

# Beyond the Short Term

**A Study of Past Productivity's Trends  
and an Evaluation of Future Ones**

**LIGEP LUISS  
INTERNATIONAL  
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ON ECONOMIC  
POLICY**

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## Acknowledgments

This is the second report to be issued by a group of international economists brought together under the auspices of LUISS. LIGEP stands for LUISS International Group on Economic Policy. Its mandate was to consider problems of economic policy in the aftermath of the Global Crisis in the World, Europe and Italy.

The discontinuity brought over by the Great Recession and the economic problems of our time are putting into question our past knowledge, the tool kit which has become common to a vast majority of scholars. It is time to review what we really know and the degree of confidence we attach to it. Even if what we knew were more robust than this unexpected event would make us to believe, it should not dispense us to assess the state of the art and to form new hypothesis, to venture new explanations. We have attempted to do that in our first report entitled *After the Crisis, the Way Ahead*.

In this second report, we take a long term view of the problem, in the light of the study of past productivity trends, in order to understand what could be the determinants of future growth, and especially of future productivity growth. Are we going back to past trend or rather are we evolving towards a “new normal”? Are there policy actions which could prepare for a better future?

The rule governing the functioning of the group is not unanimity, but vivid debates and persuasion. We want to come with strong conclusions but we also want that each of us endorses these conclusions. That is why the different contributions are not identified and the report collectively authored. For that to be achieved one of us was in charge of the last say. I thank very much all the members of the group for having given me this responsibility.

This report would not have been possible without the confidence and even the enthusiasm of both Massimo Egidi, the rector of LUISS, and Emma Macegaglia, the President of the University. From the outset they encouraged me to proceed, and gave to the group all the means it needed to achieve its aim. We are conscious of what we owe to them.

We have benefited from excellent research assistance by Fabrizio Patriarca, so excellent indeed that I decided to put him as a co-author of this report. Antra Bhat has been of great help to harmonize the English text.

Our special thanks are for the team of organizers: Laura Arrighi, Maria Silvia Ciola, and Maria Sole Micali. They have done a superb job to facilitate our work and to organize our meetings.

Last but not least, Corinne Allouch worked intensively to make up in a few days the final version of the report.

*Jean-Paul Fitoussi*



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# Introduction

The world economy is struggling since 2008 to emerge from a crisis that has no precedent since the 1930s. The Luiss International Group on Economic Policy (LIGEP) has given, in 2010, its own assessment of the crisis. We warned that besides the policies needed to contrast the cyclical downturn, a serious effort was also needed to understand, and to address, the structural weaknesses that may impede future growth. The present volume is a first attempt at this understanding, by focusing on the ways to durably improve the capacity of the economy, and in particular of the European Union economy, to grow in a sustainable way.

While there is much more in sustainable growth than just output and income, this report focuses on productivity and technical progress, one of the most evident sources of divergence in performance between the EU and the United States. In this report we step back and take a longer and broader view of productivity behaviour. If productivity drives output, what drives productivity? Why do the developed nations differ so much in their productivity performance? It is fairly easy to understand rapid productivity growth in many of the emerging economies as a process of catching up by importing capital and adopting technologies previously developed by OECD countries. It is harder to analyse the behaviour of countries, like the US, the EU-15, and Japan which have long operated close to the frontier of existing knowledge and technology.

How then can we explain that since the mid-1990s Western Europe experienced a substantially lower productivity growth than the United States? For most EU countries the fall in productivity growth beyond US levels is usually traced to lower human capital accumulation, and a wealth of reasons going from rigidity in the labour and product markets to cultural attitude and faulty regulations. The crisis is further deepening the gap: the United States are since 2010 on a path of recovery (however unsteady and fragile it may be), while the EU has been stuck in a sovereign debt and banking crisis that substantially decreases public and private investment, and hence hampers the future potential for growth.

A casual look at the data reveals nevertheless that there is nothing ineluctable behind this divergence. For the entire post-war period, up to 1995, productivity in Western Europe grew faster than in the US; therefore, the report sets as its first objective the understanding of the reasons behind the turnaround of the mid 1990s and of the strengths and weaknesses of each “model”. Most explanations start from the leading role of the United States in the Information and Communication Technology (ICT) revolution. But the report takes the stance that what is actually more important are differences in the effectiveness with which computers, the internet, and the web have been embedded in the production processes of the industries using these innovations, particularly retail and wholesale trade and other marketed services.

The report reaches two conclusions that stand somewhat apart from the current literature. The first is that the success of the US in maintaining high productivity growth derives from a complex set of interacting factors, which go well beyond simple market deregulation. In particular, we document how the role of policy has been paramount. Ironically, for a country that has been suspicious of government involvement in the private economy, it is the United States that appears to demonstrate the closest links between government policy and technological leadership. Examples may go back to the nineteenth century, when land grants to railroad companies promoted the building of infrastructures. In the modern era, research support from the National Institutes of Health and the National Science Foundation are credited with post-war American leadership in pharmaceuticals and biomedical research, as well as basic research in sciences. Defence-funded research and government-funded grants have presided over the early emergence of American leadership in semiconductors, computers, software, biotech, and the Internet itself. Government antitrust policy is credited to the emergence of a software industry largely independent of computer hardware manufacturers. Last, but not least, the report stresses the role of educational policies,

where several sources of systemic US advantage stand out, most notably the mixed system of government- and private-funded research universities, the important role of US government agencies providing research funding based on a criterion of peer review, and the strong position in a worldwide perspective of US business schools and US-owned investment banking, accounting, and management-consulting firms. On this latter point, often invoked in the debate, so often indeed that it has become a cliché, the matter is far from clear. The finance models taught in these schools bear some responsibility in the financial crisis on the one hand, and on the other, it is difficult to consider that the shadow banking system has been so successful. The productivity in the US financial system seems rather to have been strongly over valued.

Another factor which may explain the European lag in productivity is the peculiar constitution of Europe which has impeded the use of policy instruments like industrial and exchange rate policies and limited the use of traditional macroeconomic policy's instruments. That the design of European institutions has fatal flaws is becoming more and more apparent in the context of the sovereign debt crisis. The consequence of the fiscal compact on productivity growth, for example, can't be but negative as it is increasing the balance sheet recession of the private sector and reducing the capacity of the public sector to invest.

While emphasizing the role of policy in a broad sense in providing an innovation-friendly environment, the report also warns against the temptation to generalize, pointing out how the appropriate policies vary according to the sector, the country, or even the time period. For what concerns innovation and productivity growth, as most other domains in economics, one-size-does-not-fit-all. This is what makes skilful institution building and policy implementation necessary conditions for sustained growth.

The second main conclusion of the report is that it is necessary to avoid a one-sided critique of Europe and praise of the United States. There is a lot we do not know about the causes of productivity growth, and what we think we know depends on metrics on which we have faint confidence. Multifactor productivity is rather a measure of our ignorance and it is affected by a myriad of variables, so many that we have an identification problem.

Besides, a number of factors point to a future slowdown of productivity growth in both areas, including the demographic effect of an ageing population, the effects of globalization in draining away previously high-paying jobs in manufacturing and other sectors, and the effects of the post-2007 world financial crisis that is leaving consumers, banks, and governments burdened with excess debt. Europe also shares with the US the most serious threat of all, coming from the nature of innovation itself. While the process of invention and innovation is clearly not dying out, it is becoming increasingly unlikely that future innovation will have the effect of the previous Great Inventions. In other words, we do not know where and when would emerge the third industrial revolution.

Some factors, on the other hand, point to a future disadvantage of the United States: the effect of rising inequality is making the average growth rate of income in the US for the entire economy exceeds that of the "bottom 99%" by a substantial margin. There is thus an increasing gap between growth per capita and whatever measure of well-being we could design. This is a clear indication that the US growth regime is not sustainable. Another headwind holding back the US more than Europe is its poorly performing secondary education system and rampant cost inflation in higher education that is in part the cause of a steady decline in the US ranking in international league tables of college completion. Also the US is far behind Europe in implementing policies to cope with global warming, and promoting green growth, that may be, in the future, important sources of technological advances and productivity increases.

#### THE REPORT IS STRUCTURED AS FOLLOWS

The first chapter elicits the basic concepts and describes the relationship between output per capita and productivity since 1960, and then, in more detail, for the period since 1995. It inquires about the likely causes of the shifting growth rates of output and productivity in the US and in Western Europe over these different periods.

By definition there are only two ways for output per capita to rise, either through higher productivity or as a result of higher hours of work per member of the population. A striking aspect in the comparison between the two regions was a simultaneous transition after 1995. Europe's growth of productivity moved from faster than the US to slower, while at the same time Europe's growth of hours per capita moved from

slower than the US to faster. These opposing changes exactly cancelled out, so that European and US growth of output per capita was identical in the long period from 1977 to 2011, including the post-2007 period of the great financial crisis. Hence remarkably, the US productivity growth revival had absolutely no effect on the level ratio for output per capita, which remained anchored at 70 percent with no sign of any European slippage after 1995.

The second chapter builds on the literature on the sources of growth. Growth accounting is a longstanding method for decomposing output growth into its underlying sources, including changes in the quantity and quality of labour, quantity and quality of capital, and a residual usually called “multi-factor productivity”(MFP). This general introduction to the sources of growth is followed by a summary of conclusions from the more significant recent studies for both the US and the EU-15.

The chapter identifies a long list of reasons for differences in the behaviour of productivity growth in the United States and the EU-15, and to a lesser extent differences within the EU-15. Some of the reasons for slow productivity growth in Europe are not revealed at all by growth accounting or even by industry-level analysis as in the specific discussion on market services productivity gap. Instead, a substantial part of the European productivity growth problem may be hidden inside the slow rate of Multi Factor Productivity (MFP) growth that, because of its residual nature is influenced by many factors and should not be taken as telling us something about technological change. Over the past 50 years European productivity has been held back by a long list of government interventions that lower the amount that each worker can produce. Examples include shop-closing rules that prevent shops from attaining their full efficiency by forcing them to remain empty for portions of the week; labor market regulations that prevent firms from firing employees who are no longer needed; and land-use regulations that protect small shops in the central city while preventing the construction of American-style “big boxes” like Wal-Mart and Target either in the middle of cities or on the periphery.

Hence the discussion of habits, culture and institutions focuses on the productivity-inhibiting aspects of attitudes, incentives and regulations. The chapter concludes with evidence that there was a change after 1995 in Europe toward fewer regulations, faster employment growth, but slower productivity growth, as inexperienced low-skill workers entered the labour force after previously being excluded by virtue of cultural attitudes, high taxes, or regulations. There was a change after 1995 in the US too. In retrospect the productivity revival was relatively short lived – say 1996-2003 – but the US labour market has radically changed. Usually labour market flexibility is praised because it is supposed to help equilibrating the supply and demand for labour, thus keeping unemployment low. But since the stock market bubble of the early 2000s the increasing power given to management led in the US to savage cost cutting: a much more aggressive attitude in reducing employment in 2001-02 (and even more so later in 2008-09) than prior to 2000. A higher propensity to reduce labor hours in response to reductions in profits and stock prices was reflected in an unusual drop in labor hours relative to output, with the counterpart that output per hour increased more than would have been expected. This helps us to understand why the increase in the unemployment rate relative to the decline in output was about double in the US than what it was in Europe.

Chapter 3 addresses the specific issue of innovation and innovation policies. R&D trends and the sectoral structure of the economy seem to play an important role in explaining the divergence of the past 15-20 years. While the EU has an R&D intensity gap relative to the US in specific sectors, it also has a sectoral composition bias towards less R&D intensive sectors.

The highest intensity gap in absolute terms can be observed in the ICT sector and other non-transport equipment sector. The second highest relative gap emerges in commercial services where the intensity in the EU is one third of the corresponding figure for the US. Sectors with a large gap in R&D tend to have a large gap in productivity growth as well.

The literature on innovation distinguishes between the initial invention and its subsequent development and diffusion. A longstanding puzzle in the retardation of British economic growth after the 1870s is the fact that many inventions initially made by British inventors were brought to commercial success in the US, Japan, and elsewhere.

While predicting technological developments in advance is exceedingly difficult, there is ample literature which points to particular national characteristics that help to explain, at least in retrospect, why particular inventions and industries came to be dominated by particular countries

Even in the dismal days of American pessimism during the years of the 1972-95, productivity slowdown, it was widely recognized that America's private and state-supported research universities were its most successful export industry, at least as measured by its lead over other countries and its appeal for students from the rest of the world. The interplay among these research universities, government research grants, and private industry was instrumental in achieving American leadership in the ICT industry, and it was no coincidence that Silicon Valley happened to be located next to Stanford University or that another concentration of ICT companies in the hardware, software, and biotech industries was located in the Boston area near M.I.T. and Harvard. The most important aspect of public policy appears to have been the relatively unfocused support of research and training by the US government

The literature on technological leadership omits a source of American advantage that is surely not insignificant. While language has little to do with domination in computer hardware (where indeed many of the components are imported), it is important for the American software industry that English long ago became the world's leading second language in addition to being spoken as a first language by a critical mass of the world's educated population. Another oft-neglected factor that should be discussed more often is the longstanding openness of the United States to immigration and the role of immigrants from India, East Asia, and elsewhere in providing the skilled labor that has been essential to the rise of Silicon Valley.

Chapter 4 investigates the role of the public sector in fostering productivity growth. That sector mainly affects growth and productivity through three channels. The first, and most straightforward, is public investment, and the building of infrastructure that enhance the productivity of the private sector. The chapter emphasizes how less than perfect substitutability of production factors, externalities and sunk costs, constitute reasons for direct involvement of the government in the accumulation of capital in the economy. In terms of physical capital the comparative advantage goes to European countries that in general have more modern and efficient infrastructures than the US. Externalities and market failures lead to a discrepancy between private and social returns. Every time that the social and private return of the provision of a given good diverges, there is under or over provision of that good. A number of investment projects (notably in infrastructures) have a large social return, while being not (or partially) profitable for individual private entrepreneurs. In that case market provision is insufficient, and there is room for public intervention.

Another aspect, also related to externalities and market failures, is transnational investment. This is particularly important in deeply integrated economies, like the European Union, where area-wide infrastructure development may become a bottleneck. In the European Commission's intention, for example, the trans-European transport network (TEN-T) should become one of the cornerstones of the Europe 2020 Strategy.

A second factor which may distort the comparison of productivity growth at the disadvantage of Europe is the way government production is measured. It is usually measured according to costs, i.e. on the assumption that productivity is stable. As, in general, government production is higher in Europe than in the US, this convention may lead to underestimate productivity growth in the former region. It also surely leads to underestimate the GDP of countries which have a "big government". Privatization, say of the pension system, would result in higher profits for Europe's financial services industry and lower benefits for Europe's retirees. The higher profits would likely be reflected in an increase in GDP.

A recent report by the OECD (2008b) argues that in the next three decades the investment in infrastructures will need to grow considerably to keep the pace of economic growth. This is all the more true that most of the world growth will come from emerging countries where the stock of public capital is considerably lower, and hence its productivity higher. OECD (2008b) provides rough estimates of the investment need that, even with a very restrictive definition of physical infrastructures, range between 2.5% and 3.5% of GDP

The policy prescriptions of the report are then rather straightforward for what concerns the financing of infrastructure building (or maintenance). Public-Private-Partnership, increased user charges, increased involvement of other financing sources like pension funds. And the criticisms are also straightforward,

as the difficulty with infrastructures is their feature of public goods, that makes private and social returns diverge; it is unclear why would PPP emerge for non-rentable public works, unless substantial subsidies were given to firms, thus renewing the problem of costs for the budget constrained public actors

It seems then unavoidable that an increase of the public capital stock passes by an increase in public spending, reversing the trend observed in the past two decades especially in advanced economies. But how can this be made compatible with the, also unavoidable, public budget constraints? Two ways deserve to be explored, increased taxation and/or allowance for a golden rule of public finance which would permit investment to be financed out of public borrowing.

Where instead the US has an indisputable lead is the second channel identified by the report, human capital accumulation. In the provision of education and research the role of policy and of institutions appears to be crucial, as witnessed by the different paths of the US and of Europe recalled before. Education and technical training are well-known examples of public goods whose social return justifies public intervention even in presence of negative economic returns. The report further notices how the notion of human capital accumulation somehow blurs the traditional national accounting distinction between current and capital expenditure by the government. Why should the wages of teachers and professors be considered as being different from investment in bridges and railroads, when it comes to assessing the future capacity of the economy to produce income and well-being?

Last but not least, the role of the public sector in enhancing productivity growth is apparent in the institutions that foster (or hamper) innovation. A typical example is the US tradition of government securities regulation that forced public disclosure of information and of access of equity research analysts to internal company information, fostering a large and active market for public offerings, and this together with the relatively recent emergence of the venture capital industry provided ample finance for start-up companies. Another example is the (in) efficiency of the judiciary system that in some countries imposes upon firms high costs of doing business and, even more importantly, creates an environment of uncertainty that reduces the incentives to risk taking and innovation.

Chapter 5 deals with Italy, pointing out what are the sources of its difficulties in the past two decades, and noticing that often these sources date further back in time. Italian overall performance is weaker than the EU average. Until the mid-1990s the increasing productivity growth in Italy was sustained by a decline of labour utilization and an increase of capital intensity due to high wages. The labour market reforms of the late 1990s and early 2000s raised employment, but this led to stagnation in productivity growth, as less skilled workers entered the labour market.

Italy constitutes an interesting case study, because most of its features fit in the framework laid in chapters 1 and 2. Since the 90s a number of institutional features explain the low levels of investment per worker, R&D expenditure, and productivity. The chronic instability of public finances led to increased uncertainty for firms, and to recurrent corrective measures that curtailed public investment. Wrong incentives were also given by subsidies and wage support schemes that resulted in excessive risk taking by private and public enterprises. Furthermore, taxes on incomes and profits have constantly risen to reach nowadays European peak levels, in exchange for services of dismal quality.

Italy's policy, in effect, aimed at maintaining real incomes, employment and production exactly where they were by increasing public expenditure which placed a tremendous burden on the public sector and publicly owned companies, impeding flexible adjustment. The public finance problem was worsened by the introduction of generous pension and health benefits, enacted in the late 1970s and early 1980s in order to mitigate social conflict. These benefits were partly financed through higher sales and labour taxation which contributed even more to increasing the already excessive labour costs and accelerated labour shedding.

A main inhibiting factor in Italian policy was the perpetuation of a "three legs subsidy system" made up of incentives, extraordinary wage support schemes (*cassa integrazione straordinaria* and *mobilità*) and extraordinary administration proceedings (*amministrazione straordinaria*) provided to public and private companies. Within this framework, protection of domestic companies has also been ensured by means of closed public procurement (around 14% on annual GDP) and a contracting system for engineering and infrastructure works that has systematically favoured local companies often violating European rules, delayed new technology adoption, and fuelled rampant corruption by politicians and administrators.

They contributed to maintain industry specialization in less technological sectors – despite the presence of some highly competitive industries – with prevalence of labour intensive industries, low innovation and relatively low knowledge intensity

In this context, the adverse effect of high taxation on private investment decisions is likely to have been compounded by the acute uncertainty generated by changes in tax rates and tax rules.

The reports provides industry level evidence showing that both in trade and in business services, hotels and restaurants, personal and public services productivity is on average lower than in the European counterparts.

The lagging productivity growth in Italy can be explained primarily by scale of operations (the predominance of small and medium enterprises), land and product market regulation, labour barriers including tax wedges and wage regulations and infrastructure gap.

The reports points at institutions also to explain the dismal performance of the labour market. Women's participation rate is kept low by insufficient provision of welfare services such as child care and family benefits, while distorted incentives in the pension system and insufficient investment in active labour market policies keep young and senior citizens away from the labour market.

Contrary to common wisdom, the Italian labour market is not particularly rigid on average. Nevertheless, it is strongly dualistic, with a majority of highly protected workers that carry high gross labour costs (both directly in terms of high fiscal and contributive wedge and indirectly in terms of social rights and firing costs). At the other extreme we find temporary workers with lower firing costs, fiscal wedge and social security charges. This dualistic structure distorts the incentives of firms, which tend to hire non-protected workers because of the economic and regulatory benefits of temporary contracts. This in turn reduces incentives for human capital investments, and temporary employment creation tends to be in low-skill areas.

The chapter concludes by considering human capital and the educational system, also responsible for low productivity growth. The Italian labour market seems to be unable to absorb tertiary degree holders in similar proportions to other EU countries while its university system is in turn characterized by low tertiary attainment. The report also points out that the Italian system is unable to attract foreign students as well as foreign faculty/researchers, and that wage premia of graduates in Italy are lower than in Europe, although there are significant gender differences. The important skill mismatch contributes to the low productivity of the system as a whole.

In spite of this, Italian research remains of good quality, even if the channels of transmission to the firm sector are inefficient, leading to poor diffusion of innovation. Cooperation between universities and business is discouraged by several factors such as high costs, risk-aversion, a weak innovation culture and lack of institutional capacity to support inventions.

Italy performs especially poorly in “human resources” (which measures the availability of a high-skilled and educated workforce) and in “firms investments”: private R&D expenditure only reaches 0.67% of GDP against the EU average of 1.23% and public expenditure for R&D in Italy stands at 0.54% of GDP against 0.76% in EU27.

Last, but not least, industrial policy is also incapable to foster productivity growth. In particular, and especially in a period of recession and fiscal consolidation such as the present, facilitating access to credit should be part of industrial policy. In Italy the productive system is dominated by SMEs and non-banking means are relatively scarce since equity financing continues to play a modest role in the Italian context compared to other EU countries. Therefore, direct support to firms and, more importantly, constant attention to a proper functioning of the credit system, become paramount. The scarce public resources should also be allocated to the sectors in which the potential for productivity growth is larger (business services, ICT, etc.), and in which Italy can more easily fill the gap with other European countries.

The crisis appears to have acted as a catalyst for structural reforms. The OECD Going for Growth 2012 analysis points out that, compared to the pre-crisis period, the Italian responsiveness to the recommendations addressed to OECD countries has greatly increased. A lot has been done especially since 2011. It is likely that these reforms, notably the reduction of regulatory barriers to competition, strengthening incentives for innovation and labour market reforms, will address the delay of productivity performance in Italy, both in the whole economy and in the services sector.

Finally, an appendix is devoted to the study of some exit strategies in the labour market.

## POLICY RECOMMENDATIONS

The focus of the report is on productivity and potential growth, and as such it is more concerned with the long than with the short run. In short we are trying to figure out what are the policy measures which may lead to an increase in potential productivity growth. It is worth emphasizing that an increase of a few tenths of points would have considerable effects on growth per capita in the medium and long runs. Unfortunately there is no magic recipe to reach such a goal, at least for what concern advanced economies. But doubts do not imply paralysis. Whatever the limitation of our knowledge, it is not empty.

The challenge is therefore to design and implement policies aimed at improving the long run potential growth rate of the economy, in a context of depressed short/medium growth.

Although the US economy is far from being a model (as the report points out at length), its productivity growth in the past decades has been globally superior to the EU average. The report emphasizes, with no pretence of being original, a mix of institutions, of human capital accumulation, and of industrial policies that explain this superior performance.

The comparison between EU countries and the US, nevertheless, allowed us to highlight at least three features that are less commonly discussed in the literature.

The first feature is linked to the dynamics of hours worked. Chapter one runs counter most of the literature trying to explain the crossing of trend productivity growth in the US and in the EU, in the mid 1990s. Instead of (or in addition to) the different diffusion of the internet revolution, whose importance is probably overstated, the report highlights a social transition that happened later in Europe (especially in Mediterranean countries) than in the United States.

Prior to the mid 1990s the European social model was characterized by low employment and participation rates (in particular among women), and a reduction of working hours that accompanied the increase of productivity. Reforms in the 1990s changed this model, trying to adapt to changing environmental conditions, and to associate increased productivity with increased employment. A number of changes have been implemented: the reform of pension systems (notably with higher retirement age), induced by longer life expectancy; policies supporting female and youth employment, through incentives to part-time work and the creation of flexible contracts; the effect of immigration flows on labor supply; All these factors have changed the position of labor supply and demand curves. The objective of full employment, that inspired national reforms but also EU policies had a negative effect on productivity dynamics. The entry on the labor market of less qualified workers, and more intensive use of capital goods, have negatively affected wages and competitiveness of the European productive system. But it had a fairly positive impact on well-being as employment is one of the main objective factors determining it.

This perspective opens the way to a number of prescriptions for policy makers:

- (1) Investment is of course a key factor. Reducing capital intensity would have a negative impact on productivity; therefore the challenge is to increase employment at constant capital intensity. Capital accumulation must accompany employment growth. The previous LIGEP report highlighted how investment in Europe has been insufficient in the current crisis. The present report suggests that this is likely to cause even more serious problems in the future capacity of the economy to grow. The report further emphasizes that the tight constraints that member States face with regards to their public finances calls for a serious European infrastructure building effort, much larger in size and in scope than the one the recent European summits have agreed upon.
- (2) As for private investment, the report suggests that both public and private credit flows need to be improved, especially in countries that rely on credit more than on capital markets, like Italy. The credit crunch is widely discussed as one of the major factors that prevent the recovery of the European economy. The report argues that it is also an obstacle to productivity growth in the long run. A better access to finance is thus a crucial instrument for allowing European firms, especially small and medium sized enterprises to invest. But this supposes to resolve the rampant European banking crisis which characterises the Euro area today.
- (3) Several European countries have devised measures to reduce labour costs and to avoid disinvestment in firm specific human capital by encouraging and subsidizing part time employment. These policies have given to Europe a decisive advantage vis à vis the US in smoothing the evolution of unemploy-

ment. They should be pursued and generalized to southern countries where the rate of unemployment has reached unacceptable levels. To the extent that these policies are alike internal devaluation, they should be coordinated at the European level.

- (4) What the recent period taught us is that the outcome of employment policies depends also of the balance of power between firms and workers. If more flexibility is desirable to adapt to changing circumstances, it should not come at the expense of economic security. The European policy makers should devise labour market reforms keeping an eye on the bargaining power of the workers.
- (5) The changing European social model also calls for a broader rethinking of the labor-life cycle. So far the only response our economies have been capable to give to higher life expectancy has been increasing the number of years spent at work. It may be worth to consider incentives to schooling and late entry in the labor market as complementary policies. Indeed, the more educated the labor force, the fewer of them will be doing arduous low-skilled work. Professionals like to work longer because their work is rewarding and fulfilling. So the larger the percentage of the population is educated, the higher retirement ages can be.

The second feature of the report that emerges as peculiar is linked to MFP growth. The break-up by sector shows that Market Services account for a large part of the transatlantic gap in productivity, and more importantly were the main factor behind the crossing of productivity trend lines in the 1990s. The report highlights that this is explained by poor MFP dynamics rather than intensity or productivity of single factors. However, once Europe is disaggregated by country groups, the dismal performance of this sector results to be a prominent feature of Southern Countries while Northern Countries have achieved remarkable improvements, in particular where important reforms have been realized.

Among market services, the retail industry is the most important example: low productivity in that sector is on one side due to different urban development and transportation models (that favour small scale businesses rather than large shopping malls as in the US); on the other, it is due to oligopolistic practices, excess of red tape and regulation, corporatism, and scarce incentives to innovation (e.g. e-commerce). These limits, flagrant in the retail sector, are in fact common to most of the services sector. This calls for a series of policy prescriptions:

- (6) The first and most obvious is of course to streamline regulation and to enhance competition through contrast to oligopolistic practices, reduction of red tape, and most importantly fighting corporatist practices.
- (7) The second is to adapt the infrastructure system to enhance the logistics, and thus the productivity, of the diffuse retail trade network of EU countries. It has to be emphasized that “Infrastructure” is a term with a broad definition – it encompasses everything in the external environment that makes a person or a business firm more productive.
- (8) The third is to transform the ‘weakness’ of the small scale retail network in ‘strength’, through the development of quality and value added and incentives to craftsmanship, while at the same time transferring as much as possible to large distribution the commerce of low added value goods.

These prescriptions, specific to retail trade, can be generalized to other service sectors, like for example tourism, where the insufficiencies of Infrastructures and of better organization (for example of the transport network) at the European scale is flagrant. This of course relates to prescription 1 above, giving hints as of how a European infrastructure network should be built.

A word of caution is in order. We have identified four sectors -- wholesale trade, retail trade, financial services, and business services – where European productivity lags behind its US counterpart. This lag is mostly explained by the differing trends in MFP, a variable which is in some ways a measure of our ignorance. It is likely that our ignorance is deeper than what we think. In effect, much of the increase in GDP today occurs not as a result of, say, an increase in the *number* of cars purchased, but of their quality and our metrics is poor for measuring quality<sup>1</sup>. For material productions we may use some conventions which allow us to account for quality improvement, as we do when we use hedonic prices for computers. But

1 Cf. Jean-Paul Fitoussi, Amartya Sen and Joseph Stiglitz: *Mismeasuring our Life*, the New Press, 2010.

the difficulty is compounded when we deal with services. Whereas for manufactures it is easy to define the unit purchased, this is much harder for many services<sup>2</sup>. This difficulty has long been recognized and it implies that for the service sector, especially for complex services, the quality question will be much harder to resolve. And precisely, we have identified the sectors where European productivity is lagging as wholesale trade, retail trade, financial services, and business services. A modicum of historical sensitivity would tell us that we were wrong in our measurement of output and productivity for the financial sector in the US. Business services are complex services, and we have to go deep into the details of the comparison before coming with a robust conclusion. Even in the retail sector, it is not so easy to define the unit purchased. Our conclusions are thus to be taken with caution, hoping that in the future better metrics will allow us to be more precise.

The third theme that emerges from the report also pertains to MFP and technical progress. The report emphasizes the two pillars that sustain the US leadership in innovation and growth: on one side an efficient system of private financing of invention and innovation (mostly through private equities and venture capital) and on the other an important role for government policies. Europe has largely been on the opposite path, with absent (or harmful) government policies, and inefficient financing.

- (9) The first policy prescription is therefore to enhance or more often develop the capacity of the system to finance innovation whose returns are uncertain and/or distant in time; in more extreme cases, incentives should be designed to induce firms to face short term losses in return from investment that is rentable only in the long run. Environmental technologies are a typical example. It is doubtful that such an objective could be reached without an explicit industrial policy.
- (10) Tertiary education is instrumental to raise productivity. Because of globalization, Europe's industry specialization is changing: employment is shifting from primary and basic manufacturing sectors to knowledge-intensive activities which require high-skilled workforce. As a result, investment in tertiary education becomes essential as it contributes to increase a country's ability to innovate. The European system is lagging behind the US one, because the search for formal equality comes often at the expenses of quality. In devising reforms of the university system, Europe should aim at substantial equality that is meritocracy. Some features of the US system may be imitated and some others have to be rejected. In particular, meritocracy should not be limited among the higher income deciles of the population (whose weight is increasing among the students of the top universities). At the contrary, student from poor families have to be helped on order to concour on equal footing with the others.
- (11) The report also emphasizes the need of a bidirectional exchange between the education system and the productive sector (private and public alike), that in Europe is limited by regulation and by corporatism.

2 Cf. *The Atkinson Review: Final Report*, Palgrave-MacMillan, 2005



# Chapter 1

## Productivity: Basic Concepts, Historical Context, and Current Puzzles

### I. I

#### INTRODUCTION

While both the US and Europe suffered acutely from the 2007-09 world financial crisis and began their recoveries at roughly the same time in mid-2009, their path of recovery has diverged in 2011 and 2012. Fiscal austerity measures imposed in several European countries have tilted them back into recession, while the US has delayed its fiscal reckoning and, partly as a result of continuing fiscal stimulus and very easy monetary policy, has experienced a slow but steady recovery. To the extent that this divergence, between a recovery in the US and renewed recession in parts of Europe, extends beyond 2012 for several more years, it will widen the longstanding gap between per capita output in the US and in Europe. Notice that this divergence has nothing to do with the fundamentals determinants of potential growth but much to do with the way Europe is dealing with the sovereign debt crisis, imposing almost everywhere restrictive fiscal policies and structural reforms in the hope that present recession will boost future growth.

The fundamental driver of output growth (when growth is allowed for) is the growth of labour productivity<sup>1</sup>. For the entire post-war period up to 1995, productivity in Western Europe, hereafter the “EU-15” (the pre-2004 members of the EU) grew faster than in the US. In what Europeans sometimes call the golden years between 1945 and 1973, rapid European productivity growth mainly reflected catching up to American technology that the US was able to adopt between 1914 and 1945, while Europe was suffering from wartime destruction and interwar economic chaos. Between 1973 and 1995, Europe continued to catch up in its level of productivity until 1995 where it reached 92 to 95 per cent of the US level. In this period the main driving force was not particularly rapid European growth but rather the widely discussed and somewhat puzzling US productivity growth slowdown. In the 80s, productivity growth in the US was on average 0, 80 per cent. But it is worth remembering that at that time, Europe was admiring US performances because of its higher “employment content” of growth.

After 1995 Europe’s productivity growth fell behind that of the US in two stages, first during the relatively prosperous years 1995 -2007<sup>2</sup> and in a second phase during the post-2007 years of the financial crisis. The current divergence of paths, with renewed recession in parts of Western Europe and continued recovery in the US, threatens to further worsen Europe’s relative productivity performance.

In this report we step back and take a longer and broader view of productivity behaviour. If productivity drives output, what drives productivity? Why do the developed nations differ so much in their productivity performance? It is fairly easy to understand rapid productivity growth in many of the emerging economies as a process of catching up by importing capital and adopting technologies previously develo-

1 In times of depression, as the 30s teach us, productivity stagnates as a consequence of the deficiency in global demand. The actual evolution of productivity thus depends also of demand factors. The relationship to which we refer assumes that no distorting factors are coming from the demand side. Cf. Jean-Paul Fitoussi, Anthony B. Atkinson, Olivier J. Blanchard, John S. Flemming, Edmond Malinvaud, Edmund S. Phelps and Robert M. Solow: *Pour l’emploi et la cohésion sociale*, Presses de la Fondation Nationale des Sciences Politiques, 1994.

2 Europe’s strategy was in effect to decrease the cost of labour through payroll tax reductions and wage moderation in order to allow the hiring of less skilled workers.

ped by OECD countries. It is harder to analyse the behaviour of countries, like the US, the EU-15, and Japan which have long operated close to the frontier of existing knowledge and technology. This report examines productivity growth in the so-called “rich nations,” both differences among groups of countries and also changes in behaviour over time. Most of the emphasis is on contrasts between the US and the EU-15, with occasional references to the Japanese experience.

This section of the report begins by clarifying the relationship between output per capita and productivity, which are almost the same concept, but not quite. We recognize that the measures of the economy’s total real output used to define both the standard of living and productivity are imperfect, and that there are many aspects of the standard of living that are neglected in the output statistics. Differences in the time paths of the basic concepts are examined for the post-war period going back to 1960, and then in more detail for the shorter period since 1995. The chapter summarizes the consensus in the literature as to what caused the shifting growth rates of output and productivity over these different eras.

The outstanding puzzle in recent years, at least for 1995-2007 prior to the financial crisis, is why Europe’s productivity growth slowed down while that of the US speeded up. This chapter summarizes some of the broader causes in the recent literature. Among the possible causes of the transatlantic disparity is the leading role of the US in the internet revolution, partly in the innovation of hardware and more importantly software. More important are differences in the effectiveness with which computers, the internet, and the web have been implemented in the industries using these innovations, particularly retail and wholesale trade and other marketed services. Some of the causes include differences in regulations between the US and the EU-15 and within the EU-15 itself, involving such issues as land-use planning, product-market regulations, and labour-market regulations. The report avoids a one-sided critique of Europe and praise of the United States.

The final section identifies six “headwinds” that may slow future economic growth and that have impacts differing in the US and EU-15. The effect of rising inequality distorts the data, making the average growth rate of income in the US for the entire economy exceed that of the “bottom 99%” by a substantial margin. Another headwind holding back the US more than Europe is its poorly performing secondary education system and rampant cost inflation in higher education that is in part the cause of a steady decline in the US ranking in international league tables of college completion. Also the US is far behind Europe in implementing policies to cope with global warming, and any movement in the US toward a carbon tax will hinder future growth. Europe shares in common with the US other headwinds, including the demographic effect of an ageing population that will reduce future growth in hours of work per capita, the effects of globalization in draining away previously high-paying jobs in manufacturing and other sectors, and the effects of the post-2007 world financial crisis in the form of consumers, banks, and governments burdened with excess debt.

The most serious threat of all, however, comes from the nature of innovation. Steady future GSP growth at the past rate of 1.5 or 2 per cent per year is not guaranteed.<sup>3</sup> That rate of growth in the past 140 years has been achieved by a cluster of innovations, mainly in the late 19th century, which brought the world electricity, the internal combustion engine, running water, and indoor plumbing, and all of the supplementary innovations that were made possible after that – household appliances, manufacturing machinery, motor vehicles, airplanes, superhighways, supermarkets, suburbs, and air conditioning. While many of these inventions took a century or more to be fully developed, they can be characterized as “one-time-only” inventions, i.e., changes that would not be repeated endlessly into the future. Speed accelerated from that of a horse to that of a Boeing 707 in 1958, but has not increased further since then. Central heating and air conditioning have made it possible to maintain room temperatures evenly (at 70 degrees F or 21 °C) in summer and winter, but we can’t make the climate any more comfortable than that. There was virtually no economic growth between the Roman Empire and Britain in 1750, and then the world got used to a steady burst of innovations since then. But, while innovation is clearly not dying out, it is becoming increasingly unlikely that future innovation will have the effect of the previous Great Inventions in brightening the evening, speeding transport, eliminating household drudgery, and bringing comfortable indoor temperatures.

3 The growth rate of output per capita in the US between 1929 and 2007 was 2.2 percent per year.

## 1.2

DEFINITIONS: OUTPUT PER CAPITA  
AND PRODUCTIVITY ARE ALMOST THE SAME THING, BUT NOT QUITE

The concept of labour productivity, often called simply “productivity,” is almost the same as output per capita, but not quite. The latter, by definition, divides output by the population, whereas productivity divides the same measure of output by the total number of hours worked in a year by all the employees. Thus if each employee works 40 hours per week for 50 weeks per year, then he or she contributes 2,000 hours per year. If there are 10 million such employees in a country, total hours are equal to 20 billion. If real GDP is \$1,000 billion, then productivity is \$50 per hour.

By definition there are only two ways for output per capita to rise, either through higher productivity or as a result of higher hours of work per member of the population. Throughout history people have shown their preference to work fewer rather than more hours, and so to make possible a reduction in hours for more vacations and days off, on average productivity rises somewhat more rapidly than output. This was particularly true in Western Europe between 1960 and 1995, when hours per person declined substantially, holding back growth in GDP relative to the growth in productivity.<sup>4</sup> This relationship also extends to comparisons across countries. When the EU-15 are compared as a unit with the United States, they enjoyed faster productivity growth than the US between 1970 and 1995, and in fact their productivity almost caught up to the US level over that interval, but their output per person languished at about 70 percent of the US level. This difference was due by definition to a decline in EU-15 hours per person by about 30 percent relative to the United States.

After 1995 the relationship changed. Hours in Europe rose relative to the US but productivity growth slipped back<sup>5</sup>, primarily because Europe did not share in the post-1995 US productivity growth revival that is usually interpreted as a benefit of the internet and the invention of the world-wide web in the late 1990s. Why Europe reaped fewer benefits from web-related innovation is one of the main productivity puzzles that we explore here, building on a rich literature to which both Europeans and Americans have made important contributions.

The behaviour of hours per person can move in either direction, and thus we have witnessed eras in which productivity grew more rapidly than output per capita for decades and when the reverse was true. A leading example of fast growth in output per capita and slow growth in productivity occurred in the US between 1965 and 1990, which was the interval when the role of women was revolutionized. Social attitudes changed from the assumption that women would stay home with their children to the new culture that women would work and have full-life careers, with only relatively short intervals of labour-force exit to bear children and take care of them while young. Output per capita could rise faster than productivity, simply because hours of work per capita increased as women entered market work.

The entry of females into the labour force proceeded more slowly in the EU-15 and in 1985 the participation rate of Spanish women was only half that of Swedish women. As a result, the increased participation of women that dominated the behaviour of hours per person in the US was instead dominated in Europe during 1970-95 by a move to a shorter work week, earlier retirement, longer vacations, and a higher unemployment rate. After 1995, as we shall see, this contrast was reversed, and the EU-15 experienced an almost exactly offsetting increase in their growth of hours and employment relative to the US combined with a decrease in their relative growth in productivity. Subsequently we will discuss the extent to which there was after 1995 in Europe a trade-off between faster employment growth and lower productivity growth. If so, then Europe’s productivity problems after 1995 did not just involve a slow adaptation of the benefits of computers and the internet, but rather the outcome of a social transition that had occurred earlier in the US than in Europe, particularly in the Mediterranean countries.

4 An hour not worked because of longer vacations, a shorter work week, higher unemployment, and lower labor-force participation does not automatically create an equally valuable hour of leisure. Hours of work generate large amounts of tax revenue that hours of leisure do not, and some hours (particularly those of the unemployed) are less valuable than the after-tax value of work. See Gordon (2011a).

5 Of course, part of the divergence in productivity trends may be explained by this relative change in hours worked.

## I.3

## ALTERNATING INTERVALS OF ADVANTAGE AND DISADVANTAGE: THE CONTRASTING HISTORY OF GROWTH IN THE US AND THE EU-15 SINCE 1960

The differing history of growth in per capita output versus productivity in the EU-15 and the US can be clarified if we look at a series of graphs, all of which plot the data from 1960 to 2011. Figure 1.1 exhibits growth in productivity in the EU-15 and in the US, showing much faster growth in the EU-15 in the 1960s, a growth slowdown for both the EU-15 and the US between 1960 and 1980. After 1980 EU-15 growth continued to outpace that of the US, which experienced a low growth plateau from the late 1970s to 1995, but the margin between rapid EU-15 growth and slower US growth continued to narrow. The margin by which EU-15 growth exceeded that of the US fell from three percentage points in the late 1960s, to two percentage points in the late 1970s, to less than one percentage point between 1985 and 1995.<sup>6</sup> After 1995 the relationship flipped around; Europe's productivity growth continued to decelerate while that in the US rejuvenated between 1995 and 2002. However, this US revival did not last, and by 2007-11 the growth path had returned to roughly the same relatively low pace as during 1986-96. US productivity growth was notably better than in the EU-15 not just during the pre-crisis years of 1997-2007, but also during the post-2007 years of the financial crisis, recession, and recovery.

Figure 1.1 – Annual growth in H-P trend of output per hour in the EU-15 and the United States, 1961-2011

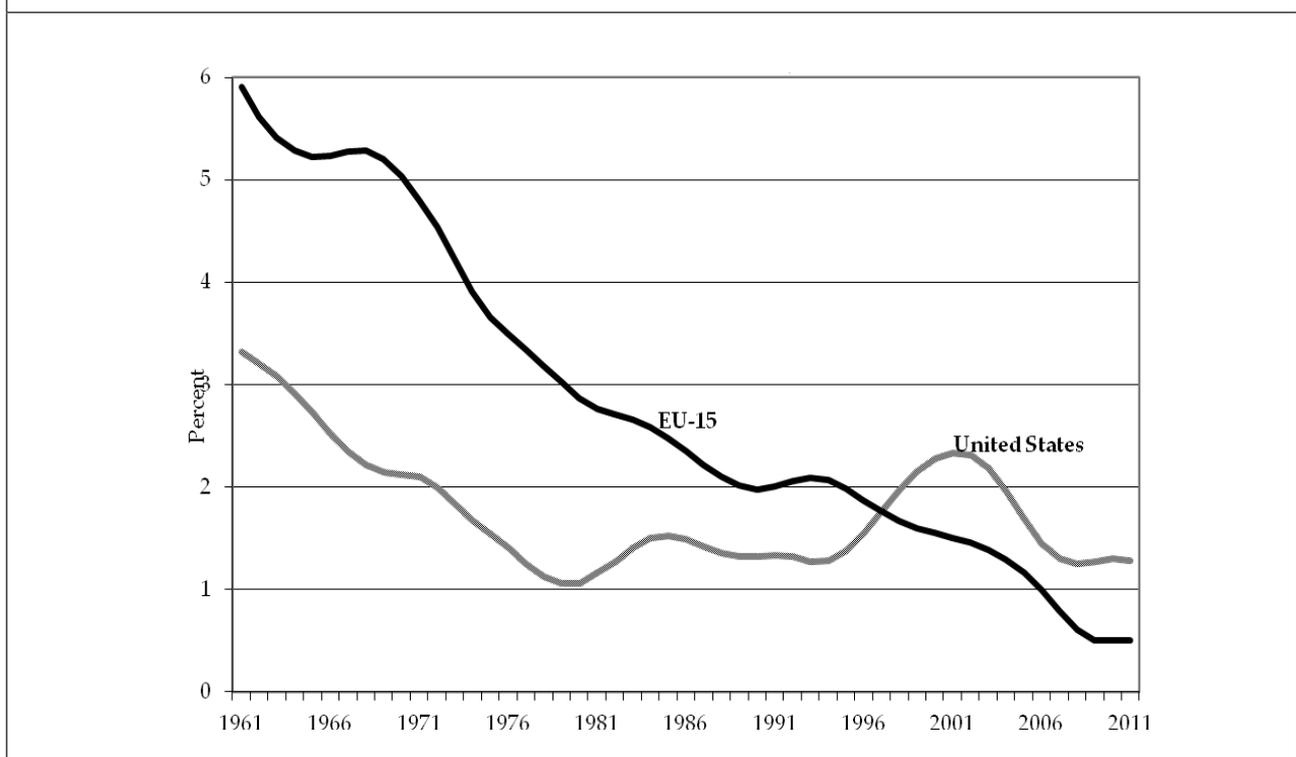
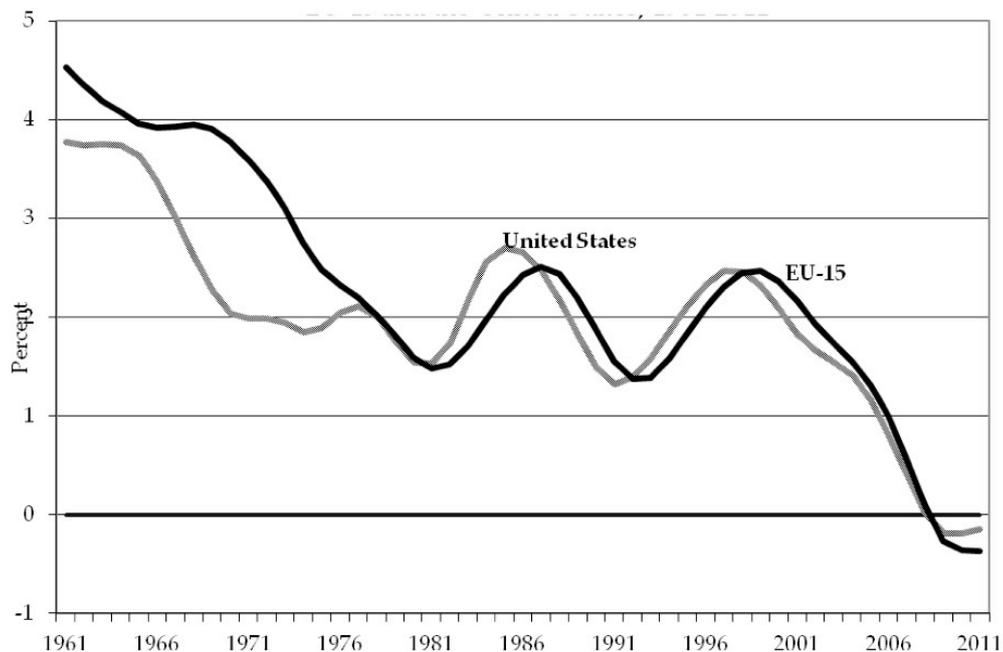


Figure 1.2 shows for the same period the smoothed growth rates of output per capita in the EU-15 as contrasted with the US; the volatile year-to-year changes in growth rates are smoothed by the same technique as in Figure 1.1. This graphical depiction of output growth is surprisingly different than the previous graph displaying productivity growth. Growth of output per capita in the EU-15 slowed down to the American rate by 1977 and did not exceed it thereafter. In fact the EU-15 slowdown from 4 to 2 percent growth during 1971 to 1977 echoes the same slowdown in the US that happened a few years earlier between 1964 and 1970. After 1977 Figure 1.2 evokes the song “Me and My Shadow,” because EU-15 growth of smoothed output per capita almost exactly mimics the US growth rate of one or two

<sup>6</sup> Growth in both productivity and output per-capita are quite volatile from year-to-year. The data graphed in Figures 1.1 and 1.2 are trends extracted from the annual data using the Hodrick-Prescott method with a smoothness parameter of 100.

years earlier. There were short-lived revivals in 1983-89 and 1994-2000 on both sides of the Atlantic, followed by a relentless slide down to negative growth of output per capita after 2008. Because growth in EU-15 and US output per capita was so similar between 1977 and 2011, the level of EU-15 output per capita failed to make any progress in catching up to the US level.

Figure 1.2 – Annual Growth in H-P Trend of Output per Capita in the EU-15 and the US, 1961-2011



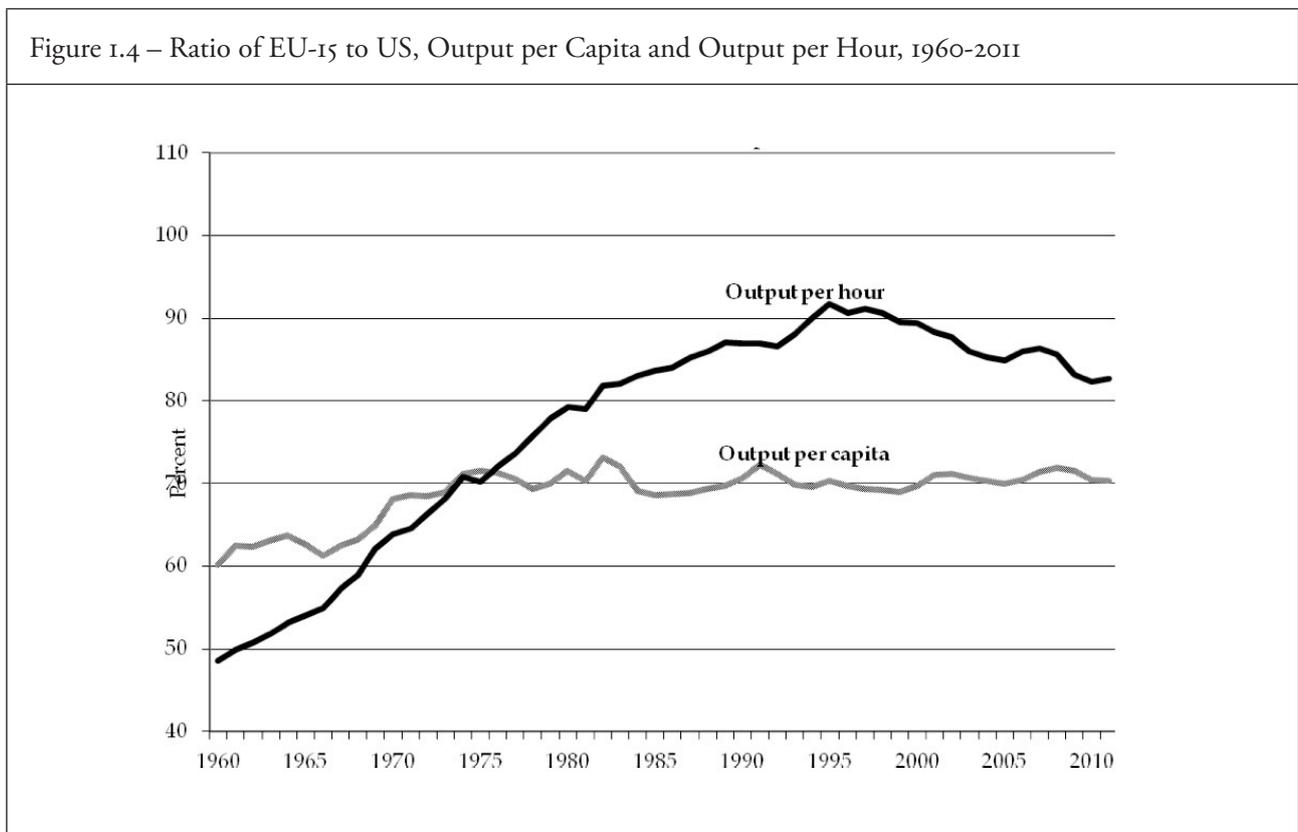
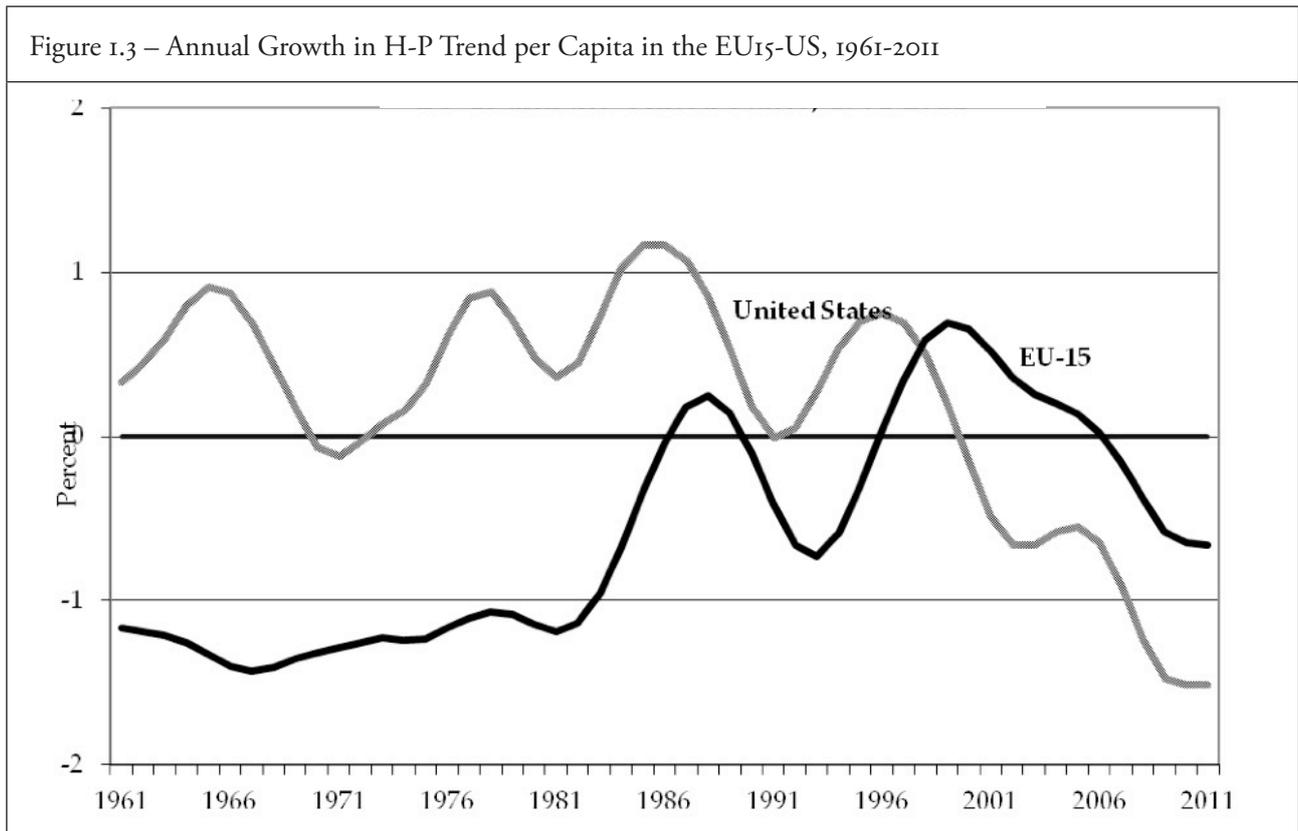
By definition, output per capita equals productivity times hours per capita. That same definition means that, since output per capita growth in Figure 1.2 was virtually identical after 1977, differences between the EU-15 and the US in productivity growth shown in Figure 1.1 must have been offset by the opposite pattern of growth rates of hours per capita. Thus it is no surprise that the EU-15 productivity growth advantage of 1977-95 of Figure 1.1 is offset by a shortfall of growth in hours per capita over the same period in Figure 1.3. In fact EU-15 smoothed hours per capita had a negative growth rate of more than minus one percent for more than two decades between 1961 and 1982.

For the decade after 1995 the two lines in Figure 1.3 form the shape of an “X” in which the US growth rate collapses while the EU-15 growth rate soars upward, at least temporarily. Throughout 2000-2011, the smoothed growth rate of US hours per capita is negative. This explains at least in the arithmetic sense why the US was able to achieve a much better productivity performance in the past 15 years without gaining any further advantage in the margin by which its output per capita exceeds that in Europe.

Thus the growth rates examined so far are for smoothed changes in productivity, output per capita, and hours per capita. We can also look at the ratio of the actual level of these variables in the EU-15 relative to their values in the US<sup>7</sup> As shown in Figure 1.4 by 1995 European productivity had reached 91.7 percent of that of the United States and then by 2011 slipped back to 83.0 percent. Three European countries exceeded the US level for a few years during the 1990s: France was at 103.6 percent in 1995,

7 Working-age population and hours can be compared directly across countries. However, output in one country can be compared to another only by adopting a uniform set of prices for each good or service. The available data provide two alternative international price weighting schemes; these are the “G-K” (Geary-Khamis) weights calculated in 1990 dollars and the “E-K-S” (Eltető, Köves, and Szulc) weights calculated in 2008 dollars. All data on productivity, output per capita, and hours per capita come from the Groningen economy wide database, now housed at the Conference Board. See <http://www.conference-board.org/economicdatabase/>.

while Belgium achieved a ratio of 108.1 percent and the Netherlands a ratio of 105.0 percent. All three of these nations had fallen back under 100 percent of the US level by 2011.

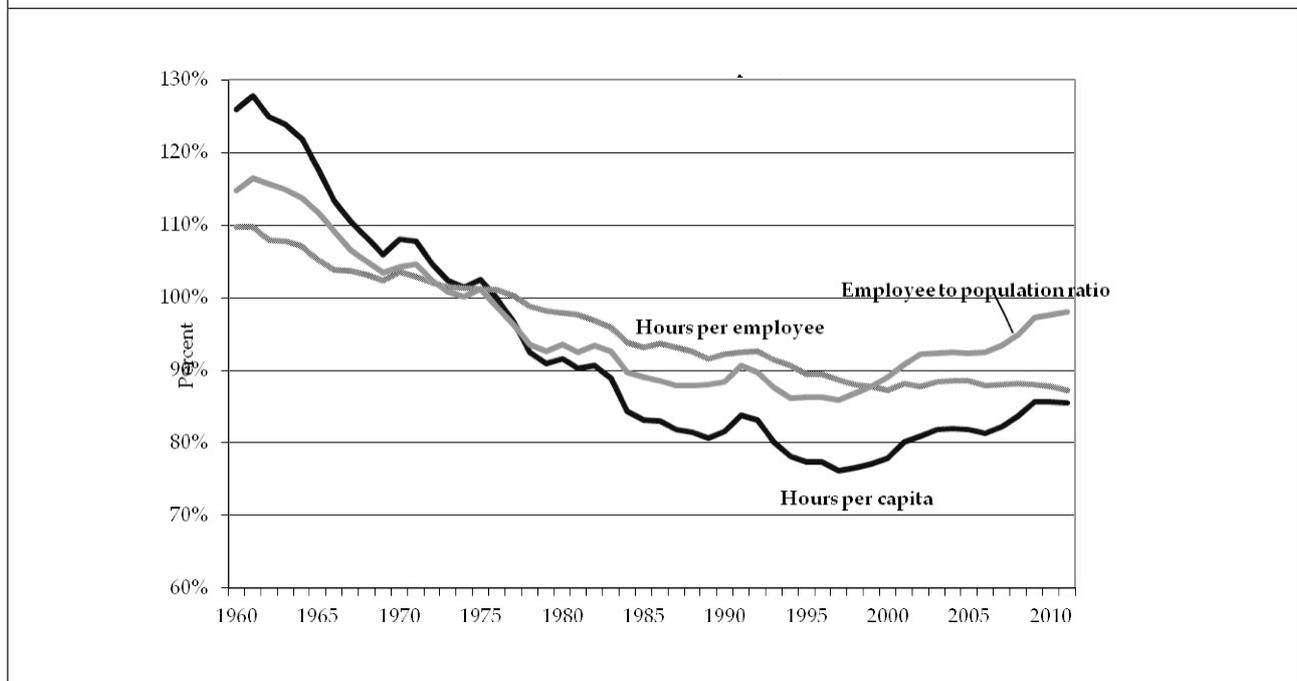


The grey line in Figure 1.4 displays the EU-15 ratio to the US of output per capita, using the same definition of output as the black productivity line. Just as the smoothed growth rates of Figure 1.2 displayed

an amazing similarity after 1977, so the ratio in Figure 1.4 is extremely stable after 1977, varying only between 69 and 72 percent. Short-lived upward movements in the ratio such as in 1981-83 reflect US recessions, while intervals when the ratio slipped below 70 percent are the counterpart of prosperous periods in the US such as 1985-90 and 1997-2000. The small bulge in the ratio in 2008-09 suggests that the recession associated with the world financial crisis was more severe in the US than in the EU-15.

The diverging behavior of the two lines in Figure 1.4 is consistent with a decline before 1995 in the ratio of hours per capita in the EU-15 relative to the US and a reversal after 1995. The solid line in Figure 1.5 displays the epochal drop in that ratio from 126 percent in 1960 to 76 percent in 1997, followed by a recovery to 86 percent in 2011. What caused these movements? Once again, definitions help to clarify these changes. Hours per capita by definition equals employment per capita times hours per employee. Employment per capita declines either when there is a rise in the unemployment rate, as occurred in Europe after the mid-1980s, or if labor-force participation declines. Hours per employee can decline as a result of more weeks of vacation, fewer work days per week, or fewer number of work hours per day. Since Figure 1.5 plots ratios of these variables to the US, a downward movement could also reflect an increase for the US, including its rise in female labor-force participation between 1965 and 1990.

Figure 1.5 – Ratio of EU-15 to the US, Hours per Capita, Hours per Employee, Employees per Capita, 1960-2011



All of these factors help to account for the divergent behavior of hours per capita in the EU-15 relative to the US. The solid black line in Figure 1.5 displays the steady decline in the ratio of EU-15 to US hours per capita from 1960 to about 1997, followed by a modest recovery in two phases, 1997-2003 and then again in the recession period 2008-11. The two components of the hours per capita ratio are also plotted in Figure 1.5. The solid grey line is employment per capita, and the dashed grey line is hours per employee. The EU-15 to US ratio of employment per capita fell steadily from 1960 to 1995, with a few cyclical bumps along the way, but then it recovered substantially after 1997. The final phase of this recovery after 2007 occurs in part because both employment and labor-force participation fell much more in the US than in Europe in the aftermath of the world financial crisis. The decline in the plotted ratio for hours per employee was quite steady from 1960 to 2000, but in the past decade the decline has stopped and the ratio has settled down to a plateau of about 88 percent.

The time-series plots of the five ratios in Figures 1.4 and 1.5 are summarized in Table 1.1, which displays both levels and growth rates for 1960, 1973, 1995, 2007, and 2011. Because the intervals are of different lengths, we focus here on the annual growth rates shown in the bottom four lines of Table 1.1.

The first column shows that the European level of output per capita grew much faster than the US level from 1960 to 1973, then inched up slightly further by 2007 and then declined slightly back to the 1995 ratio by 2011. The growth rates in the second column show the much greater speed of catching up of the productivity ratio through 1995, followed by a slow decline through 2007 and more rapid decline during 2007-11.

Table 1.1 – Levels and growth rates of Output and Labour Utilization: Ratio of EU-15 to US, 1960-2011					
	Output per Capite	Output per Hour	Hours per Capite	Hours per Employees	Employee per Capite
<b>Levels</b>					
1960	60.1	48.6	126.0	109.8	111.4
1973	68.2	69.0	102.3	101.4	100.8
1995	70.4	91.7	77.3	89.6	86.3
2007	71.5	86.3	82.2	88.0	93.4
2011	70.4	82.6	85.5	87.2	98.0
<b>Annual Growth Rates</b>					
1960-1973	1.0	2.7	-1.6	-0.6	-0.8
1973-1995	0.1	1.3	-1.3	-0.6	-0.7
1995-2007	0.1	-0.5	0.5	-0.2	0.7
2007-2011	-0.4	-1.1	1.0	-0.2	1.2

Source: Conference Board Total Economy Database, accessed April 2012

The third column shows the steady decrease in the ratio of hours per capita between 1960 and 1995, followed by a significant recovery. The mirror-image behavior of the second and third columns after 1973 has elicited interest in the idea of a trade-off between hours and productivity growth, which we explore further below. As shown in the fourth column hours per employee also declined relatively steadily from 1960 to 1995, followed by a much smaller rate of decline after 1995. Employment per capita exhibits a similar decline through 1995 and a more dramatic turnaround after 1995. In fact, the ratio of EU-15 to US employment per capita has almost returned to the level of 1973, in part reflecting the dismal US labor market of the last several years.

#### I.4

##### EXPLANATIONS FOR THE OVERALL PATTERNS IN THE DATA: A CONCISE HISTORY

The data charts and table discussed in the previous section pose a number of questions. For each of the major intervals (1960-73, 1973-95, 1995-2007, 2007-11) we observe faster or slower growth in the EU-15 and/or the US in productivity, output per capita, and hours per capita. Sometimes the two sides of the Atlantic display an identical performance, such as for 1977-2012 the growth rate of output per capita in Figure 1.2 or the ratio of the level of per-capita output in Figure 1.4. Most of the time, however, the US and EU-15 behave quite differently. This section provides a broad overview of explanations, organized around several puzzles suggested by the charts. This section ends with a summary of the major factors that appear to matter for productivity growth, and in subsequent sections we relate these factors to the more formal setting of growth accounting introduced in the last section. Does growth accounting provide deep explanations or is it merely an accounting device?

The puzzles that need explanation include the following:

- (1) Why was EU-15 productivity growth faster than the US during the pre-1995 period and why did it steadily slow down over every decade after 1960?
- (2) Why did US productivity growth peak early in the 1960s, steadily slow down until it reached a plateau during 1980-95, and then revive temporarily during 1995-2002?
- (3) Why did EU-15 hours per capita decline so much relative to the US before 1995, and why did they grow more rapidly thereafter? To what extent does this reflect changes in EU-15 labour markets as contrasted with changes in the opposite direction in US labour markets?
- (4) Was it a coincidence that EU vs. US productivity growth differences were exactly offset by movements in the opposite direction of hours per capita? Is there any causal connection between movements in hours per capita in one direction and movements in productivity in the opposite direction?
- (5) How has the adjustment of output and labour markets changed these relationships since 2007? It appears from Figures 1.1 and 1.3 that the slowdown of Europe's relative productivity growth (as compared to the US) and the relative revival of its hours per capita and employment per capita have increased during the crisis period. Does that reflect new types of behaviour in the US, the EU-15, or both?

Breaks in behaviour plotted in Figure 1.1 suggest that it is helpful to break up the post-1960 post-war era into four intervals divided at 1973, 1995, and 2007. Until 1973 Europe was catching up by exploiting the inventions of which the US had been able to take advantage years or decades earlier. The dominance of the US when World War II ended was so overwhelming that it was bound to be temporary, as other nations took advantage of post-war peace to adopt the late 19th century inventions (electricity, internal combustion engine, running water, indoor plumbing) and their 20th century complements (electrification of manufacturing, air conditioning, air travel, supermarkets, superhighways, suburbs). An amazing fact is that in 1929 the US accounted for 80 per cent of the world's motor vehicle production and 90 per cent of its vehicle registrations. In 1950 the productivity and output per capita of the EU-15 was less than half that of the US (Table 1.1 shows that it was still only 49 per cent as recently as 1960). In its adoption of electricity and automobiles, France in 1948 was roughly at the same stage as the US in 1915. Productivity naturally grew rapidly in Europe, high rates of saving and investment allowed the reconstruction of wartime damage and the adoption of modern conveniences. Europe had a well-educated population and strong institutions, and it was just a matter of time for investment to develop a modern stock of equipment, structures, and infrastructure that incorporated a previous century of invention.

The period between 1973 and 1995 witnessed a marked slowing of productivity growth in both the EU-15 and the US, but the EU-15 remained well ahead in its growth rate. Thus its level of productivity continued to catch up. The slowdown in Europe's growth seemed easy to explain and there was relatively little written about it; the opportunities to catch up naturally eroded over time. Instead economists in Europe were much more interested in the sudden emergence of high unemployment there, with the unemployment rate shooting up between 1972 and 1985 for the EU-15 from around 3 per cent to more than 10 per cent. Related problems included a loss of skills by the long-term unemployed and a mismatch between the labour force and an insufficient amount of industrial capacity to employ that labour force. Responding quickly to the apparent permanence of Europe's unemployment rate of 10 per cent, economists developed the idea of hysteresis or path dependence in which the equilibrium long-run unemployment rate (the "natural rate of unemployment") moved up automatically in response to a long period of high actual unemployment (Cross, 1988).<sup>8</sup>

However, as high unemployment persisted and hours per capita continued to decline, the possibility was suggested of a trade-off between the growth of productivity and hours per capita<sup>9</sup>. Through high taxes, powerful unions, and regulations that limited the flexibility of labour and product markets, Euro-

8 Several hypotheses were brought together in the "hysteresis" literature based on the supposition that the equilibrium long-run rate of unemployment had crept up to equal the high rate of unemployment, due to loss of skills by the long-term unemployed and lack of sufficient capital investment to employ the available labor force. Papers written at the time called attention to the contrast between the high unemployment rate of labor and the relatively high capacity utilization rate, indicating much less unemployment of capital. For an early compendium of these papers, see Cross (1988).

9 What once was called the European school developed a theoretical framework to establish a typology of Unemployment. The dominant diagnosis for Europe for the period going from mid 70s to mid 90s was Classical Unemployment (i.e. due to a too high level of the real wages). Cf. Malinvaud (1977), Fitoussi and Malinvaud (1979), Fitoussi (1982), Blanchard and Fitoussi (1997).

pean policies had made labour expensive, pushing Europe up and to the left (“Northwest”) on its labour demand curve. Because the cost of labour was higher, employers hired less of it, and the productivity of workers rose (both because the least productive workers were either fired or not hired, and because the reduction of hours raised the ratio of capital to labour for the remaining workers). Even before the data turned around in 1995, showing that Europe’s productivity growth had declined below that in the US while hours growth exceeded that in the US, Gordon (1997) was one of the first to explicitly suggest an employment-productivity trade-off based on data up to 1993.<sup>10</sup> His analysis emphasized not only the European but the American side of the trade-off. Fewer regulations and lower taxes encouraged the employment in the US of inexperienced teenagers and women in relatively low-paying jobs in the service sector, including parking lot attendants, valet parking, restaurant bus boys, and grocery baggers.

Prescott (1994) claimed that that the entire reason for Europe’s lower hours per capita was its high tax wedge between before-tax labour costs and after-tax worker pay. Critics of Prescott argued that at most the tax wedge could explain only half of the decline in hours (see Alesina, Glaeser, and Sacerdote, 2006). Other writers discussed links between low hours per capita, taxes, and institutions without emphasizing the trade-off with productivity (Blanchard and Wolfers, 2000; Layard et al., 2005; Ljungqvist and Sargent, 2006). Thus in retrospect, European productivity growth was faster than that in the US between 1960 and 1995 not just because of technological catching up (1960-1973), but as well because of a separate and independent process by which taxes and institutions made labour expensive, causing hours per capita to fall and productivity to grow faster than in the US (1974-1995).

The post-1973 slowdown in US productivity growth is more mysterious. Since the US had defined the technological frontier since the beginning of the 20th century, slower productivity growth implied that the frontier was expanding more slowly, with negative implications not just for the US but for the countries engaged in the catch-up process. The literature on the causes of the US 1973-95 productivity growth slowdown sprouted even before the slowdown was evident (Nordhaus, 1972). A leading hypothesis was that the multi-fold increase in energy prices in 1973-75 and 1979-81 had reduced labour productivity, since it led to a decline in the use of energy as an input (Bruno and Sachs, 1985)<sup>11</sup>. The labour-market influx of inexperienced teenagers and women was also an important explanation, as was diminished investment in infrastructure due in part to the completion around 1972 of the interstate highway system.<sup>12</sup> Doubtless there is some truth to all these explanations, but Nordhaus’ suggestion of the “depletion hypothesis” seems most convincing in retrospect. As the interstate highway example suggests, by 1973 the US had finished exploiting the complementary 20th-century inventions to the original Great Inventions of the late 19th century. Three of the last of these complementary inventions to boost productivity over the 1870-1970 century were air conditioning, the jet plane, and the interstate highway system. All had their maximum impact in the 1950s and 1960s, and indeed a more refined trend extracted from quarterly data shows that the fastest US productivity growth of the post-war years was achieved in 1961-62 (Gordon, 2011b). Particularly notable was the transition between the epochal 1820-1970 era when the speed of travel had increased from that of a horse to that of a jet plane; there have been no further increases in the speed of human travel since 1970.<sup>13</sup>

As shown in Figure 1.1 productivity growth revived in the US from 1995 until 2002-03 but continued to slow down in Europe. This raises three questions – why did US growth revive, why did Europe fail to mimic the US revival, and what additional developments in Europe may have contributed to the divergence? The retrospective growth-accounting analyses of the first question, the sources of the US productivity growth revival, are unanimous that the main cause was the internet revolution. Robert Solow

10 Romer (1987) had earlier suggested on the basis of historical US data that there had been an alternation of intervals of roughly two decades in which productivity growth alternated between low and high, while growth in employment had alternated in the opposite direction between high and low.

11 Such an explanation was also hypothesized for Europe.

12 The original 1958 interstate highway map, with limited access multi-lane highways extending across the continent along six or seven routes from east to west, and at least ten routes from north to south, was a massive undertaking completed in the relatively short period between 1958 and 1972. Interstate highway construction continued after 1972, primarily consisting of ring roads around the periphery of metropolitan areas.

13 US air travel completed the transition from propeller planes to jets in the short period from 1958 to 1972. The only further increase in speed was the ill-fated supersonic Concorde aircraft, long since grounded as economically impracticable, and space travel.

earlier in 1987 had quipped that “we can see the computer revolution everywhere except in the productivity statistics.” The analyses of Jorgenson et al., Oliner et al., and others pointed to an explosion of investment in ICT capital as the basic source of the post-1995 revival. Quite notable during the 1995-2000 interval was the commercialization of the internet, the invention of the World Wide Web, and a marked acceleration of the rate of decline of computer prices and rate of growth of real investment in computers. The share of investment in ICT equipment as a share of US GDP reached a peak in 2000 which has not been exceeded since.

A puzzle in the US experience is that the stock market and ICT investment collapsed between 2000 and 2002, yet the actual pace of quarter-to-quarter productivity growth remained rapid until early 2004. This seemed to cast doubt on the explanation of the 1995-2000 revival based on ICT investment. Two sources of the continuation of productivity growth in the wake of lower ICT investment were suggested (Gordon, 2003, 2010). The first was that US labour markets had changed, with increasing power given to management which was much more aggressive in reducing employment in 2001-02 (and even more so later in 2008-09) than prior to 2000. A higher propensity to reduce labor hours in response to reductions in profits and stock prices was reflected in an unusual drop in labor hours relative to output, with the counterpart that output per hour increased more than would have been expected. The second explanation was an argument based on timing. Computer investment was included in GDP as soon as the computers were produced, but it took months and even years for the software to be written and the training to take place to implement the productivity benefits of computers. Whatever the explanation, the productivity revival began to fade away in early 2004, and the annual rate of productivity growth between mid-2004 and mid-2008 was only 0.8 percent per year, slower than in what have been called the “dismal decades” between 1973 and 1995.

Analyses in the early 2000s of the post-1995 US productivity revival often adopted a triumphalist attitude, abounding with enthusiasm about the “new economy” and the unlimited horizons opened up by the internet. As shown in Figure 1.4 above, the failure of the EU-15 to match this productivity performance caused the ratio of the level of EU-15 to US productivity to slip back from 92 percent in 1995 to 87 percent in 2007 (and then further to 83 percent in 2011, for a different set of reasons discussed below). Yet, remarkably, as also shown in Figure 1.4, the US productivity growth revival had absolutely no effect on the level ratio for output per capita, which remained anchored at 70 percent with no sign of any European slippage after 1995. This reflected not only the revival of European hours per capita shown in Figure 1.3 and discussed below, but also the remarkable transition in the smoothed growth of US hours from positive before 2000 to consistently negative after 2000. The trend of US hours growth fell from +0.7 percent per year in 1996 to -0.6 percent in 2005-07 and then to a devastating -1.5 percent in 2009-11.

Why did the growth of US hours slow down so much? Growth in hours per capita is by definition the product of hours per employee, employees divided by the labor force, and the labor-force participation rate. The problem was not so much the employment rate (which by definition is 1.0 minus the unemployment rate); the unemployment rate in the peak year of 2007 was 4.6 percent, not that different than the super-peak year of 2000 when the unemployment rate for the year averaged 4.0 percent. Rather, hours growth sagged both because hours per employee began to decline more rapidly than before as an increasing number of firms reduced the number of full-time jobs offering medical insurance and other fringe benefits in favor of part-time jobs offering fewer or no benefits. Equally important was the decline in labor-force participation, a full percentage point lower in 2007 than in 2000, representing a decline in the labor force of about 2.4 million people. Labor-force participation grew steadily from 1965 to 1990, reflecting in large part the entry of females into the labor force (which happened earlier and to a larger extent in the US than in the average for the EU-15), and to a lesser extent the entry of the baby-boom teenagers during the years 1963-1978. Thus a part of the shift towards negative smoothed growth in hours per capita is explained by the ageing of the baby-boomers and the plateau reached in female labor-force participation around 1990. Part of the 2000-07 decline in participation is a simple “mix effect”; as the population ages the percent in the groups aged 60+ rises, and the average is pulled down by the relatively

low participation of older people in the 60+ groups. The second major aspect of the 2000-07 decline was a tendency toward more schooling among young people aged 16-25.<sup>14</sup>

The next question is why Europe failed to mimic the US productivity growth revival after 1995. The most comprehensive and recent study of this question has been carried out by Timmer et al. (2010). While the US literature points to the rise in ICT investment during 1995-2000 as the primary driver of the productivity revival, Timmer does not place primary emphasis on a lack of production of ICT within Europe. Rather the problem is in the use of ICT equipment. They pinpoint poor productivity growth in the market services, e.g., retail, wholesale, and business services, as the heart of the European problem. Their focus on these portions of the market services sector is motivated not just by slow EU-15 productivity growth in these industries but also the contrasting rapidity of US productivity growth in the same industries. Other elements of their diagnosis include a difficulty Europe faced in “switching from growth based on imitation to growth based on innovation” (Timmer et al., 2010, p. 5). These authors suggest that “outdated and inflexible industrial structures” prevented Europe from making the transition from low-tech to high-tech manufacturing. We return subsequently to a more complete diagnosis of these European problems, based on the research of the Timmer team and by others.

Just as the causes of rapid productivity growth in Europe before 1995 can be divided into two sets of causes – technological catch-up and hours-reducing labor-market institutions, so the post-1995 performance can similarly be illuminated by joining the innovation-based arguments related to the production and use of ICT with a further exploration of the productivity-hours trade-off. The most important evidence in favor of such a trade-off is the simple data presentation of Figures 1.1 and 1.3. The smoothed growth rates of EU-15 and US productivity and hours per capita display movements in the opposite direction so closely that their product, output per capita ( $Y/N = Y/H \cdot H/N$ ), has identical movements on both sides of the Atlantic for the entire period between 1977 and 2011 (Figure 2 above). In our more detailed treatment of European productivity issues below, we discuss the nature of the empirical support for the trade-off idea, and its interaction with the innovation-related factors.

As the last topic in this section we turn to the smoothed growth rates displayed in Figures 1.1-1.3 for productivity, output per capita, and hours per capita between 2007 and 2011. Superficially the graphs seem to say “more of the same.” In Figure 1.1 EU-15 productivity growth slows further and remains below that of the US. In Figure 1.3 smoothed growth in EU-15 hours per capita turns negative but remains well above that of the US. In Figure 1.2 smoothed growth in output per capita remains almost identical and slows on both sides of the Atlantic from almost 2.5 percent in the late 1990s to a dismal rate in 2009-11 that is slightly negative.

But to say “more of the same” is to ignore the different forces that came into play in the post-2007 financial crisis. Both the EU-15 and the US suffered roughly the same decline in output relative to trend. Estimates of the ratio of actual real GDP relative to its long-run trend declined by about the same amount. But the response of productivity and hours per capita was quite different. In the US behavior shifted not just in 2008-09 but earlier in 2001-03 toward a much greater reduction in hours relative to output than had been typical before 2000. Business firm managers, who in the United States earn very high compensation based in substantial measure on their firm’s stock market performance, cut costs drastically in 2008-09 in a desperate attempt to avoid bankruptcy, which would imply that the common stock with which they were rewarded would become worthless. Not only were workers tossed overboard, but total domestic investment fell at an annual rate of 32 percent during the winter and spring of 2009. As a counterpart of savage cost-cutting, labor productivity actually experienced a short-lived explosion in late 2009-10. The new behavior of the economy both in 2001-03 and in 2008-09 implied that productivity no longer fluctuated procyclically, and in fact had not done so since the sharp recession of 1981-82.

14 On the overall behavior of participation see Van Zandweghe (2012). For an analysis of declining participation during 2000-06, see Aaronson *et al.* (2006). This mention of increased attendance at school may appear to contradict the emphasis in section 1.3 and Table 2 on the plateau of educational achievement in the US as a source of pessimism about future growth prospects. The resolution of this puzzle is that more Americans than ever, roughly 70 percent of young people, begin a program in higher education, but only slightly more than half of them earn degrees. Two-year community and junior colleges are little better than remedial efforts to impart knowledge and skills that students did not acquire in high school. There is remarkably little transferring from two-year community colleges to four-year colleges. There is no wage premium for earning an associate’s degree as given by two-year colleges; the college wage premium comes entirely from finishing a four-year college and obtaining a bachelor’s degree.

In Europe generalizations are difficult because reactions were quite different among the component countries of the EU-15. In the Netherlands, Germany, and Austria government-sponsored institutions favored “kurzarbeit,” or shorter working hours, in which workers were not fired but rather retained on the staff at reduced pay and working hours. Government subsidies analogous to unemployment compensation cushioned the income loss for workers, while firms were able to keep the skills and organization-specific knowledge of their workers intact for the recovery. These programs help us to understand why the increase in the unemployment rate relative to the decline in output was about double in the US than what it was in Europe. But by retaining employees in the face of depressed production and sales, Europe suffered from a further drop in productivity growth. And in some countries workers were not protected at all; the unemployment rate in Ireland, Spain, and Greece increased far more than in the US

While the charts display data for 2007-11, this report de-emphasizes productivity patterns in those crisis years as representing cyclical responses rather than long-term structural trends. In subsequent sections we emphasize findings based largely on data referring to the pre-2007 intervals in order to sort out the main sources of productivity growth differences on both sides of the Atlantic.

To summarize this section, we have isolated a set of determinants of productivity growth, and of explanations of differences in growth in the EU-15 and the US, which contains numerous elements:

- (1) Innovation and the exploitation of inventions. The US was responsible for a majority of the path-breaking inventions that occurred between 1870 and 1945, and Americans were free to introduce inventions such as electricity and the internal combustion engine during the years when Europeans were distracted by the pre-1914 arms race, the two World wars, and inter war economic chaos and disaster. Innovation also enters as an explanation of the US post-1995 productivity growth revival, because much of the innovation in ICT hardware and software, both before and after the invention of the internet, took place in the US
- (2) Catching up. The technological frontier established by the US after 1900 involved relatively open technologies that could be easily copied. After 1945 when Europe was free to invest its national saving into structures, producer durables, and consumer durables instead of guns and munitions, it was able to achieve a rapid albeit incomplete catching up.
- (3) Saving and investment. To rebuild their cities and equip them with modern vehicles and conveniences, Europeans had to save and they did. European saving rates were much higher than in the US throughout the postwar period.
- (4) The preceding list ignores interactions between productivity and hour wise growth. Productivity is not determined just by the pace of innovation and catch-up. Institutions and regulations differ across countries, and they can introduce distortions into the process of growth. These distortions include taxes, unions, minimum wages, product market regulation, and employment protection legislation.
- (5) The most familiar distortion is a tax on labor. To finance its welfare state, the EU-15 levied higher taxes on labor income than did the US. The creation of the welfare state deserves praise for reducing poverty, making lifetime outcomes more certain, making health care a right of citizenship, and many other benefits. Indeed the comparisons of per-capita output in the previous graphs are based on pre-tax income, not after-tax income, which involves the implicit assumption that each dollar of welfare expenditure financed by taxes delivers the same welfare or satisfaction to a consumer as a dollar of untaxed cash. Elementary economics suggests that higher taxes on labor reduce labor supply, i.e., help to explain the precipitous decline in EU-15 hours displayed in Figure 1.5 and indeed for Prescott (1994) higher taxes were the only explanation of reduced European work hours.
- (6) Work hours and productivity are inseparable, linked by the labor demand curve. Anything that makes labor more expensive reduces the demand for labor. Workers who lose their jobs or work shorter hours are selected as those who are least productive and efficient. The remaining workers are more productive, and so the measures that make labor more expensive have the effect of artificially raising average labor productivity relative to its level in a no-regulation environment. Timmer (2010, p. 19) emphasizes that the shrinking demand for labor in Europe was accompanied by a rapid increase in the capital-labor ratio, as the rise in the cost of labor created an incentive to substitute capital for labor.

- (7) Until 1995 hours per capita declined in the EU-15 relative to the US, and productivity growth was higher. After 1995 the reverse was true – hours per capita increased relative to the US and productivity growth recovered. While suggestive of a trade-off, the reasons for the revival of EU-15 hour wise growth are not well understood. In our discussion of recent research in subsequent sections, we focus on the long-overdue rise in female participation in southern Europe and the arrival of inexperienced immigrants.
- (8) The entire mechanism of making labor more or less expensive occurs independently of innovation and catch-up. But it does have the side-effect of skewing the industrial structure of the economy. As we will see in the more detailed analysis below, in Europe taxes, unions, minimum wages, and regulations all combined to stunt the growth of the services sector relative to the US. European women stayed at home doing their own laundry and cooking, while because of low wages and benefits that made services relatively cheap, Americans took their laundry to the Laundromat or cleaning shop, while shifting much of the work of cooking and food production to inexpensive fast-food and take-out restaurants.<sup>15,16</sup> The result was slow productivity growth in the US during 1973-95 because so many low-skilled jobs were created; part of the reason for the turnaround after 1995 is that Europe's high cost structure for labor began to erode, and lower-skilled jobs began to become available.

This summary of the major factors that help explain the differing growth experience of the EU-15 and of the US suggests a number of factors that are missing from traditional growth accounting that for decades has guided the usual explanation by economists of the sources of growth. This traditional approach is explained in the next section, with an example for the past and future of the US economy. Subsequently we will show that the wide-ranging approach of this section and the formal sources of growth literature are complementary and not mutually exclusive.<sup>17</sup>

## I.5

### THE HEADWINDS THAT WILL SLOW PRODUCTIVITY GROWTH ON BOTH SIDES OF THE ATLANTIC

This chapter has emphasized the steady slowdown in the rate of European productivity growth compared to that of the US. From 1960 to 1995 Europe's labor productivity caught up to the US but since then has fallen back. However, Europe is not alone in facing problems. It is becoming increasingly evident that the post-1995 productivity growth revival was a one-time event that lasted less than a decade, with a significant slowdown after 2004. Part of this is due to diminishing returns – just as the complementary inventions to the great late 19th century industrial revolution (often called the “Second Industrial Revolution”) had their major effect in the century ending in 1970, so the “Third Industrial Revolution” of the computer, personal computer, and the internet are now encountering diminishing returns.

The productivity impact of computers involves the replacement of human effort by electronic equipment, a substitution of capital for labor. But much of the basic contributions of the computer to this substitution happened a long time ago. The first industrial robot was introduced by General Motors in 1961. Telephone operators went away in the 1960s and the ranks of clerks began to diminish as the initial computer-produced telephone bills were developed by sorting punch-cards. Credit cards were introduced in the 1950s. By the 1970s, even before the personal computer, tedious retyping had been made obsolete

15 Freeman and Schettkat (2005) have shown that European women do not enjoy more leisure than American women. They participate less in paid market work and spend more time working on food, laundry, and cleaning the house. The net difference in leisure is cancelled out, so the extra home production of European women prevents them from enjoying more leisure.

16 The problem is that home production is not counted in GDP so that the shift from home to market production increases GDP even if total production would remain the same. In a way, in this period, production in the US was overvalued vis-à-vis Europe.

17 The approach in this section which combines technological catch-up and the role of European institutions of making labor more expensive and thus suppressing demand-driven growth of low-wage market services, is supported by Timmer (2010, p. 18): “The European growth slowdown might be related to long-term trends in the structure of the economy, such as the increasing demand for low-productive services and a gradual exhaustion of the potential for growth based on a catching up in traditional technologies.”

by memory typewriters. The 1970s and early 1980s brought airline reservation systems, the first bar-code scanners, the first automatic cash machines, and in 1982 the introduction of the IBM personal computers. Even the earliest PCs could run word-processing software with word wrap and the elimination of repetitive typing. Secretaries began to disappear in legal firms and even in economics departments professors began to type their own papers. The 1990s brought the internet and web, and further effort was eliminated as the world's libraries replaced card catalogues with electronic terminals, auto parts departments no longer had to spend an hour a day replacing pages in the paper parts catalogues, and web search tools made research easier, not only in academic research but in e-commerce that allowed consumers to search for models and prices on the web.

The nature of electronic innovation changed after 2001. Most of the inventions discussed above involved the direct replacement of human labor by machine labor, going back to those early telephone bills and bank statements in the 1960s. But since 2001 the most prominent inventions have replaced one form of entertainment or communication by another, from the Walkman to the iPod, the cell phone to the SmartPhone, the laptop to the ultra book and the iPad. Along the way, the dominance of American companies has increased as Apple's iPhone has replaced Nokia's previous dominance in ordinary mobile phones, and as its iPod replaced the Walkman and other types of music devices pioneered by Sony.

The history of technology provides many examples of the folly of forecasting, of naïve pronouncements that everything useful has already been invented. We suggest that diminishing returns to the electronic revolution is still a controversial proposition, and many pleasant surprises may lie just beyond the horizon. But less controversial is the fact that the US and Europe face strong headwinds in achieving productivity growth as fast as the last 50 years. All these headwinds are faced on both sides of the Atlantic albeit with different rankings and urgency.

- (1) The first headwind is demographic. Recall that income per capita grows faster than labor productivity when hours per capita are increasing and vice versa. The US received what is called a demographic dividend between 1965 and 1990 through the social changes that drove the rise in female labor-force participation and the entry of the baby-boom teenagers. The demographic dividend has now become a deficit pulling down hours per capita as the baby-boom generation retires between 2012 and 2030. Birth rates have been lower in many European countries than in the US for a long time, but the rise in female participation, particularly in southern Europe, delayed the demographic deficit. But increasingly female participation will reach a plateau and cause the ageing of the population to reduce hours per capita.
- (2) The second headwind is education, which poses challenges for both Europe and the US. In the US educational attainment reached a plateau in 1991 (Goldin-Katz, 2008). Since then the US has slipped from first to about 14th in rank among the OECD countries in its percentage of college completion. This headwind combines a number of problems that have different solutions. One of them is the cost disease in higher education, the rapid increase in college tuition relative to the prices of other goods and people's incomes. The cost inflation in higher education is leading to mounting student debt, which is increasingly distorting career choices and deterring low-income people from going to college. At the secondary level the PISA test is administered by the OECD for 37 nations. The United States in the most recent survey ranked 21st in reading, 31st in math, and 34th in science. The US suffers from an ongoing achievement gap between whites and Asians versus Hispanics and Blacks, and the Hispanic percentage of schoolchildren keeps increasing, dragging down the national average. The two US problems are interrelated, because the problem of stagnant college completion involves those who drop out of college without degrees, due both to high costs and poor preparation as reflected in the low PISA scores. Quite a few European countries have surpassed the US in college completion and most have better PISA scores. Thus education is not as daunting a headwind in Europe, although in some countries like the UK government tuition subsidies are being cut as a result of austerity policies, leaving open the possibility that in some countries college completion rates may stop increasing or even could begin to fall.
- (3) The third headwind is also more important for the US than for Europe, and this is the inexorable rise of income inequality. The growth in median income has been substantially slower than the

averages displayed on the charts above, implying that the measured stagnation in Europe's output per capita relative to the US has been understated, at least for the bottom 99 percent of the income distribution. The US numbers are startling. From 1993 to 2008, the average growth in real household income was 1.3 percent per year. But for the bottom 99% it was only 0.75 per year. So there's a full half percentage point gap between the bottom 99 and the averages that we've been looking at. The top 1% captured fully 52% of the income gains during that 15-year period. While there has been some increase of inequality in European countries like Sweden and the UK, the differences between the bottom 99% and the top 1% are much smaller.

- (4) The fourth headwind faces Europe and the US with equal force. Globalization has brought a flood of imports from Asia, and it has also led to an outsourcing of many functions such as radiologists in India reading X-rays and replacing radiologists in the United States. There are nuances in understanding the widespread effects of globalization. For instance, Apple's i-phone is assembled in Asia with Asian components, but more than half of the value-added remains in Silicon Valley in the form of development costs and pure profit. Further, globalization has different impacts across Europe. Germany has benefited by its middle stand that produces specialized machinery for the entire world, while the traditional low-tech products of Italian manufacturing like clothing, shoes, and furniture are desperately battling to stay alive in the face of competition from China and elsewhere.
- (5) The fifth headwind is the interlinked issue of global warming, the environment, and energy policy. Part of any effort to cope with global warming and energy independence represents a payback for past growth. In 1901, they didn't care about the environment, and the symbol of prosperity was a factory with chimneys emitting dense black smoke. Most American economists are in favor of a carbon tax that gradually increases in order to raise American gasoline prices up more toward European levels. That subtracts from growth in output by reducing the amount that households have left over to spend on everything else. The US is far behind the EU-15 in energy policy from gasoline taxes to the development of solar and wind energy. But some Americans are sceptical of the high-tax solution, given the essential role that high-carbon coal plays in the production of electricity, the critical infrastructure needed to power continuing economic growth in India and China. Some of the improved energy efficient in the US may come without massive increases in gasoline taxes, given the enthusiasm of the auto industry for the draconian fuel-economy rules introduced recently and their implication for pushing the development of auto engine technology.
- (6) The final headwind is the triple deficits, which brings us past 2007 to consider the impacts of the global financial crisis. Households face a debt overhang in countries that have experienced a housing boom and subsequent collapse in housing prices, and this has happened both in the US and in Europe. Banks and financial institutions allowed leverage to get out of hand in the years before 2007 and are now struggling to rebuild capital ratios, crimping the supply of credit for business and consumers and thus contributing to the slow economic recovery. Finally, governments to different degrees have experience soaring debt-to-GDP ratios, combining policies preceding 2007, the collapse of government revenue as a side-effect of the crisis, and in some countries like the US the consequence of aggressive fiscal stimulus packages.

The ongoing Euro crisis differentiates the Euro area from the US. Many American economists predicted before 1999 that the euro was infeasible because it lacked two essential prerequisites of a common currency area, labor mobility and a centralized fiscal authority. The US is free from pressure by bond markets to implement fiscal austerity but may nevertheless face the same fate if political gridlock after the 2012 Presidential election prevents the compromises needed to implement long-run fiscal solutions to the ominous future of an ever-rising debt-to-GDP ratio.

# Chapter 2

## The Sources of Productivity Growth

### 2.1

#### INTRODUCTION

In this chapter we begin by an introduction to the literature on the sources of growth, which is a long-standing method of decomposing output growth into its underlying sources, including changes in the quantity and quality of labor, quantity and quality of capital, and a residual usually called “multi-factor productivity.” Some studies of the sources of growth go further and attribute a separate role to changes in infrastructure spending, energy use and that of intermediate materials. This general introduction to the sources of growth is followed by a summary of conclusions from the best recent studies for both the US and the EU-15. What were the main sources of the slowdown of EU-15 productivity growth after 1995 and the revival of US productivity growth after that year? What forecast can be made of the future behavior of the sources of growth, and hence of the future growth of productivity and output?

After a summary of findings about the divergent development of productivity across the Atlantic in market services (particularly retail trade, wholesale trade, finance, and business services), the chapter turns to the sources of innovation and a set of institutional differences between the EU-15 and US in the role of government in stimulating innovation, including the synergies between elite US private universities and the finance sector, eager through venture capital to finance creative start-up companies. Attention is called to the differing methods of government support of higher education, with more emphasis on peer-reviewed research grants in the US as compared to block tuition subsidies for undergraduates in Europe.

A consistent theme of the chapter is that the traditional “sources of growth” decompositions fail to explain any of the puzzles discussed in this chapter. This technique divides up the sources of growth in labor productivity between “capital-deepening” (increases in the ratio of labor to capital), changes in the quality of capital and labor, and a residual called multi-factor productivity (MFP) growth. All the interesting questions and differences are buried inside the residual, and the growth arithmetic hides the puzzles inside the mysterious MFP residual.

The chapter identifies a long list of reasons for differences in the behavior of productivity growth in the US and the EU-15, and to a lesser extent differences within the EU-15. It dismisses the tendency of economists to identify MFP growth as telling us something about technological change, because there are so many additional factors besides technology influencing MFP growth.

The definition of productivity as output per hour in itself suggests a classification of sources of productivity growth. For productivity to rise, workers have to produce more. Historically this has not occurred, except in some slave societies, by bosses bringing out whips to flog the workers into greater effort. Instead, the sources of higher productivity growth can be classified as follows, with examples.

- (1) A worker can be equipped with a machine. This aspect of growth is called “capital deepening” and occurs when there is an increase of the quantity of capital relative to the number of worker-hours.
- (2) However, workers use different types of capital now than they did a century ago. The history of farms, for instance, portrays a progression from men walking behind plows, to men guiding horses which pulled plows, to tractors pulling plows, to ever-better tractors today guiding themselves with GPS. This example suggests that changes in the quantity of capital, e.g., the number of horses or tractors, are inseparable from the quality of that capital. For instance, tractors have improved stea-

dily since their invention with more powerful motors, better ways of attaching tools like plows to the tractor, better wheels to progress through muddy fields, and more recently electronics like GPS and computer-driven seeding devices that allow the tractors to guide themselves and drop seeds with minimal human intervention. Computer equipment included with tractors, motor vehicles and aircraft, along with many other uses of electronic equipment, provide an endless array of examples of the constant improvement in the quality of capital, through the long progression from the primitive mainframes and punchcards of the 1960s to today's powerful laptops and ipads.

- (3) Workers can become smarter by acquiring additional education. In 1900 few people had acquired any education beyond the age of 12. During the 20th century high school graduation became common in many developed countries by 1960 and in some countries 40 to 50 percent of young people now attain college degrees. Higher levels of education raise productivity in obvious ways, such as enabling workers to understand and use all the features of highly-computerized industrial machinery. More importantly, more educated workers not only create goods more efficiently but also routinely invent services that generate revenue, from efficiently-run high-volume restaurants, to neighborhood computer-repair stores and copying shops, to new computer software and applications.
- (4) Energy is used to produce output, from fuel in trucks and airplanes to coal in electricity generating plants. A notable advance during the 20th century was a shift from fuels like coal and wood that had to be physically transported by humans and horses or trucks, to new sources of fuel like nuclear power or natural gas that flows automatically through permanent pipelines to the ultimate customer.
- (5) "Infrastructure" is a term with a broad definition – it encompasses everything in the external environment that makes a person or a business firm more productive. This can be provided by the government in the form of roads, or by private firms building toll-roads or telephone networks. It includes highways, airports, runways, electricity, telephone service, water availability and sewage facilities to remove the water. One of the most important contributions to higher productivity and output in the past 150 years has been the development of municipal waterworks that deliver running water to households and businesses, and also remove the waste through sewer lines.
- (6) The environment could be thought of as a type of infrastructure, although usually it is considered as a separate category. The municipal waterworks of the late 19th century were a first step in cleaning the water and wiping out waterborne diseases. Air pollution continued to be a problem throughout most of the 20th century and still plagues urban China and other rapidly growing regions dependent on coal for electric power. Substantial progress made in cleaning up the environment has directly contributed to worker productivity by improvements in health.
- (7) Saved for last is perhaps the most important of all sources of growth in productivity, and this is technology. A long debate in the economics profession about the relative importance of capital accumulation and technology was settled more than 50 years ago by a simple remark once made by Evsey Domar. "If there had never been any technological change, then capital accumulation would have amounted to piling one wooden plow on top of another wooden plow." Thus technological change and improvements in the quality of both labor and capital go hand in hand. The GPS installed in the tractor makes it more productive, and this in turn entices people to buy more tractors, as one example of the effect of technology in raising the quality of tractors. Subsequent sections will delve further into the sources of technological change.
- (8) An American would perhaps stop the list here. But nothing in this list so far helps us to understand the reasons for the ebb and flow of European vs. US productivity growth. And without any analysis of the differences, we cannot proceed to a discussion of desirable policy changes on both sides of the Atlantic. Over the past 50 years European productivity has been held back by a long list of government interventions that lower the amount that each worker can produce. Examples include shop-closing rules that prevent shops from attaining their full efficiency by forcing them to remain empty for portions of the week; labor market regulations that prevent firms from firing employees who are no longer needed; and land-use regulations that protect small shops in the central city while

preventing the construction of American-style “big boxes” like Wal-Mart and Target either in the middle of cities or on the periphery.<sup>12</sup>

## 2.2

### THE ROLE OF MULTI FACTOR PRODUCTIVITY

Economists have long decomposed the sources of growth into these various categories, with primary emphasis on the quantity and quality of capital, in recent years distinguishing between information and communication technology (ICT) capital and other capital, and on the role of education in improving the quality of labor. The portion of growth in labor productivity (output per hour) that cannot be explained by these factors is treated as an unexplained residual, usually called “total factor productivity” or “multi-factor productivity” (MFP). It is measured by subtracting from output the contribution of the quantity and quality of capital and the quantity and quality of labor hours. This is equivalent to taking the growth rate of labor productivity and subtracting the so-called capital-deepening effect, that is, the growth rate of the ratio of capital to labor, including both their quantity and quality growth, and multiplying by the estimated contribution of capital to output. The resulting residual or MFP growth is often thought of as representing technological change, but less widely recognized is that it also includes other factors on the list above that are not measured explicitly, including energy, the environment, infrastructure, and the effects of tightening and loosening of regulations.

A further qualification to the interpretation of MFP growth involves growth in the quality of capital. As measured by the best-known work on capital quality by Dale W. Jorgenson and associates (most recently 2008), this only looks at the tip of the iceberg of changes in capital quality. It observes that short-lived capital goods like computers have much faster depreciation rates than long-lived capital goods like structures. To earn enough profits to pay for their rapid depreciation, short-lived computers must have a higher marginal product than long-lived structures, implying that they earn higher profits per dollar of investment and a higher share in the income of all capital goods. The Jorgenson method then weights capital input not by dollars of original investment in a good, but rather with a weighting scheme that places more weight on short-lived goods. This estimate of growth in capital “services” always is higher than the growth in the capital stock which measures each capital good by its historic cost of investment.

But this is only the tip of the iceberg, because the contribution of capital quality goes far beyond re-weighting. Within a narrow category like aircraft or autos or kitchen appliances, the value of many quality changes was never recorded in the price indexes for these capital goods. Jet commercial aircrafts like the Boeing 707 and Douglas DC-8 were faster, larger, and had much lower seat-mile costs than their piston predecessors like the Douglas DC-6. But price indexes for aircraft linked together the prices of old and new aircraft assuming no change in quality. A major reason that quality change was missed in the price indexes is that new goods were typically introduced into the official indexes years after the initial introductory period when their prices experienced rapid reductions. For instance, the automobile was not introduced into the US official Consumer Price Index until 1935. Room air conditioners were first sold in 1951 but did not appear in the CPI until 1967. Video cassette recorders fell in price from \$1200 in 1978 to \$200 in 1987 but were introduced to the CPI only in that year. Whenever the rise of capital goods prices is overstated, as in the US official price indexes for most of the postwar era, then growth in both capital quality and in output itself is understated. But the impact in understating capital input growth is greater than on output growth, so that MFP growth is likely to be slower in reality than in official measures.

However, recall that MFP growth is not the same thing as technological change. Contributions to MFP growth include items that are typically omitted in studies of sources of growth, and as listed above these include energy, the environment, infrastructure, and regulations. Further, much of the contribution

- 1 In the US Wal-Mart and Target, which began as stores located exclusively in the suburbs, are now rapidly building very large stores in low-income areas of large cities like Chicago where previously the population suffered from “food deserts” in which fresh food could only be obtained from small individually-owned shops at exorbitant prices.
- 2 One could also argue that these regulations are the outcome of several trade-off: between productivity and family life for the shops closed on Sunday for example; between employment and economic security; between productivity and the social capital of cities, etc.

of technological change is “hiding” inside the contribution of capital quality, because without technological change we would never have witnessed a massive shift from investment in long-lived structures to electronic equipment that typically has a short life not because it wears out but because it becomes obsolete.

Table 2.1 provides one example for the US showing how economic research decomposes the sources of economic growth. The first two columns display growth rates for the 20 years ending in the final quarter of 2007 (2007:Q4), which was the peak of the US economic expansion that lasted between late 2001 and late 2007. The left column refers to the total economy and displays growth rates of the key variables plotted in Figures 1.1-1.5 discussed above. Growth in output per hour (1.79 percent) was almost the same as in output per capita (1.74 percent), because there was virtually no change in the three components of growth in hours per capita.

#### Box 2.1: The Sources of Growth and Technological Change

The relationships among output, labor, capital, and productivity can be explained succinctly by assigning symbols to each component. This helps us to understand how the unobservable concept of multi-factor productivity growth is estimated by economists and government statistics offices from data on output and inputs. Using small letters for growth rates, we can use symbols to relate the growth rates of output ( $y$ ), capital ( $k$ ), labor hours ( $h$ ), labor productivity ( $y-h$ ), and multi-factor productivity ( $m$ ).

In order to know how much the measurable labor and capital inputs contribute to output growth, we need an estimate of the responsiveness of output to each input. Robert Solow's (1956) Nobel-winning research provided a crucial and simple insight. If labor markets are competitive, then labor's real wage equals its marginal product. This implies directly that the elasticity of output growth to labor input growth (the marginal product of labor divided by the average product of labor) equals the share of labor in national income (the real wage divided by the average product of labor). The same is true for capital. Thus the contribution of labor to output growth is the growth in labor input times the income share of labor, and the contribution of capital is the growth in capital input times the income share of capital. A standard symbol for the contribution of capital to output growth is  $b$  and the contribution of labor is  $(1-b)$ . This treatment of the contributions reflects the assumption of constant returns to scale, i.e., that doubling both inputs will double the amount of output. Multi-factor productivity growth is defined as

$$m = y - bk - (1-b)h = y-h - b(k-h).$$

The first expression states that MFP growth is output growth minus the contribution of capital growth minus the contribution of labour force growth. The second expression provides a useful simplification, that to determine MFP growth all we need to do is to subtract from labor productivity growth the income share of capital ( $b$ ) times the growth rate of the capital-labor ratio ( $k-h$ ).

Notice that our list of contributions to growth in this section contains eight components, but there are only three contributions to growth in the equation ( $b$ ,  $k$ , and  $h$ ). Changes in the quality of capital and labor can be handled in the equation by treating the  $k$  and  $h$  terms as the growth of quality-corrected capital and labor. However, since no direct measures of the role of energy, the environment, infrastructure, technology, and regulation are included in the equation, the “residual” term  $m$ , or growth in MFP, combines the influence of all these factors. Thus MFP growth definitely does not provide a measure of technological change, and instead it is better labeled as simply the “residual” or the more cynical term that dates from the 1950s, “the measure of our ignorance.”

How was MFP related to labor productivity growth over this two-decade period? Because the data on factor inputs is most readily available for the non-farm private business (NFPB) sector, about 75 percent of total GDP, the decomposition of sources of growth in labor productivity is shown in the bottom part of the second column. Growth in labor productivity in that sector of 2.23 percent per year was faster than the 1.79 percent registered by the total economy, because the part of the economy that is excluded from the NFPB sector (the government, households, and institutions) typically has little or no measured productivity growth.

The 2.23 percent growth in NFPB labor productivity can be divided between contributions of 0.96 per year for the capital deepening effect (growth in capital quantity and quality relative to growth in labor hours),

plus a contribution of 0.32 percent per year for improvements in labor quality (i.e., higher educational attainment), and the residual of 0.96 percent (2.23-0.96-0.32) represents MFP growth – this residual combines the impacts of changes in energy use, the effects of environmental pollution, growth of infrastructure, technological change, and regulations. This decomposition proceeds further and provides the breakdown of the overall capital-deepening effect between ICT and non-ICT capital, and it also decomposes MFP growth between that achieved by ICT-producing industries (including software) and the rest of the NFPB sector.<sup>3</sup>

Table 2.1 Growth rates of components of real GDP and related variables, actual for 1988-2007 and projected for 2007-2027				
	Actual 1987:Q4-2007:Q4		Projected 2007:Q4-2027:Q4	
	Total Economy	NFPB Sector	Total Economy	NFPB Sector
Output (Y)	2.93		2.40	
<i>Components</i>				
Output per Hour (Y/H)	1.79	2.23	1.70	2.05
Hours per Employee (H/F)	-0.13		-0.10	
Employment Rate (FIN)	0.05		0.00	
Labor-force Part. Rate (L/N)	0.02		-0.20	
Working-age Population (N)	1.19		1.00	
<i>Related Variables</i>				
Aggregate Hours (H)	1.14	0.70		
Household Employment (F)	1.26	0.80		
Labor Force (fl)	1.21	0.80		
Output per Capita (YIN)	1.74	1.40		
<i>Decomposition of NFPB Labor Productivity Growth</i>				
Output per Hour		2.23		2.05
Capital Deepening		0.96		0.85
ICT		0.71		0.60
non-ICT		0.25		0.25
Labor Quality		0.32		0.15
Multi-factor Productivity		0.96		1.05
ICT		0.50		0.45
non-ICT		0.45		0.60

*Source:* Gordon (2010a Table 10).

3 The sources-of-growth decomposition in the second column of Table 2.2 comes from Gordon (2010) and represents an updated version of Oliner, Sichel, and Stiroh (2007).

The forecast for the two decades 2007-2027 is laid out in the two right columns of Table 2.1. This forecast reflected what was known back in 2007 and has not been updated to reflect the response of any of the variables to the crisis years since 2007. The forecast was relatively optimistic, calling for productivity growth only slightly smaller than in the previous two decades. This forecast is interesting and instructive by showing which factors among the sources of growth can cause a change in the forecast of overall growth. While technological change and MFP growth in general cannot be forecasted, some components of future growth are known with relative accuracy. For instance, we know that in the US there will be a retirement of the baby-boomers (the large cohort born during the years of high birth rates from 1947 to 1964). This implies a decline in hours of work per capita that can be forecasted fairly precisely, subject to a change in the retirement age.<sup>4</sup> Another component of the forecast is that educational attainment has reached a plateau in the US since 1991 (Goldin and Katz, 1998). The forecast of future changes in labor quality, which has traditionally been estimated on the basis of changes of educational attainment, thus can be made fairly easily.

In the forecast on the right side of Table 2.1, growth in output per capita was forecasted to slow down substantially from 1.74 to 1.40 percent per year, due in large part to the retirement of the baby-boom cohort and the plateau of educational attainment. When it was made in 2008, this forecast of growth of output per capita was considered pessimistic and indeed was substantially slower than over previous 20-year intervals in US history back to 1929. Yet as shown by the growth rates in Figure 1.2, US growth has fallen far behind the forecast. During the period 2007:Q4 to 2012:Q1, US output per capita declined 2.6 percent, in contrast to the 6.1 percent increase that is implied by the forecast in Table 2.2, implying a shortfall of 8.6 (2.2 + 5.6). In the two years ending in 2012:Q1 the realized growth rate of output per capita was only 1.0 percent, and a continuation of growth at that slow pace would imply a 20-year growth rate between 2007 and 2027 of only 0.7 percent.<sup>5</sup> In short, unless the pace of the US recovery quickens, the realized 2007-27 growth rate will be only half of that forecast a few years ago and fully 1.1 percentage points per year slower than was achieved during 1987-2007.

Thus so far we have compared growth rates and levels of productivity, income per capita, and hours per capita in the US and the EU-15. We have also examined the standard classification of sources of growth as they refer to the US economy both in the realized data of 1987-2007 and also how they may change over the period 2007-27. Subsequently we will summarize findings about the sources of differences in EU-15 and US growth that emerge from recent studies.

Table 2.1 above introduced the distinction between the definitional decomposition of productivity and the sources of growth approach. The definitional decomposition splits up growth of output per capita into productivity and hours per capita, and then beyond that into hours per employee and employment per capita. Just because a relationship is a definition does not imply that it is uninteresting or unrevealing. The contrast between Figures 1.1 and 1.3, or between Figures 1.4 and 1.5, in previous section reveal that since 1977 there has been an implausibly close negative correlation between the EU/US ratio of productivity levels and the same ratio of levels of hours per capita. Before 1995 productivity growth in Europe was faster but hours growth was slower, and after 1995 the reverse was true.

How much additional insight is provided by comparisons of the EU-15 and US based on the sources of growth methodology? Fortunately, Timmer et al. (2010) in a recent book provided a wide range of comparisons based on a comprehensive new data set that provides definitely consistent measures of the major components that are included in a sources-of-growth analysis.<sup>6</sup> They organize their analysis of the sources of growth differences between the EU-15 and the US in a format exactly the same as the US decomposition that we have already examined in Table 2.1. In Table 2.2, taken from their book, the four columns provide annual growth rates for the EU-15 before and after 1995, and then for the US before and after 1995.

4 A larger number of retirements reduces work hours without affecting the working-age population, which includes everyone from age 16 until the year of their death.

5 These calculations are made with natural logs and exponents. Real output per capita is measured as real GDP (US National Accounts, Table I.1.6) divided by the Working-age Population (from the FRED database).

6 The Timmer (2010) book is the first systematically to base its empirical analysis on the EU KLEMS database, introduced in 2007-08. This provides identically defined levels and growth rates of output and inputs not just for the aggregate economy in many countries but also for individual industries within those countries. A prime example of the methodological homogenization imposed in the EU KLEMS data is that price indexes for computers and other electronic equipment are taken from the US hedonic price deflators, even if the country in question does not adjust the prices of its computers for rapid changes in quality and performance.

Table 2.2 Decomposition of sources of growth, EU-15 US, average annual growth rates, 1980-1995 compared to 1995-2005				
	EU-15		United States	
Decomposition of Sources of Growth for the Market Economy	1980-95	1995-2005	1980-95	1995-2005
1. Output	2.1	2.2	3.2	3.6
2. Labor hours worked	-0.5	0.7	1.3	0.7
3. Labor productivity (1)-(2)	2.5	1.5	1.9	2.9
<i>Contributions from:</i>				
4. Labor quality	0.3	0.2	0.2	0.3
5. Capital services per hour (6) + (7) <i>Of which:</i>	1.2	1.0	1.0	1.3
6. ICT capital per Hour	0.4	0.5	0.7	1.0
7. Non-ICT capital per your	0.8	0.4	0.3	0.3
8. Residual = MFP (3) - (4) - (5)	1.0	0.3	0.7	1.3
<i>Addendum: Contributirni of the knowledge economy to labor productivitiy (4) + (6) + (8)</i>	1.7	1.1	1.6	2.6

*Source:* Timmer et al. (2010 Table 2.1).

The overall objective of the table is to explain why (on line 3) US labor productivity growth was 0.6 points slower than the EU-15 during 1980-95 and 1.4 points faster during 1995-2005. The end result of the calculations is that MFP growth (the unexplained residual) was 0.3 percent slower than the EU-15 during 1980-95 and 1.0 points faster after 1995. This means that the explanatory factors provided in the table, the contribution of labor quality and of capital deepening, contribute only 0.3 percentage points of US shortfall in 1980-95 and only 0.4 percentage points of the US advantage in labor productivity growth after 1995. The remaining turnaround from a MFP growth shortfall of 0.3 points to a surplus of 1.0 points is left entirely unexplained. The only contribution of this growth accounting exercise, besides revealing the MFP growth turnaround as an unexplained puzzle, is to point to the slowdown of EU-15 non-ICT capital growth as a source of its productivity growth slowdown.

Let us define the term “turnaround” to refer to the change between the EU-15 advantages in productivity growth prior to 1995 to the US advantage after 1995. For labor productivity on line 3 of Table 2.2, the EU-15 advantage before 1995 was 0.6 percentage points and the US advantage after 1995 was 1.4 percentage points. This turnaround sums to 2.0 points (that is, 0.6 plus 1.4). The turnaround for labor quality on line 4 was 0.2 points, for capital deepening was 0.5 points, and thus for MFP had to be 1.3 points, thus accounting for the labor productivity growth turnaround ( $2.0 = 0.2 + 0.5 + 1.3$ ). When the authors add together the contribution of knowledge-related factors that include labor quality, ICT capital deepening, and MFP growth, they obtain a turnaround of 1.6 points, accounting for most of the productivity growth turnaround of 2.0 points.

So far the growth accounting exercise in Table 2.2 leaves us baffled. Most of the turnaround is attributed to MFP growth and an even greater component is attributed to the contribution of knowledge which includes MFP growth. But since MFP is just the residual or “the measure of our ignorance,” there is no real explanation in Table 2.3. More useful analysis occurs when the authors use their massive EU KLEMS data base to provide a breakdown by industry. Of the 2.0 percent turnaround in labor productivity, they assign 0.2 to ICT production, 0.5 to the rest of manufacturing, 0.0 to other goods, and a whopping 1.2 percent to market services.<sup>7</sup> The ICT-producing sector in the US, somewhat surprisingly, turns out not to be important, in the sense that it explains only 10 percent ( $0.2/2.0$ ) of the turnaround, despite the role of US companies such as Intel, Dell, Oracle, Cisco, Apple, and Microsoft in driving the internet revolution. While the US has a

<sup>7</sup> See Timmer *et al.* (2010, Table 2.2, p. 32).

somewhat larger share of its economy devoted to ICT production, its productivity growth in ICT industries does not differ appreciably from the EU-15.

Before we turn to the crucial role of market services, Timmer et al. (2010, p. 33) identify an important role for the changing structure of the European economy. Production has gradually shifted from manufacturing, where productivity growth tends to be relatively fast, to market services, where productivity growth tends to be relatively slow. The authors calculate that if productivity growth after 1995 in each industrial sector retained its actual value, while the employment shares are held constant at 1980 percentages, EU-15 overall labor productivity growth would have been 0.5 percent faster after 1995 than actually occurred. This source of a productivity slowdown is familiar from the US literature going back four decades. Services are handicapped by “Baumol’s Disease,” the difficulty of increasing productivity when a service is provided by direct contact between the service provider and the customer. Bartenders hand drinks to customers and waiters bring food; so far robots have not replaced these basic labor-intensive occupations. Baumol’s own example of a string quartet requiring four players has long been obsolete, because modern electronic media raise the productivity of the string quartet as measured by the number of listeners divided by the number of players.

### 2.3

#### EUROPE’S PRODUCTIVITY PROBLEM IN MARKET SERVICES

Detailed studies of differences across industries in EU-15 versus US productivity growth began at least a decade ago, long before the development of the EU KLEMS data base used by Timmer et al. (2010). Early in the last decade four industries were identified as having much faster post-1995 growth in labor productivity and MFP in the US than in Europe, and none of these involved the production of ICT equipment. The four sectors are wholesale trade, retail trade, financial services, and business services. The analysis of the Timmer team confirms that this is not explained by the behavior of capital-labor ratios but rather reflects differences in the unexplained residual of MFP growth. Thus a central area of research in the past decade has been on the sources of rapid productivity growth in these four service industries in the US compared to Europe, with leading contributions in a compendium of papers on the US service sector (Triplett and Bosworth, 2004) and a relatively early paper documenting trade and finance as the heart of Europe’s post-1995 productivity problem (van Ark et al., 2003). The latter study showed that of the differential in productivity growth between Europe and the US in the late 1990s, fully 55 percent was contributed by the retail sector, 25 percent by the wholesale sector, and banking/finance contributed the remaining 20 percent. Surprisingly there was no net contribution to explaining the differential from the rest of the economy. The updated decomposition by Timmer et al. (2010) is less extreme, but also these authors emphasize that market services are the key to faster productivity growth in Europe. Given that market services are likely to continue to grow as a share of the economy in both regions, they are potentially a major source of economic growth. Services industries, such as distribution and business services, may see rapid labour productivity growth, as evidenced by the US experience. But until the mid 2000s Europe did not exploit this opportunity, leading to a growing gap in the productivity level between Europe and USA. In 2005, Europe’s market services sector was 20% less productive than that in USA. In addition to slow productivity growth in market services, labour productivity growth in goods production, a traditional European strength, also slowed considerably after 1995 and, to some extent, to slower capital deepening.

Table 2.3 shows the sectoral growth in labour productivity. ICT production and personal services have experienced a better productivity dynamics in US in both periods although the gap widens in the second one. However, ICT production is the only sector where productivity growth in the EU increased also in the second period. The highest contribution to the productivity growth turn-point in ‘95 comes from Distribution and Business and Financial services.

Box 2.2 deepens the possible causes of EU to US productivity gap in the retail sector. A prominent source of the productivity growth in the US is its “big-box” retail format. This point deserves awareness since it represents a typical example of an eventual trade-off between productivity and well-being. Indeed, the European burdens to the development of such a format are strictly related to the continental life styles and social norms embodied in the specific urban models. Thus, a shift towards the urban model

is coherent with a fully developed “big box” format which could have a negative impact on the EU well being (weaker social networks, city center desertification, longer journeys, etc.). However, the problem of increasing retail productivity is still at hand, although the corresponding policies should take into account the peculiarities of the EU urban models, as the provision of the appropriate real and intangible infrastructures (as logistic platforms and small firm networks) and regulatory issues are able to shift smaller and city center retailers towards high value product retail.

Table 2.3 Sectoral labour productivity, EU and USA				
<i>Growth in labour productivity (annual growth)</i>				
	EU		USA	
	1980-95	1995-2005	1980-95	1995-2005
ICT production	4.9		6.5	5.9
Manufacturing	3.2		2	2.1
Other goods	3.5		1.6	1.8
Distribution	2.5		1.7	2.7
Business	0.3		0.3	0.3
Personal	0.5		0.4	1.1
Market economy	2.5		1.5	1.9
				10
				2.9
				-0.4
				4
				2.6
				1.2
				2.9

Sources Timmer et al. (2010a).

The US differential of higher productivity growth also applies to wholesale trade, financial services, and business services. The sources of the US productivity advantage in wholesaling have some of the same causes as in retailing. Much of US trade takes place in the suburbs than in the central city. This means that wholesale merchants can make their deliveries with larger trucks, less congestion, fewer problems of narrow streets, and can deliver to large suburban shopping malls and big boxes in well-designed loading docks designed for large trucks. Wholesale productivity has also adopted computer bar-coding and scanner devices, which in turn is possible because the wholesale trade industry in the US involves large firms selling to large customers.

The finance sector’s meteoric rise in the US in the 1990s was both a source of measured productivity growth and of controversy, particularly after the US financial services industry caused the global financial meltdown of 2007-09. A greatly increased share of GDP taking the form of finance sector value-added occurred simultaneously with a marked increase in the relative compensation of top officers in financial firms, a primary cause of rising income inequality in the US. Sceptics wondered whether the alleged productivity advantage of the financial firms reflected mainly increases in compensation rather than increases in productivity. The answer requires close study of the methods used by the US national accounting agency (the Bureau of Economic Analysis) to deflate financial sector value added. No clear answer has yet emerged as to whether the increased executive pay was mis-measured as higher productivity growth. Nevertheless, it is clear that there was frenetic activity in the US financial sector during 1990-2007 that created many new financial products that in turn contributed directly or indirectly to the post-2007 financial crisis.

An important remark is in order. Much of the increase in GDP today occurs not as a result of, say, an increase in the *number* of cars purchased, but of their quality and our metrics is poor for measuring quality.<sup>8</sup> For material productions we may use some conventions which allow us to account for quality improvement, as we do when we use hedonic prices for computers. But the difficulty is compounded when we deal with services. Whereas for manufactures it is easy to define the unit purchased, this is much harder for many services.<sup>9</sup> This difficulty has long been recognized and it implies that for the service sector, especially for complex services, the quality question will be much harder to resolve. And precisely, we

8 Cf. Jean-Paul Fitoussi, Amartya Sen and Joseph Stiglitz: *Mismeasuring our Life*, the New Press, 2010.

9 Cf. *The Atkinson Review: Final Report*, Palgrave-MacMillan, 2005

have identified the sectors where European productivity is lagging as wholesale trade, retail trade, financial services, and business services. A modicum of historical sensitivity would tell us that we were wrong in our measurement of output and productivity for the financial sector in the US. Business services are complex services, and we have to go deep into the details of the comparison before coming with a robust conclusion. Even in the retail sector, it is not so easy to define the unit purchased.

Our conclusions are thus to be taken with caution, hoping that in the future better metrics will allow us to be more precise.

#### Box 2.2: US and EU productivity in the Trade sector

The productivity advantage in US retailing did not occur evenly across the board in retailing, rather was concentrated in “large stores offering a wide array of goods accompanied by low prices and relatively high use of self-service systems” (Sieling et al. 2001, p. 10). A complementary finding by Foster et al. (2002) based on a study of a large set of individual retail establishments shows that all of retail productivity growth (not just the revival but the entire amount of measured productivity growth over the decade of the 1990s) can be attributed to newly entered more productive establishments which displaced comparatively less productive existing establishments. The average establishment that continued to be in business exhibited zero productivity growth despite the massive investment of the retail industry in ICT equipment that presumably went into both replenishment of old and opening of new establishments. In Foster’s results, productivity growth reflects the greater efficiency of newly opened stores, and Sieling’s comment implies that most of these highly efficient new stores were large discount operations, the proverbial “big boxes” like Wal-Mart, Home Depot, Best Buy, Circuit City (now defunct), and new large supermarkets.

Sieling’s and Foster’s findings seem to conflict with that of Oliner-Sichel (2000, 2002) that at least for the period through 1999, all of the productivity revival in retailing was achieved by purchasing new computers, software, and communications equipment. All retailers, whether new establishments of the 1990s, older establishments of the 1980s or prior decades, had adopted ICT technology. Bar-code readers have become universal in new and old stores. It is likely that the productivity revival in retailing associated with newly built “big box” stores involves something beyond the use of computers, including large size of the big boxes, economies of scale, efficient design to allow large-volume unloading from delivery trucks, stacking of merchandise on tall racks with fork-lift trucks, and large-scale purchases taken by customers to vehicles in adjacent parking lots.

This set of factors related to size and scale reinforce Timmer et al. (2010, p. 36) finding that MFP growth rather than “factor intensity” (i.e., capital deepening) is responsible for most of the US to EU gap in productivity growth. Just as the US retailing sector has achieved efficiency gains for reasons not directly related to computers, including the “big box” format, we can suggest in parallel that Europe has fallen back because European firms have lesser liberty to develop the “big box” retail formats. Impediments include land use regulations that prevent the carving out of new “greenfield” sites for big box stores in suburban and exurban locations, shop-closing regulations that restrict the revenue potential of new investments, congestion in central-city locations that are near the nodes of Europe’s extensive urban public transit systems, and restrictive labor rules that limit flexibility in organizing the workplace and make it expensive to hire and fire workers with the near-total freedom to which US firms are accustomed.

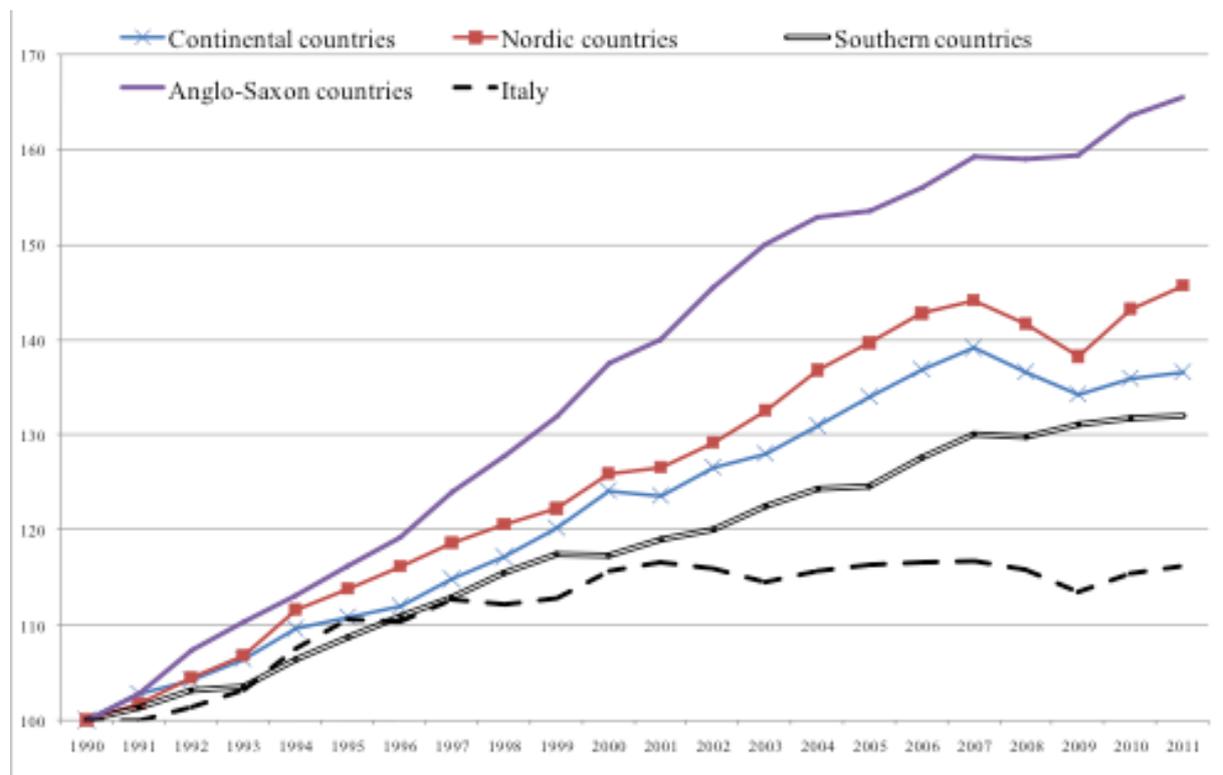
A regulatory issue is the role of resale price maintenance policies that in the US assure new competitors that they will be able to obtain volume discounts for their large operations, so that they can sell at lower retail prices both because of lower wholesale prices and for more efficient operations that imply smaller retail markups and thus lower retail prices. In contrast, in some European countries producers refuse to discount to sell to or provide volume discounts to new, high-volume, and low-cost retailing formats in order to protect smaller high-cost merchants. In some European countries, regulations directly prohibit the entry of large-scale stores and/or limit store opening days and hours, thus preventing large stores from fully amortizing their investments.

### Box 2.3: The Dynamics of Productivity within Europe

In a general perspective of Europe falling behind the US in productivity, it is hard to tell a “single European history” as over time there are large differences in productivity performance within the EU (Figure 2.1). That is why in this paragraph we compare the productivity growth between some “families” of European countries<sup>1</sup>. Over the last twenty years Anglo-Saxon are the best performers mainly due to the significant boost from more productive foreign direct investment in Ireland; Nordic countries follow with a very good performance. Even though continental countries did well, as Nordic countries, they experienced large productivity losses in the recent crisis. Despite a rapid catch-up up to early 2000s due to very low starting levels, the labour productivity growth of Southern countries lags behind that of the other groups.

Figure 2.1 – Labour productivity (GDP per hour worked, 1990=100).

Source: The Conference Board and OECD.



EU Klems database<sup>2</sup> contains industry-level measures of output, inputs and productivity for 25 European countries, Japan and the US from 1970 to 2007. Figure 2.2 shows the performance of the four families of European countries.

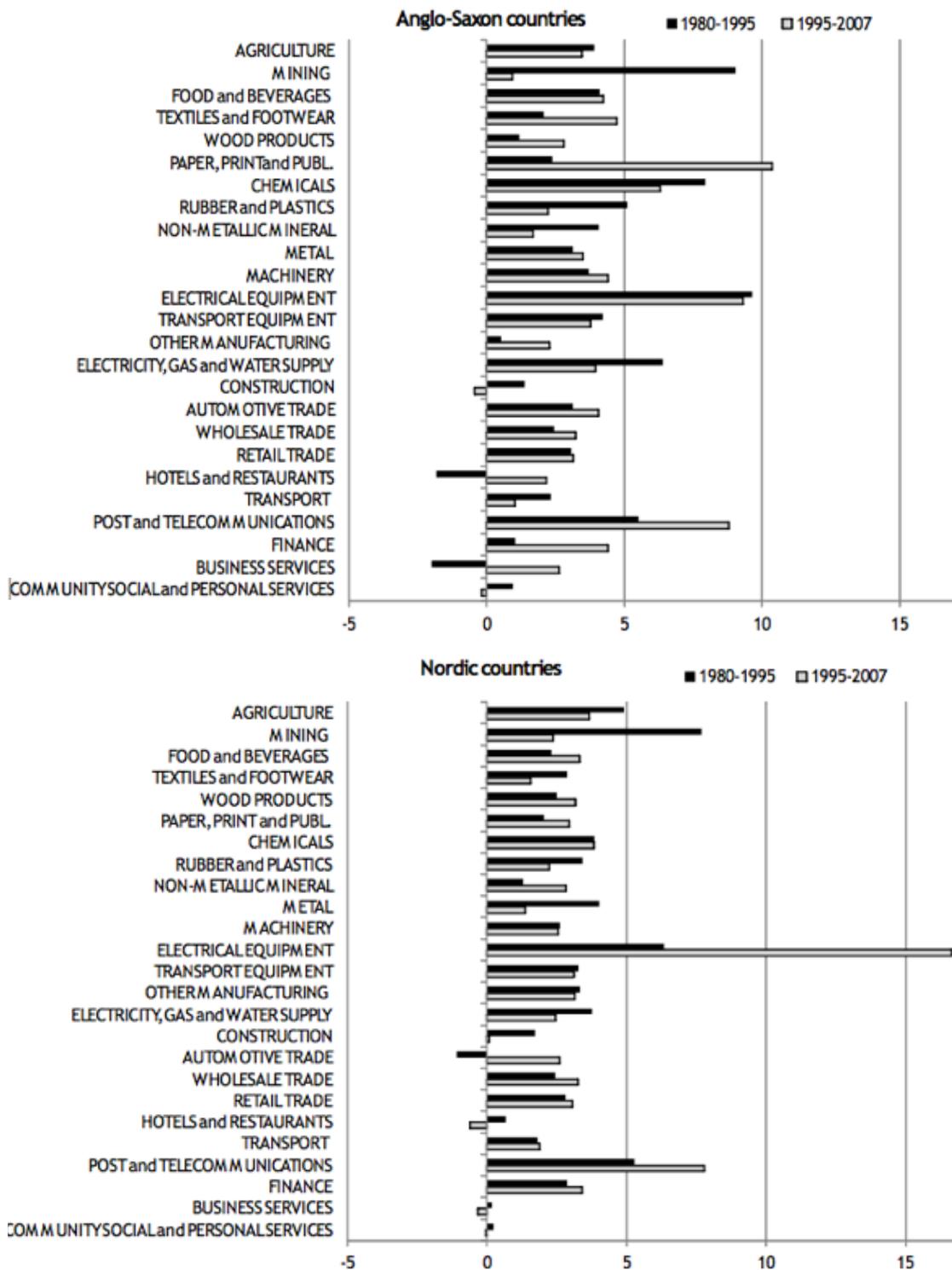
The Anglo-Saxon countries show outstanding performance: 14 out of 25 industries bear out an increase in labour productivity growth rate in 1995-08. In most of the other industries productivity growth was first-rate in the period 1980-95 and then in 1995-07, the productivity growth rate was satisfactory. This group display between the two periods a shift of the sectorial peaks of the productivity growth rates: while in the first period the highest rates concern more traditional sectors (mining, agriculture, chemical), recent peaks mainly concern less traditional ones (Paper Print and Publishing, Business Services, Finance, Post and Telecommunications).

A similar shift also occurred in the Nordic countries where the productivity growth rates reflects their industry specialization, with an outstanding increase of productivity in electrical equipment and post and telecommunications services during 1995-07 (while in the first period Mining, Metal and Agriculture were also prominent). In the services sector we observe an increase in wholesale and retail trade and in financial services (notably high in Sweden, see Box 5.1 in the last Chapter).

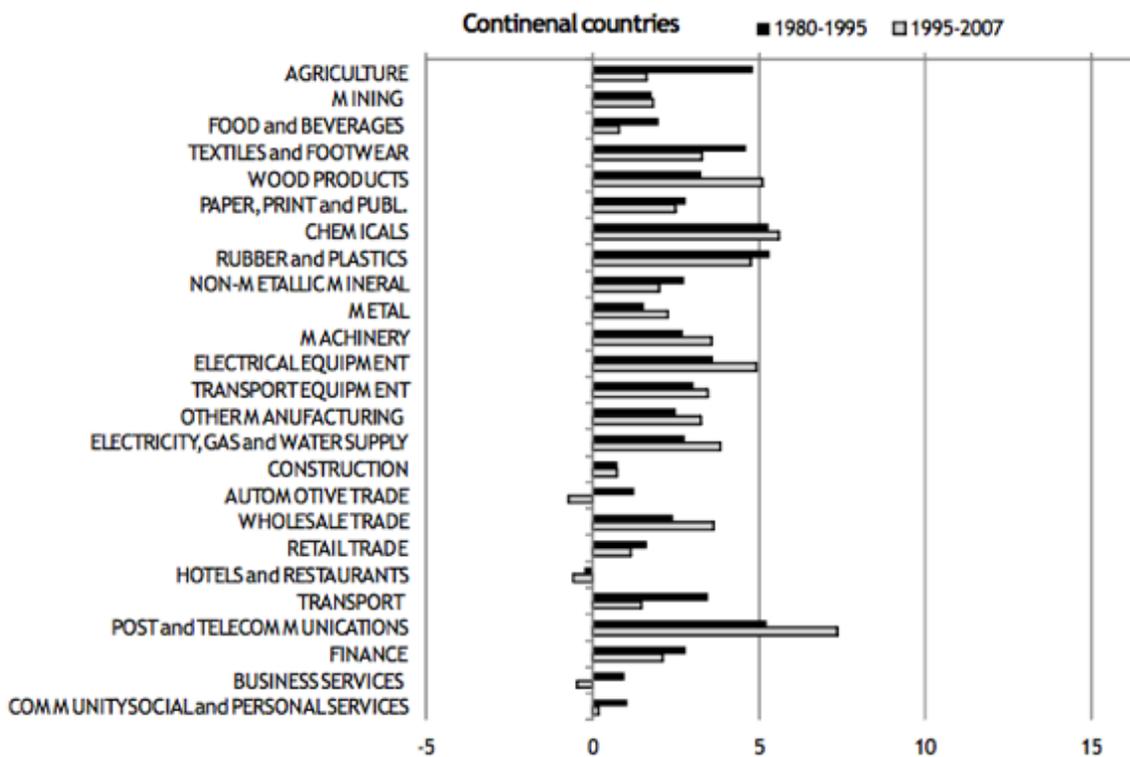
Box 2.3: The Dynamics of Productivity within Europe

Continental countries show an improvement in labour productivity growth in 1995-07 with respect to the previous period, with manufacturing sectors performing better than services (except for financial intermediation), but lacking a clear common sector-specific pattern. Lastly, in this sectorial insight, the dismal performance of Southern countries displays a sectorial composition following the European one, in the correspondent lesser extent. Noteworthy is that the only sector that seems to have benefit of relatively higher increases, in the pre crisis period, is Finance (and the opposite is true for Business Services).

Figure 2.2 – Labour productivity growth in the four families of EU countries (annual average, %)



Box 2.3: The Dynamics of Productivity within Europe



## Note

1. The four families of EU countries are grouped as follows. Northern countries: Denmark, Finland and Sweden; Anglo-Saxon: Ireland and United Kingdom; Continental: France, Germany, Benelux and Austria; Southern: Spain, Portugal and Greece. Italy is considered aside and analyzed in Chapter 5.

2. [www.euklems.net](http://www.euklems.net). For an overview of the methodology and construction of the EU KLEMS database, see O'Mahony and Timmer (2009).

## 2.4

THE ROLE OF CULTURE AND INSTITUTIONS  
IN THE EUROPEAN PROBLEM OF SLOW PRODUCTIVITY GROWTH

Some of the reasons for slow productivity growth in Europe are not revealed at all by growth accounting or even by industry as in our discussion of market services above. Instead, a substantial part of the European productivity growth problem may be hidden inside the slow rate of MFP growth after 1995 as shown in Table 2.3 above. The discussion of culture and institutions in this section goes beyond issues related to innovation treated in the preceding section. Here we focus on productivity-inhibiting aspects of attitudes and regulations. This section concludes with evidence that there was a change after 1995 in Europe toward fewer regulations, faster employment growth, but slower productivity growth, as inexperienced workers entered the labor force after previously being excluded by virtue of cultural attitudes, high taxes, or regulations like shop-closing hours.

Phelps (2003) takes a broad view of economic institutions that promote economic “dynamism” and those that suppress it.<sup>10</sup> His analysis of “dynamism” starts from Schumpeter’s concept of “creative destruction”. He adds to Schumpeter’s emphasis on entrepreneurship an equal if not greater emphasis on “financiership,” that is, the ability of financial markets to steer finance to worthy innovations. The greater

<sup>10</sup> See also Phelps and Sinn (2010, pp. 15-16).

success of the US in encouraging innovation is attributed in part to its greater emphasis on venture capital and initial public equity offerings than in Europe.

In Phelps' view, the relatively poor economic performance of continental Europe results *both* from the underdevelopment of capitalist institutions like venture capital and equity finance, and the overdevelopment of corporatist institutions which suppress innovation and competition. These corporatist institutions impose "penalties, impediments, prohibitions, and mandates generally intended to damp down creative destruction." Among these impediments are licenses and permissions to set up a new plant or firm, the need to consult with workers on changes in the mix of products or plants, and employment protection legislation. Because these institutions are designed to suppress the changes inherent in "unbridled capitalism," they also lead to the underdevelopment of the stock market, resulting in lower ratios of stock market valuation to GDP in continental Europe than in the US and other less corporatist economies like Britain, Canada, and Australia.

Phelps provides a complementary analysis of cultural differences between Europe and the US. Europeans view money-grubbing Americans with their out-sized rewards for CEOs and successful entrepreneurs with disdain. American children begin to work earlier than European children, earning baby-sitting money in their early teens, working in fast-food outlets while in high school, and are forced to work during college in contrast to European youth who "free ride" on government-paid college tuition and stipends. Phelps concludes that Europe has developed a culture of "dependency" that "breeds an unduly large share of young people who have little sense of independence and are unwilling to strike out on their own." He might have added that high levels of long-term youth unemployment discourage independence and encourage young adults to live with their parents in their 20s and, in Italy, into their 30s.

Europeans do not take these criticisms lying down. Yes, they admit that high youth unemployment, low labor force participation, and a generation of young adults living with their parents represent an economic and social failure. But they are quick to criticize aspects of American economic and political institutions that, while making it easy for Wal-Mart and Home Depot to find the land to build thousands of "big box" stores, have offsetting disadvantages. Europeans find abhorrent the hundreds of billions, or even trillions, that Americans have spent on extra highways and extra energy to support the dispersion of the population into huge metropolitan areas spreading over hundreds or even thousands of square miles, in many cases with few transport options other than the automobile. Productivity data do not give Europe sufficient credit for the convenience benefits of frequent bus, subway, and train (including TGV) public transit. Excessive American dispersion is viewed as a response to misguided public policies, especially subsidies to interstate highways in vast amounts relative to public transport, local zoning measures in some suburbs that prohibit residential land allocations below a fixed size, e.g., two acres, and the infamous and politically untouchable deduction of mortgage interest payments from income tax.

Europeans enjoy shopping at small individually owned shops on lively central city main streets and pedestrian arcades, and recoil with distaste from the ubiquitous and cheerless American strip malls and big-box retailers although Carrefour, Ikea, and others provide American-like options in some European cities to counter the effects of American land use regulations that create overly dispersed metropolitan areas. Europeans counter with their own brand of land use rules that preserve greenbelts and inhibit growth of suburban and exurban retailing.

A striking aspect of the graphs above was a simultaneous transition after 1995. Europe's growth of productivity moved from faster than the US to slower, while at the same time Europe's growth of hours per capita moved from slower than the US to faster. These opposing changes exactly cancelled out, so that European and US growth of output per capita was identical in the long period from 1977 to 2011, including the post-2007 period of the great financial crisis.

What caused this inverse relationship between growth in productivity and in hours per capita? The basic economic mechanism behind the tradeoff has been introduced above. Let us discuss just one source of the tradeoff, labor taxes (presumably used to finance social welfare programs). Higher taxes make labor more expensive to employ while reducing after-tax pay to workers. Firms respond by hiring fewer workers and workers react by choosing to work less hours per capita decline, but output per hour increases because those who lose their jobs or choose to work less are typically less efficient and productive than the remaining employees.

This tradeoff has been studied by Dew-Becker and Gordon (2012), using data and hypotheses suggested by Bassanini and Duval (2006) and other authors cited above, particularly Prescott (1994), Alesina *et al.* (2006), and others. Their paper does not compare the US and the EU-15 as a whole, but divides up the EU-15 into four groups of countries – Nordic, Anglo-Saxon, Continental, and Mediterranean – and explores explanations of the very different behavior of hours and productivity growth in the four country groups. In regressions for both employment per capita and productivity spanning 1980-2003, they highlight the similarity of the European experience before 1995 and the divergence across country groups after 1995.

Two quite different sets of factors might have caused the post-1995 turnaround in employment growth, which in turn was associated with a decline in productivity growth. Tax rates fell moderately, unions became weaker, and regulations in both labor markets and product markets were loosened. In addition several European countries reduced drastically payroll taxes for the low paid<sup>11</sup>. All of these changes contributed to the turnaround in employment growth but at the cost of slower productivity growth; the effects of these changes on output per capita are ambiguous. But one of the main causes of the revival of EU-15 employment growth is something quite different, and this is the marked increase of female employment and labor-force participation in the Mediterranean countries (especially Italy and Spain), where 70 percent of the employment increase after 1995 consisted of females. Starting from extremely low rates of female participation in 1985, half the rate in Spain as in Sweden, the Mediterranean countries caught up rapidly both during 1985-95 and after 1995. The increase of employment in the southern countries was also to a lesser extent an increase of immigrants, who were presumably unskilled and dragged down national averages of productivity levels. These two sets of causes, changing institutions and changing behavior, may be interrelated. Lower taxes on labor or changing social norms, which cause an influx of inexperienced women into the labor force, can interact in raising hours per capita while decreasing output per hour.

11 Cf. Fitoussi (1997)



# Chapter 3

## Innovations

### 3.1

#### INTRODUCTION

The sources of growth analysis has singled out MFP as the main component of the transatlantic gap on productivity dynamic. Although the growth of such variable has often been used synonymously with technical change, its dynamics and differences between countries reflect far more than just technology, and include a wide variety of institutions, regulations, and cultural factors. In this section we look at Innovation as the result of the interplay between technological change and all these other factors. Indeed, countries structural differences involve the setting up of specific innovative models. Such models differ for the intensity and the effectiveness of innovation activities but also for “the trajectory” that innovations take in each economy.

In the following sections, we first look at the data concerning the dynamics of R&D expenditure without answering the question of whether the European R&D deficit is a symptom rather than a cause of weakness in EU’s capacity to innovate. However, formal organized R&D is only one source of progress; also Entrepreneurship and Creativity play an important role,<sup>1</sup> and the relative importance of corporate R&D varies across products and industries

We explore the differences between the two R&D systems according to institutions and productive sectors such as: competition and market entry conditions; the willingness of financial markets to fund new sectors and new firms; the differences in labour market and in product markets; the investment in higher education; the different public-private interface. Before concluding, we consider one of the main field where innovation issues are expected to be relevant, that of Energy and Environmental Policies

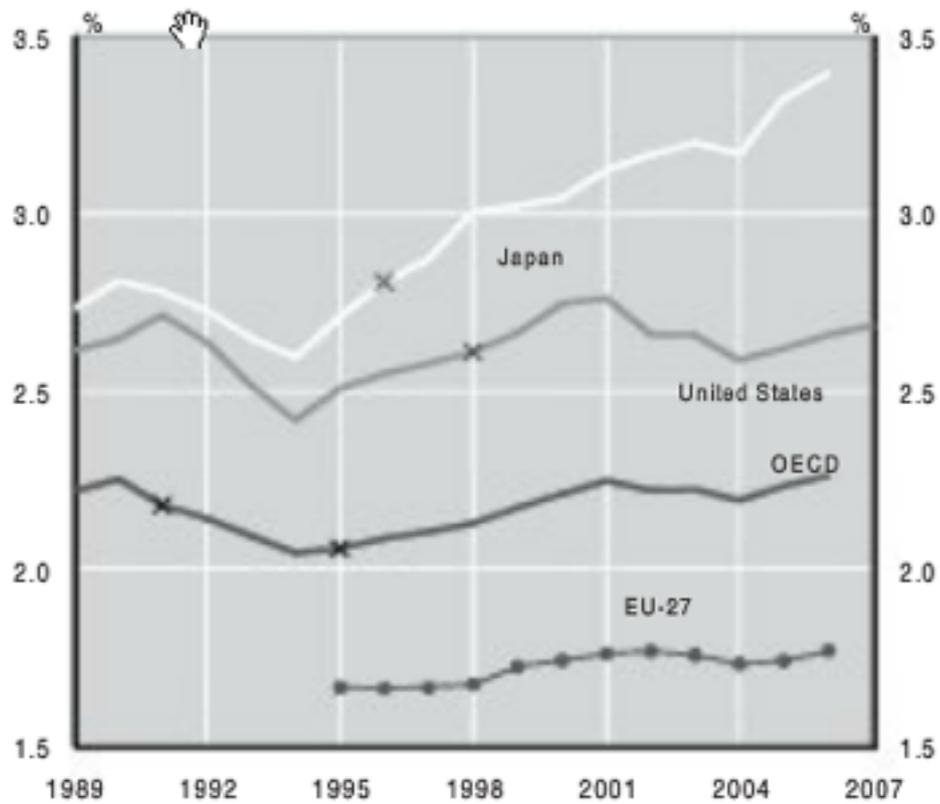
### 3.2

#### R&D INVESTMENTS AND GDP

The R&D investment in innovation is the most commonly used mode to measure the innovation activities of firms. Figure 1 shows the dynamics of R&D expenditures as a percentage of GDP in EU, US and Japan. Japan has the highest intensity in R&D investment in all the period considered. Indeed, after the catch-up of the US level that occurred at the beginning of the ’80s, Japan has always experienced a steady growth in the index of R&D all along the period except during their crisis years, in the first half of ’90s, while in US the corresponding index has varied cyclically around a constant intensity level. Europe experiences a permanent gap relatively to the R & D expenditure in US, although the intensity level has kept more stable, with a lower sensitivity to cyclical conditions. In line with the analysis of MFP dynamics in previous section, EU did not demonstrate any recovery after ’95 contrary to Japan and the US. Actual levels of EU investments in R&D are also well below the average of OECD countries.

1 Electricity and the internal combustion engine, as well as the phonograph and telephone, were not invented in the late 19th century inside the R&D departments of large corporations, but by individual entrepreneurs. Bill Gates and Mark Zuckerberg provide more recent examples. Furthermore, European Innobarometer survey shows firms investing in creative innovative activities are likely to be fast growing.

Figure 3.1– Gross domestic expenditure on R&amp;D (as percentage of GDP.)



Source: Main Science and Technology Indicators, OECD 2008

Table 3.1 shows the sources and the performers of R&D. Both EU Government financed and performed R&D have a higher relative share, but a lower level, than in US. Thus, the gap in innovation activities seems to rely much more on a deficit of the private sector. On the contrary, the R&D performed by European Higher Education Institutions is higher than in US also in levels (OECD 2008). However, the next section will discuss many limits in the European higher education system that harm the effectiveness of R&D investments and that are mainly related to the connection of such institutions with the private sector.

Government expenditure on R&D, have experienced a sharp decline both in US and EU (Figure 3.2). The brief revival of public R&D in the US corresponds to an increase in Defense R&D expenditures after the September 11 attacks (OECD 2008). Besides, in spite of its higher level of Defence expenditures in R&D, the same data confirm that the US innovation system is much more sustained by the government than the EU one, even when the comparison is restricted to its civil component.

Table 3.1 – Gross domestic expenditure on R&amp;D by Financiers and Performers.

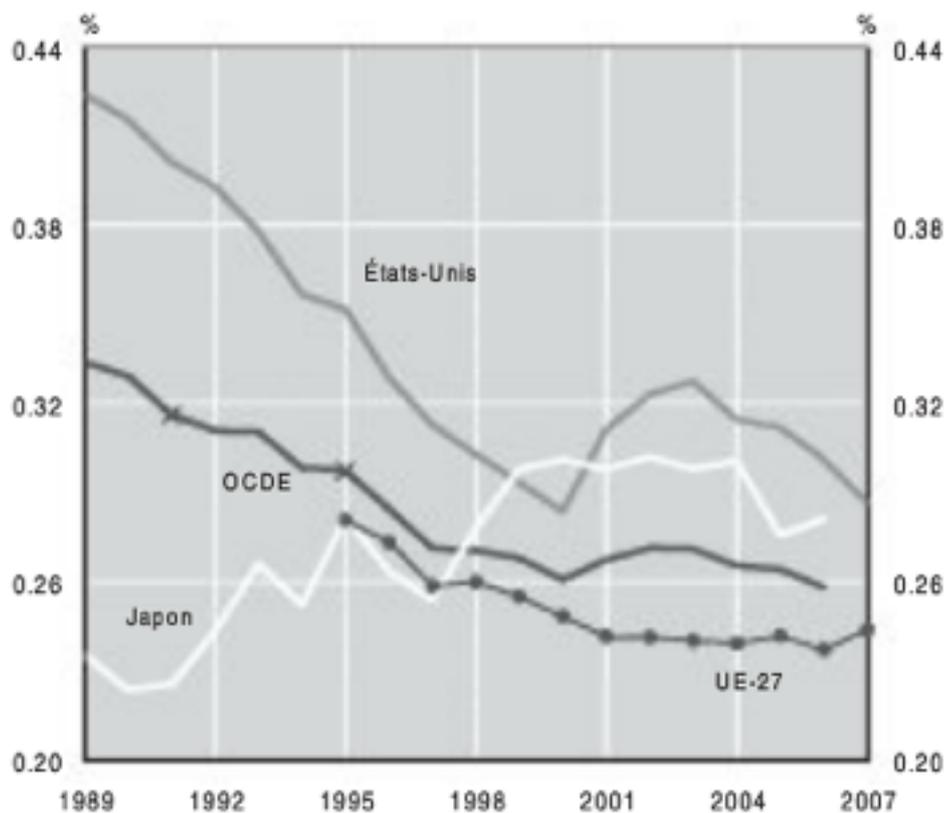
	% of R&D expenditures financed by:		% of R&D expenditures performed by:		
	Industry	Government	Industry	Higher Educ.	Government
US	66.4	27.7	71.9	13.3	10.7
EU	27	55	63.1	22.3	13.4

Source: Main Science and Technology Indicators, OECD 2008.

The EU/US gap in R&D intensity is a result of both a difference of the intensity in each sector of the two countries, and a difference in the sectoral composition since each sector is characterized by a different average intensity. While the EU has an R&D intensity gap in specific sectors with regards to that of the US, it also has a sectoral composition bias towards less R&D intensive sectors. Box 3.1 develops this argument by using the European Innovation Scorebord analysis. Beside, the more traditional aggregation in Table 3.2 sheds light on the sectoral features of the R&D intensity gap.

The highest intensity gap in absolute terms can be observed in the “ICT and other non-transport equipment” sector. This gap shows that the EU has more than a 10 percentage points difference with US in the R&D to value added ratio in the sector of ICT. The second highest relative gap emerges in commercial services where the intensity in the EU is one third of the corresponding figure for the US. Only in utilities and pharmaceuticals, the US has a lower ratio compared to EU. Thus, taking such evidences together with the discussions in chapter 1, we can conclude that the sectors where the gap in R&D between the two economies is larger tend to have also a larger gap in productivity growth as well, and thus differences in R&D intensity between EU and US play a fundamental role in the productivity gap. In particular, in commercial services the gap is wider in “Renting, Real Estate, IT services and R&D”, but it is particularly high for Wholesale and Retail Trade<sup>2</sup>. Thus, the institutional and regulatory tary barriers that harm the productivity growth in the trade sector that we considered in previous section are accompanied by a fairly weak propensity to invest in R&D.

Figure 3.2 – Government Gross domestic expenditure on R&D by financiers and performers in 2007.



Source: Main Science and Technology Indicators, OECD 2008.

2 See Van Ark (2008), L. Paganetto (2007).

Table 3.2 – Sources of the EU-US gap in business sector R&amp;D intensity

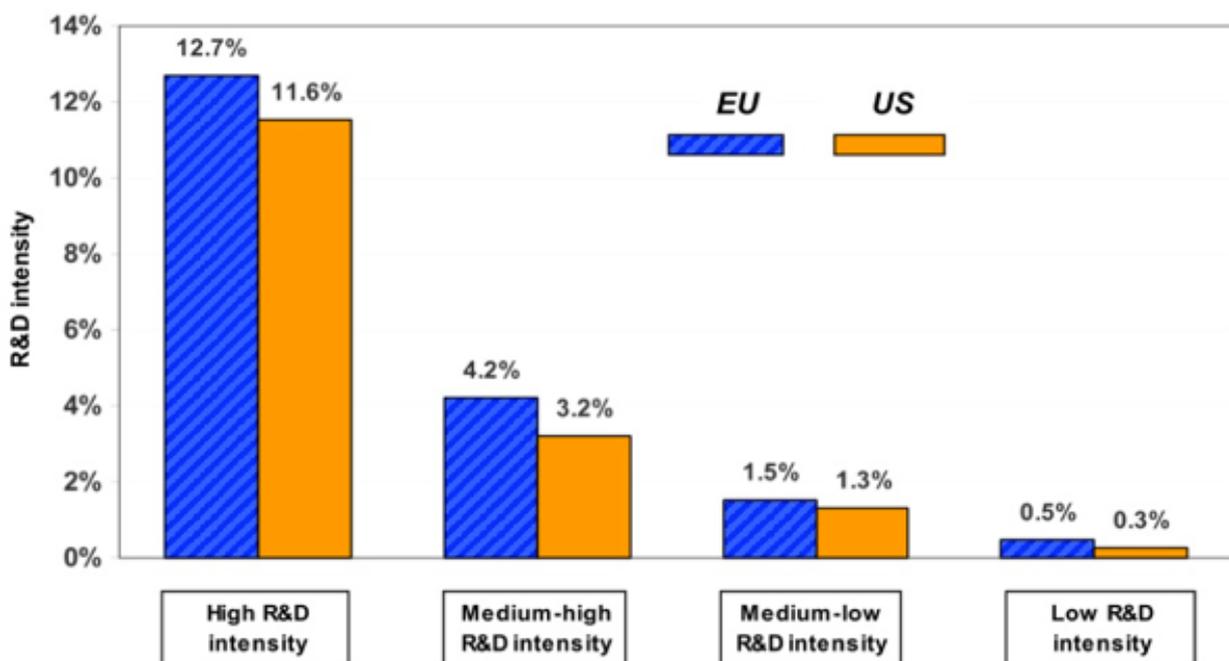
	% of sector value added			US-EU gap as a % of EU level
	EU-10	US	US-EU gap	
Transport equipment	16.3	16.0	-0.3	-2
ICT and other non-transport equipment	10.5	21.0	10.6	101
Chemicals and pharmaceuticals	10.0	9.0	-1.0	-10
Metals and minerals	1.3	1.4	0.1	9
Food, textiles, wood and paper	0.8	1.2	0.4	57
Utilities	0.6	0.1	-0.5	-88
Commercial services	0.4	1.3	0.9	215
Construction	0.1	0.1	0.0	-45
All industries	1.9	2.6	0.7	37

Source: (OECD 2009).

Box 3.1 – An R&amp;D intensity sectoral disaggregation

The European Innovation Scoreboard (EIS) classifies the various sectors into four sub-sector groups by R&D intensities (measured as the ratio of R&D investments over net sales). Figure 3.3 shows the R&D intensity of each group in the EU and US. The figure reflects similar R&D intensity in the EU and the US. The high intensity sectors (pharmaceuticals & biotechnology, health care equipment & services, ICT–software and hardware related) have an intensity ranging between 12-13%, while medium high sectors (electronics & electrical equipment, automobiles, aerospace & defence, chemicals possess an intensity ranging between 3-4%. The medium-low intensity sector (1,3-1,5%) which includes food producers, travel, media, oil equipment, electricity reflect an intensity ranging between 1,3-1,5 %. Finally, the low intensity sector which includes oil and gas producers, construction, food retailers, transportation, mining, multi-utilities has an intensity ranging between 0,3-0,5%.

Figure 3.3 – R&amp;D intensity in the four groups (R&amp;D spending as a percentage of value added, average 2000-03)



Source: EIS 2009.

Box 3.1 – An R&D intensity sectoral disaggregation

However, these different sectors contributed differently to the aggregate R&D intensity because the weight of the high R&D intensity group amongst the US companies is greater than that of the EU ones. As a matter of fact, the investment in R&D in the high intensity sector represents 63% of the total amount of R&D investment in the US and only 35% in the EU.

3.3

INNOVATION, INCENTIVES, AND INSTITUTIONS IN THE US AND EUROPE

America clearly surged after 1995 to the forefront in most of the ICT industries. Our overview of the stimuli and barriers to technological change and innovation covers not just the core of ICT (computer hardware and software and communications), but also pharmaceuticals, and biotech. Why did the US have a comparative or absolute advantage in innovative capacity in the late 1990s, more than a century after its initial leadership in the invention of electricity and its early lead in the exploitation of the internal combustion engine?

The mid-1990s discontinuity in productivity in the United States was not predicted in advance, although its significance was spotted almost immediately by *Business Week* and some other astute observers. A decade earlier it had been “Japan as Number One”, and briefly the market value of Japanese equities exceeded that of American equities. Rosenberg (1986, p. 25) perceptively generalized the difficulty of forecasting the consequences of inventions in advance: “A disinterested observer who happened to be passing by at Kitty Hawk on that fateful day in 1903 might surely be excused if he did not walk away with visions of 747s or C-5As in his head.” The great success of Japanese firms in dominating many leading technologies in the 1980s did not appear to give them any head start in dominating the new technologies of the 1990s. Rosenberg points to the failure of carriage makers to play any role in the development of the automobile, or even the failure of steam locomotive makers to participate in the development of the diesel locomotive.

The literature on technology distinguishes between the initial invention and its subsequent development and diffusion. A longstanding puzzle in the retardation of British economic growth after the 1870s is the fact that many inventions initially made by British inventors were brought to commercial success in the US, Japan, and elsewhere. The British were not alone in losing out. The US invention of videotape was followed by an exploitation of the consumer VCR market that was almost entirely achieved by Japanese companies. The Finnish company Nokia took over leadership in mobile phones from Motorola. Within any economy there are winners and losers as upstart companies (Intel, Microsoft) seize the advantage in developing technology while leaving older competitors (IBM, Wang, Digital Equipment, Xerox) behind. While predicting technological developments in advance is exceedingly difficult, there is ample literature which points to particular national characteristics that help to explain, at least in retrospect, why particular inventions and industries came to be dominated by particular countries.<sup>3</sup> Perhaps the one generalization that spans most industries is the role of the product cycle. No matter what the causes of initial national leadership, technology eventually diffuses from the leading nations to other nations that may have lower labor costs. An extensive literature on the sources of US superiority (e.g., Wright, 1990) identifies national advantages both in the supply of resources and in national characteristics of demand. The US achieved initial leadership in petrochemicals in part because of its abundant supply of cheap domestic petroleum, while its leadership in machine tools was the result of its early adoption of mass production methods, which in turn reflected its relative scarcity of labor and its large internal market. In turn mass production, together with long distances, cheap land, and the low density of urban development help to explain why the US achieved such an enormous early lead in automobile production and ownership in the 1920s. In turn, the mass market for automobiles fed back into a rapidly increasing demand for gasoline and stimulated further developments in petroleum and petrochemical manufacturing.

3 The generalizations in the next several paragraphs select among the more important points made by Mowery and Nelson (1999a).

However, it is less clear that America's large domestic market provided a universal source of advantage throughout the history of technological development over the last two centuries. Between 1870 and 1914 flows of goods, capital, and immigrants were notably free, and trade could create international markets on the scale of the US domestic markets, as demonstrated by German dominance in chemicals. After 1960, Japan rose to prominence and even domination in one industry after another, with export markets providing the scale that was lacking, at least initially, at home. Several small countries, e.g., the Netherlands and Sweden, have remained close to the productivity frontier over the past century despite their small relative size.

Close integration of industrial R&D and university research is credited to the German domination of the chemical products industry between the 1870s and early 1920s, as well as German and Swiss leadership in the development of pharmaceuticals in the early part of the 20th century. More generally, a rise in educational attainment is one of the sources of rising output per hour. While the first cited role of the education system in technological development is the rise of the German chemical industry after 1870, a set of relatively uncoordinated policies at the state and local level resulted in the US achieving the first universal secondary education between 1910 and 1940 (Goldin, 1998; Goldin-Katz, 2008) and the highest rate of participation in college education after World War II.

Even in the dismal days of American pessimism during the years of the 1972-95, productivity slowdown, it was widely recognized that America's private and state-supported research universities were its most successful export industry, at least as measured by its lead over other countries and its appeal for students from the rest of the world. The interplay among these research universities, government research grants, and private industry was instrumental in achieving American leadership in the ICT industry, and it was no coincidence that Silicon Valley happened to be located next to Stanford University or that another concentration of ICT companies in the hardware, software, and biotech industries was located in the Boston area near M.I.T. and Harvard.

A US educational advantage of possible importance is its early development of the graduate school of business and its continuing dominance in this type of education. The mere existence of business schools did not provide any solution to the productivity slowdown of the 1970s and 1980s, and indeed the ongoing superiority of Japanese firms in automobiles and consumer electronics elicited the cynical joke in those years that "the secret advantage of the Japanese manufacturers is that they have no world-class business schools." While US business schools were indeed weak in teaching such specialities as manufacturing production and quality control, they excelled in finance and general management strategy. These skills came into their own in the 1990s and interacted with the rise of the venture capital industry and internet start-up companies; in the United States more than elsewhere there was a ready supply of thousands of well-educated MBAs, both knowledgeable about finance and receptive to a culture of innovation and risk-taking. Further, US business schools have provided a wealth of talent to further develop US worldwide dominance in investment banking, accounting, and management-consulting firms.

Ironically for a country that has been suspicious of government involvement in the private economy, it is the United States that appears to demonstrate the closest links between government policy and technological leadership. The central role of government subsidies in achieving economic growth in the United States goes back to the last half of the nineteenth century, when free farmland under the Homestead Act encouraged immigration and the settlement of the frontier, while land grants to railroads promoted the building of infrastructure. In the modern era, research support from the National Institutes of Health and National Science Foundation are credited with postwar American leadership in pharmaceuticals and biomedical research, as well as basic research in the sciences. Defence-funded research and government-funded grants is credited with the early emergence of American leadership in semiconductors, computers, software, biotech, and the Internet itself. Government antitrust policy is credited to the emergence of a software industry largely independent of computer hardware manufacturers.

There are notable differences between the US method of supporting higher education and research and that found in European countries like France, Germany, and the UK. First, the US mix of private universities and those financed at the state and local level promotes competition and allows the top tier of the private university sector the budgetary freedom to pay high salaries, fund opulent research labs, and achieve the highest levels of quality, in turn attracting many top faculty members and graduate students

from other countries. Second, much of US central government research support is allocated through a peer-review system that favors a meritocracy of young, active researchers and discourages elitism and continuing support for senior professors whose best ideas are in the past. In Europe, a much larger share of central government support to universities and research institutes goes to general budgetary support that tends to result in a more equal salary structure less prone to reward academic “stars” and also relies less on the periodic quality hurdle imposed by peer review.

Explicit government policies to encourage the development of specific industries by trade protection and financial subsidies may have been successful in helping to accelerate the rise of Japan and Korea to industrial success, but they have been less successful in the United States and Europe and indeed may have backfired in Japan in the past decade. The relevance of particular government policies, from protection to defence spending to antitrust, differ sufficiently across industries as to discourage generalizations. In the industries that have received the most credit for the post-1995 productivity revival (semiconductors, computer hardware, and computer software), the most important aspect of public policy appears to have been the relatively unfocused support of research and training by the US government. The literature on the American resurgence in semiconductor production as well as its continuing dominance in software also emphasizes the role of private enforcement of intellectual property rights and regulation of licensing agreements (see Bresnahan and Melerba, 1999, and Mowery, 1999). The US pharmaceutical industry initially gained an advantage through massive government support during World War II, health-related research support during most of the postwar period, and a long tradition of strong US patent protection. US drug companies also were able to make high profits, much of which was reinvested in R&D, as a result of high rents earned in the face of a fragmented health care system with no attempt by the government to place price or profit ceilings on drug companies (see Pisano 2002). Lastly it is also worth to recall the role of the Defense department in developing the internet in the 1980s and 1990s.

Another set of US policies could be interpreted as “enforcement of benign neglect.” The US government took no action to arrest the erosion of state sales tax revenues as internet e-commerce merchants sold items without charging any sales tax to customers. In effect, the freedom of e-commerce transactions from the burden of sales taxes amounted to government subsidization of shipping charges, since for e-commerce these usually amounted to roughly the same surcharge on listed prices as sales taxes at traditional bricks and mortar outlets. The US government also maintained a zero-tariff regime for trade in electronic components, fostering large trade flows in both directions and a large US trade deficit in IT manufacturing.

In the 1980s American capital markets seemed to be a source of American industrial weakness, with their emphasis on short-run profit maximization, and there was much envy of the access of Japanese firms to low-cost bank capital that played a role in the temporary period of Japanese domination of the semiconductor industry. But the American capital market turned out to be a blessing in disguise. A long tradition of government securities regulation that forced public disclosure of information and of access of equity research analysts to internal company information had fostered a large and active market for public offerings, and this together with the relatively recent emergence of the venture capital industry provided ample finance for start-up companies once the technological groundwork for the Internet was laid in the mid-1990s. While the stock market collapses of 2000-02 and 2007-09 temporarily damaged the venture capital industry, the financial infrastructure is still there seeking out the next round of innovation, including the recent stock offerings of Linked In, Facebook, and other software companies that have achieved worldwide dominance in the development of social media software.

The literature on technological leadership omits a source of American advantage that is surely not insignificant. While language has little to do with domination in computer hardware (where indeed many of the components are imported), it is important for the American software industry that English long ago became the world’s leading second language in addition to being spoken as a first language by a critical mass of the world’s educated population. Another oft-neglected factor that should be discussed more often is the longstanding openness of the United States to immigration and the role of immigrants from India, East Asia, and elsewhere in providing the skilled labor that has been essential to the rise of Silicon Valley. Likewise, Indians returning from Silicon Valley have taken the lead in developing India’s capabi-

lities in programming and call centres that have fuelled the current American debate about the potential harm or benefit of “outsourcing.”

Several sources of systemic US advantage stand out, most notably the mixed system of government- and private-funded research universities, the large role of US government agencies providing research funding based on a criterion of peer review, and the strong position in a worldwide perspective of US business schools and US-owned investment banking, accounting, and management-consulting firms. In comparison Germany, despite its recent relative economic success compared to southern Europe, seems particularly weak in its failure to reform its old-fashioned hierarchical university system, its bureaucratic rules that inhibit start-up firms, its reliance on bank debt finance, and its weakness in venture capital and equity finance (Siebert and Stolpe, 2002). France suffers from overcentralized government control, a system of universities and research institutions which places more emphasis on rewarding those with an elite educational pedigree rather than those currently working on the research frontier.

Until its structural reforms and privatizations of the 1980s and 1990s, Britain shared a labor market dominated by strong unions with France and Germany. While the strong unions are gone, Britain continues to suffer from handicaps that date back a century or more, including a shortfall of technical skills among manual workers and a lack of graduate management training and business-oriented culture among highly educated workers. Where Britain does well, as in investment banking or as a destination of inward foreign investment, it relies on a relatively narrow set of advantages, including the traditional role of the City of London as a financial centre, and the same advantage that the English language provides, i.e., as a comfortable place for Asian firms to build plants, to the United States, Canada, Ireland, Australia, and other parts of the former British Empire.

### 3.4

#### INNOVATIONS, ENERGY AND ENVIRONMENTAL POLICIES

The debate on energy and environmental policy is focused on the study of the various energy sources in use, the percentage composition of energy production from these sources, the problems related to the supply of these sources and environmental safety. Thus, an evaluation of the opportunities and cost of energy production from petroleum, gas and nuclear sources vs. renewable energies -- so as to reach a better composition of energy production keeping in mind environmental problems and particularly the need for a necessary reduction in the CO<sub>2</sub> emissions -- is needed. More specifically, energy efficiency, renewable energy usage and related innovation are aspects of the challenges being faced. However, technological advances and innovation in the energy sector can be seen as one of the most important driving forces to recover growth and tackle the risks of climate change in the near future.

At the Summit of L'Aquila in July 2009, the main issue dealt with was the prevention of a rise in the average world temperature above 2 degree Celsius compared to pre-industrial levels, as to avoid adverse events linked to global warming. To achieve this, it was decided that by 2050 the emissions should be halved. However, the exact policy to be implemented was left open-ended by the above meeting and the Copenhagen summit in December 2009. The estimates by the 'Intergovernmental Panel of Climate Change (IPCC), establish a correspondence between the level of concentration of greenhouse gases and the increase of the average temperature of the planet and predict a likely increase in temperature of 2.1 °C if the concentration of greenhouse gases reaches 450 ppm. The IEA supports the trends stated above. To combat this problem, if appropriate initiatives are taken, emissions should decline by 34% by 2030. However, according to some other estimates (Bosetti et al.), even if the goal of a drastic reduction in emissions is adopted for 2050, the concentration of CO<sub>2</sub> will grow reaching 470 ppm.

The analysis by the World Energy Outlook of the 'International Energy Association', considers two scenarios: the first shows the evolution of emissions and energy market assuming that, by 2030, there is no change in the policies adopted. The alternative scenario includes a series of trajectories consistent with the need to stabilize the greenhouse gases into the atmosphere to no more than 450 ppm, with the aim to avoid increases in average global temperature of 2 °C. The analysis is conducted with a model that considers 24 geographic regions reclassifying them into OECD countries + (including non-EU countries

including OECD members), higher emissions (OME) such as Brazil, China, Middle East, Russia and South Africa and all other (OC) countries with lower emissions.

All scenarios show a trend of oil prices growth as a result of the growing demand for energy, especially by developing countries, and the need to stimulate investments to ensure the corresponding supply. The maximum price allowed is \$ 100 per barrel in real terms, in 2020 in the reference scenario, while in the scenario of restrictive emissions the same price will be 90 dollars for the combined effect of its reduced relative demand, linked to all the interventions. Emission reduction technologies are those that focus on renewable. Investments related to the 450 ppm scenario, are substantial and are 0.5 % and 1 % of the global GDP, respectively in 2020 and 2030. The greater part of the expenditure, more than 60%, is related to technology for the production of low carbon content energy. The need and focus on emission reduction will force innovation and adoption of new technologies even in the presence of costs of production higher than for the traditional sources. This will also generate technological completion which is better for the respective country's economic development.

The prospect of a technological change linked with end-use energy efficiency can help promote a cluster of innovation potential to fundamentally alter the system-but energy. At the same time the substantial increase in world demand of energy, beginning with China, India and emerging countries, foreseen in the coming years, and the expected increase in relative prices starting with oil, will give a push to the use of energy resources such as wind, biomass and solar energy. This, in turn, can lead to a paradigm shift, with the establishment of positions of competitive advantage based on the geographic availability of renewable energy resources, as solar and biomass.

The ETS (Emissions Trading System) idea of a single price of carbon for all countries and sectors is rational but not easily workable. To have a well-functioning cap and trade system long-term agreements must be defined and a system of clear rules must be shared by the greatest number of countries participating in the agreement. Additionally, all measures related to the transfer of energy technology, innovation, renewables, CCS and financial initiatives etc. must be carefully laid out. This is because energy demand over the next 20-30 years will come from emerging countries and, in particular, the poorest of them; thus, the emissions can be controlled only by making available the necessary technologies.

#### Box 3.2 – Energy and Environmental Policies in EU

The objectives of EU 2020 energy policy comprise of increasing the energy stability and security, monitoring of the energy prices and the adoption of appropriate policies that contain possible gains and create conditions for their reduction, and the liberalization of the energy market directed at increasing the competition in the internal market for facilitating the creation of an integrated network for the distribution of energy. The broader aims are reduction in emissions, increase in energy efficiency and an increase in the share of renewable energy in total energy production. This is imperative for the EU because they import nearly 50% of oil and gas likely to increase to 70 % in the next decade, as per estimates. Further, a wide and diverse supplier base with Russia and North Africa as gas suppliers and the Middle East as suppliers of oil, calls for a policy that works towards the development of appropriate transport networks and technologies. The binding factor of energy-environmental policies is the use of technology in achieving the objectives set, which is also supported by the International Energy Association (IEA). This is true for production, distribution networks, diversification of energy sources, and for energy efficiency objectives. Thus, technology and innovation are indispensable for combating the risks posed by climate change.

The European Commission's (EC), effective agreement on combating the risks of a 2 degree increase in global temperature levels is:

- 1) ambitious cuts by all developed countries, with a cut of greenhouse gas emissions by 25-40% compared to 1990 levels by 2020;
- 2) mitigation actions carried out by developing countries of cuts around 15-30% in comparison to the performance trends ;
- 3) global cuts of 50% compared to 1990 emissions by 2050;
- 4) appropriate action in terms of mitigation;
- 5) inclusion of the aviation maritime sectors in the list of suggested sectors where emissions can be reduced.

**Box 3.2 – Energy and Environmental Policies in EU**

Although this agreement would be very fruitful for a cleaner environmental, these objectives are difficult, if not utopistic, to reach. In fact, realistically, these countries could achieve the maximum reduction of greenhouse gases of around 10-17% by 2020 and furthermore they are still not taking the right initiatives to do it. Although the EC will be providing financial assistance of around 22 to 50 billion Euros per year until 2020 (European Council) to countries in the developing stage and for actions for adaptation of technological research and development, some loopholes remain. The tools to tackle this problem would be emissions trading and the Clean Development Mechanism (CDM). However, other instruments such as taxes on traded goods which emit lower CO<sub>2</sub> etc. which could prove to be more effective are being ignored. Thus, a possibility that excessive trust is being laid in the instruments for which financial support is being provided exists.

# Chapter 4

## Productivity and the Public Sector

### 4.1

#### INTRODUCTION

The nexus between the public sector and overall productivity is best understood when its direct and indirect effects are analyzed separately. The former refers to the productivity of the public sector with regard to the direct provision of goods and services, in accordance with its weight in overall production. The latter concerns the effect of the provision of material and immaterial infrastructure by the public sector on overall productivity. The issues being dealt with in each case are different.

To analyze the productivity of the public sector, we have to overcome one of the flaws of our measurement system which consists in measuring government production by expenditures rather than by output. Indeed, as discussed in Box 4.2, the limitation of National Accounting Systems when measuring public production by means of its costs (implicitly assuming that there is no productivity growth) has recently been tackled by many national and international institutions (footnote: see Beyond GDP and Atkinson report). However, actual improvements, although relevant, do not allow for a significant international comparison of public sector productivity.

Hence, in the next section we switch to the latter aspect, primarily, looking at the channels through which the public sector can affect overall productivity: public investments, human capital and institutions. It must be noted that the two main aspects are strictly related and most of public goods such as justice, health, education, safety, and other welfare services are constrained by the extent of the social and human capital available for private production. E.g.: a well-functioning justice system as well as a stronger struggle against corruption spurs entrepreneurship and private investments: a healthy and highly educated population increases labor productivity; a lower social risk decreases the inefficiency effect of precautionary devices and better child-care systems increase the participation of women in the labour market.

As stressed in the “beyond-GDP” literature, the targets of the policy makers are not and should not be measured only by output growth. In fact, the concept of economic efficiency used to measure overall productivity should not be used to measure public sector effectiveness. Instead, once the possible discrepancies between production and well-being are properly taken into account, a more ‘efficient’ public sector (in terms of well-being to cost ratio) could increase overall productivity as illustrated in the examples above.

#### Box 4.1 – The measurement of public sector productivity

The measurement of public sector output and its productivity suffer from acute problems due to the difficulty in giving an appropriate value to public services. Indeed, the volume of public sector services is generally measured in terms of its costs, thus implicitly assuming no productivity growth. However, this involves a bias in the analysis of country's overall performance in terms of output and productivity, especially for countries with a high share of public provided services. Recently, many OECD countries and International Organizations have engaged in developing more accurate output-based measures of such services.

Since the major problem faced in measuring the public sector production is to obtain an aggregate value index, the main complexities are to define and measure the output of the different goods and services provided by the government and to aggregate them.

## Box 4.1 – The measurement of public sector productivity

Public sector output includes different services over different dimensions; quantitative and qualitative. In order to measure it we should be able to take into account quality improvements. Consider the case of education. We can ask how many students are educated, and if we spend more resources to educate the same number of students, this would suggest that education productivity has decreased. If, however, additional resources go, say, into smaller class sizes, it may improve the quality of education. A good measure would reflect this; there would be an increase in output even though there has been no change in the number of students educated. We can measure the quality of education of students by performance on test scores, but that too is an intermediate variable. What we are really interested in is long run productivity. Test scores are only relevant to the extent that they correlate with future productivity or broader measures of wellbeing, but they are a better indicator than the number of students educated. Furthermore the output of a schooling system in a given district is affected by other societal changes (some related to the economic system) which may affect the quality of inputs: change in the average distance from home to school, increase in the degree of inequality between families, in the number and skills of immigrants and in many other factors influencing the quality of the provided service. Consider a country in which immigration increases. Because of cultural and language problems this may require, to maintain “quality” a more than proportionate increase of the number of professors and/or a reduction in class size. Should we then speak of a decrease in productivity knowing that if these special efforts are not undertaken the overall quality of education would decrease?

In the health sector, measures of output may be an even poorer indicator of output. It is not the number of heart surgeries that is of concern, but how successful they are. Fortunately we do have some indicators, even if they are imperfect measures of value added: life expectancy, child mortality, for example<sup>1</sup>.

Each individual sector consists of many different activities. While it is necessary to consider the different activities related to each service, simple measures of activities offset both quality changes and technological improvements. Furthermore, when technological changes reduce the number of activities needed to provide a given service an activity based measure would be misleading demonstrating a decrease in the volume of output.

Quality has a very special impact on the effectiveness of public services and it is better assessed by outcome indicators. However, they are exposed to several biases, since the performance of a service could strongly depend on external factors. Healthcare system outcomes are strongly affected by lifestyles and social habits such as eating, smoking, and use of leisure time, as well as by environmental conditions like carbon concentration or water quality. In fact, a change in the outcome of a service could depend only on the variation of some of these external factors.

The bias results could be particularly compromising in cross country comparisons since the extent of these factors can be very different. Two sector examples can illustrate this better. Firstly, alcohol abuse rates cannot be used to evaluate effectiveness of preventing and healing services (related to the abuse) regardless of the specific social norms such as the ones related to religion, that strongly affect alcohol average consumption and the way it is consumed. Similarly, the analysis of the effectiveness of education systems cannot ignore the average parental background of pupils, a variable that has been proved to be crucial in education outcomes and that varies highly both between and within countries.

Further problems emerge when the service is not provided at individual level as in the case of education and health and is instead provided for at the collective level as environment protection, preservation and up keeping of public gardens, architectural and cultural heritage or defence. In such cases it is difficult to exactly define the amount of service enjoyed, and it becomes even trickier when the extent of the service relies on its unused capacity as in most of the collective services such as public safety and defence that are preventive by nature.

Once a suitable set of public sector output has been defined we have to deal with the problem of aggregation. This is also a sensitive issue since public service provision is by definition a non-market process and thus prices are not available or at least not corresponding to market prices. Thus, to weight the different outputs according to their marginal value, coherently to what should correspond in the marketed output case, we cannot rely on the use of costs index since there's no reason why marginal costs should equal marginal utility. The option of considering the price of similar services traded on the market, even when available, could be misleading. Consider for example what happens if we nationalized a private insurance company. The services of the insurance industry when it is private are measured by the inputs of labor and other factors of production plus the profits. Because there are no profits the output of the nationalized industry will be smaller than

#### Box 4.1 – The measurement of public sector productivity

the output when it was in the private sector, but that has nothing to do with reality but is only reflecting accounting conventions. In the wider case of measuring the value of public goods or taking into account of positive and negative externalities, we can use qualitative surveys for a relative valuation or subjective willingness-to-pay. Such indirect methods, however, suffer from well-known technical limits and when the final goal is to analyze productivity dynamics, an eventual change in such a subjective evaluation of the marginal social benefit of services would result unsuitably in a change in productivity.

In addition to all the above problems in measuring public sector output, the measurement of productivity also faces the additional problems related to inputs measurement and the timing of the services provision. If we are analyzing a specific service at a disaggregate level, it is not simple to impute all the inputs needed in the provision of this single service. Particularly, special care must be taken when an input is used to produce a different output, or else when some services need a complementary effort by its user: e.g. education needs student diligence, healthcare needs patient cooperation and so on.

The steps needed to overcome all these problems have already been in discussion for long and National Accounting experts are now partially recognizing the need for a standard of evaluation in each of the specific sector of public services. Although such measures are still not suitable for an international comparison, where implemented, they have already stressed the gap between public and private sector growth and productivity dynamics, and thus the resulting bias of inaccurate measures. In fact, in the period of the EU productivity slowdown analyzed in the first few chapters, output-corrected measures of the public sector led to a downfall in the growth rates of France and UK, which indicates bad performance of the public sector.

Such efforts in reforming national account systems are important not only to better understand productivity dynamics but also to improve the analysis of public sector effectiveness. Thus, they are also helpful in the assessment of institutional models of public services provision such as the right ownership structure (public, private or mixed), the proper level of competition among the organization involved, and the performance incentives needed to improve quality and cost-effectiveness of each specific service.

#### Note

1 Cf JS, AS and JPF: The Measurement of Economic Performance and Social Progress Revisited, Working Paper n° 2009-33, OFCE, December 2009.

Next sections detail the channels through which government action affects, directly or indirectly, growth and productivity. Without pretending to be exhaustive, we want to highlight the main factors behind the need of public intervention as a complement to private physical and human capital accumulation: public investment, human capital and institutions.

The need to focus on the eventual complementarities between public sector effectiveness and overall productivity becomes particularly important when, as in current times, governments face the simultaneous need to cut expenses and foster recovery. Hence, the suggestion of “an extended golden rule” and such general policy prescriptions and implications for EU governance as a way to finance public investments in infrastructure and human capital proposed in the concluding sections are inferences drawn from the framework discussed above.

## 4.2

### PUBLIC INVESTMENT

The first channel through which governments may impact productivity and growth is of course public investment. Capital accumulation is a prominent source of long term growth, and with a very few exceptions (e.g. China in 2011-2012), the investment levels and capital stocks of today’s economies is not excessive, rather the contrary. Therefore, as long as public investment does not crowd out private expenditure, its effect on productivity and growth is positive.

Nevertheless, it is necessary to ask why there may be a need for public investment as opposed (or in addition) to private capital accumulation. We can think of at least three reasons:

- a) First, there is a standard externality and complementarity argument: every time that the social and private return of the provision of a given good diverges, there is under or over provision of that good. A number of investment projects (notably in infrastructures) have a large social return, while being not (or partially) profitable for individual private entrepreneurs. In that case market provision is insufficient, and there is room for public intervention. This problem should of course be minimized if there existed perfect complementarity between the different types of capital, i.e, to put it somewhat paradoxically, if a highway could be substituted in the production process by a number  $x$  of privately owned trucks. But in fact inputs to production are complementary and not substitutable (investment in trucks is more productive if there is a well-developed highways network), therefore the existence of externalities calls for the existence of public investment in sectors/projects that would otherwise not be properly managed by the private sector.
- b) A related justification for public investment is the existence of sunk costs and financial constraints. In normal conditions private agents may face credit constraints that prevent them from investing in profitable projects whose costs are borne upfront while profits are delayed. This becomes particularly relevant for large size projects. Governments may face looser short term constraints, or equivalently, be able to extend the maturity of their debt beyond what is permitted to private agents. Thus, public intervention may allow profitable investment that would otherwise not be carried on.
- c) Another aspect, also related to externalities and large scale projects, is transnational investment. This is particularly important in deeply integrated economies, like the European Union, where area-wide infrastructure development may become a bottleneck. In the European Commission's intention, for example, the trans-European transport network (TEN-T) should become one of the cornerstones of the Europe 2020 Strategy.
- d) Finally, a fourth reason for public investment may be constituted by industrial policy choices. Countries may decide to invest in certain sectors that are strategic for development and export strategies, and one of the ways to do it is through targeted investment (eventually, at the expenses of other sectors that are deemed less or not strategic at all). Strategic trade policies are discussed at length by new trade theories (e.g., Krugman, 1987)

#### Box 4.2 – The empirical evidences on the effect of public investments

The empirical literature on the effects of public capital on output and growth, on the other hand, is extremely rich, and dates back at least to the seminal work of Aschauer (1989), who finds a very large elasticity of total factor productivity with respect to public capital (around 0.4). Broadly speaking, this literature can be divided into four main categories: first, papers based on the production function approach, which treat public capital as an input of the aggregate production function, and estimate its effects on output. Second, papers based on the cost function approach, that are admittedly less demanding than the previous ones regarding the restrictions (for example on the degree of substitutability among factors) they impose. Third, papers based on cross section growth regressions à la Barro (1991), which include public capital among other explanatory variables. The fourth is the group of contributions that use VAR (or VECM) models including public capital; the advantage of this latter approach is that, by explicitly taking into account the dynamic links among variables, it allows to disentangle possible reverse causation (*i.e.* from output to capital/investment).

Romp and de Haan (2007) survey of the literature on public capital and growth, explain in detail each of the methodologies enumerated above, and reach a number of general conclusions. First, the majority of works surveyed, especially the most recent ones, conclude for a positive effect of public capital (or investment) on growth or on output. These effects are nevertheless considerably smaller than originally suggested by Aschauer. Second, a number of papers suggest that reverse causation, from output to capital, is also significant and positive. Finally, and quite unsurprisingly, Romp and de Haan notice how the effects of public capital on growth differ across countries, regions and sectors.

Box 4.2 – The empirical evidences on the effect of public investments

While the first two methodologies we mentioned naturally limit the effect of public capital to the impact on the private sector production or cost functions, growth regressions and VAR models do not have this limitation, and can capture macroeconomic effects of public expenditure beyond those linked to the production side of the economy.

Perotti (2004) and Creel, Monperrus-Veroni and Saraceno (2009) build on Blanchard and Perotti (2002), explicitly including public investment variables. Perotti concludes that investment seems to have even less effect than current spending on GDP. A possible explanation that Perotti offers for these somehow puzzling findings is that the level of public capital is so large in the countries considered, that public investment is not productive enough. The crowding out of private investment hence more than compensates the direct effect on aggregate demand. Creel *et al.*, on the other hand, find that once long term public finance variables are properly accounted for (notably inserting public debt and a monetary policy reaction function in the model), public investment has significant and permanent effects on output, contrary to current spending.

### 4.3

#### HUMAN CAPITAL

The second main channel through which public expenditure may impact economic growth is human capital. Its most known formalization is the Uzawa-Lucas model (Uzawa (1965), Lucas (1988)), even if the investigation of this channel is as old as the study of accumulation and growth.

In the theoretical literature, human capital affects aggregate output, or its rate of growth, *via* higher productivity, or through the effect on the capacity to innovate and adopt new technologies. The stock of human capital cumulated by the economy may enter into a production function alongside with physical capital and output. In this case higher human capital (or investment in it) will affect the level of GDP, but not necessarily its growth rate. To have an impact on the growth rate of the economy, we need to build a model in which human capital somehow enters, together with other variables like R&D, into the function describing technical progress. If human capital affects the rate of growth of aggregate productivity (the Solow residual, or Total Factor Productivity, TFP), it will also affect, through that channel, the growth rate of the economy.

Models embedding one or both effects (on levels or on the growth rate) have proliferated. What is important for the present chapter is that in both cases externalities may open the way for differences in social and private returns to human capital investment, and hence to government intervention. This is for example the case in Lucas (1988), where aggregate human capital affects productivity for the individual firm in conjunction with firm specific human capital. The first source of government intervention is a typical spillover, by which firms cannot fully appropriate the returns of their investment. The impossibility for a firm to capture its employees, for example, leads to underinvestment into training, for fear that competitor firms will then ‘steal’ the trained worker. Another typical case for government intervention is the existence of scale effect. No individual firm could profitably invest in basic education or in fundamental research, whose social return is nevertheless undisputed. Education and fundamental research are also typical cases of intergenerational spillovers, as investment in these fields, paid for by the current generation, benefits the future ones as well (for a model embedding this type of effects in a standard growth setting with multiple equilibria, see Azariadis and Drazen (1990)). As a side note, remark that this is one of the main reasons for financing this type of expenditure through debt.

Finally, we will see in the next paragraph that human capital may constitute a fertile background for the building of appropriate, growth-friendly institutions. Of course, as the previous examples make clear, while the importance of human capital is widely acknowledged, its measurement, and the measurement of its impact are much more controversial. In particular, as shown in Box 4.2, the necessity to pass from the measure of inputs (years of schooling, funding of research, etc.) to output (“education”, productivity) is obvious.

Empirical analysis reflects the theoretical emphasis on inputs rather than on output. The literature trying to measure the impact of human capital on productivity or on growth either introduces human capital in an otherwise standard growth equation, or tries to estimate structural equations of output and technical progress, using human capital along with physical capital and labour (a complete, even if aging, survey, can be found in de la Fuente and Ciccone (2002), that served as a basis for this section). In both cases, results seem to depend on the econometric strategy used, i.e. on whether the estimation, usually a panel, emphasizes more the cross section or the time series dimension, and in general on the quality of data. The first set of studies (for two classic examples see Barro (1991) and Mankiw, Romer and Weil (1992)) usually found a positive impact of human capital on growth and productivity, while the latter (e.g. Benhabib and Spiegel (1994; Islam (1995; Caselli, Esquivel and Lefort (1996)) are much less conclusive. De la Fuente and Domenech (2006) argue that this is because of the poor quality of human capital data (years of schooling, or investment in education), that emerge more clearly when using time series than when using cross sections.

This chapter does not have the ambition to be exhaustive on a complex issue like that of human capital. But there are three considerations that need to be made to conclude this short discussion. The first is that while it is common to talk about “investment” in public capital, there have been rare attempts to try and measure the stock of human capital that this flow of investment would lead to. With the exception of some pioneering work in the 1970s for the United States Kendrick (1974; Graham and Webb (1979; Eisner (1980), the issue remained largely unexplored until when it was mentioned by the Stiglitz-Sen-Fitoussi Commission (Stiglitz, Sen and Fitoussi (2009). A recent assessment for France Melonio (2011), estimates human capital to be as high as 140% of GDP, with all the obvious implications with respect to the importance of the stock of public debt.

The second observation is that most of the literature on human capital focuses on the impact of education and research; but in fact, the quality and the quantity of human capital also depend on other factors, that are only partially correlated with standard measures of educational attainment or research expenditure. For example, social protection, efficient institutions, or a good health care system, are all complementary factors. A given investment in human capital in the standard sense (for example in basic education) will be more productive if the individuals receiving the education are in good health, live in a safe environment, live and work longer, live in a household with access to books and magazines.

A third and related aspect, which appears in all its importance in the current crisis, is the impact of business cycles on the stock of human capital. Crises destroy capital; this has been clear since Karl Marx’s *Capital*. But human capital also pays an important toll to economic downturns (for a recent discussion of hysteresis and human capital loss, see Ball (2009)). Long unemployment spells, particularly frequent in European countries, degrade skills and the productivity of workers. The overall stock of human capital, therefore, is impacted by the capacity of governments to contrast macroeconomic fluctuations through fiscal and monetary policy; and also on their capacity to attenuate, for example through active market policies, the loss of human capital due to unemployment and forced inactivity.

In conclusion, once we try to depart from a measure of public capital through its inputs, it becomes hard to think of a single economic process, or policy measure that does not have an impact on the stock of human capital. This of course makes the task of measuring human capital, and its contribution to productivity growth, overwhelming. This does not mean that it should not be attempted. In the meantime, we would at least need to abandon old customs that it is harder and harder to justify. It is for example clear, when discussing public investment, that there is a need to go beyond the standard dichotomy between current and capital public expenditure.

#### 4.4 INSTITUTIONS

The third axis along which public intervention is crucial in ensuring productivity growth is institution building. While the old *one-size-fits-all* recipes dividing the institutions in “good” and “bad” has been

discredited at least for development policies,<sup>1</sup> the importance of putting together the “right” set of institutions remains undisputed. Rodrik (2005; 2007) defines a set of “first order neoclassical economic principles” — protection of property rights, contract enforcement, market-based competition, appropriate incentives, sound money, debt sustainability — that, he argues at length, are compatible with a multitude of institutional arrangements. The list of first principles put forward by Rodrik may be challenged, even in its most common sense elements. Li (1996), for example, argues that the ambiguous property rights regime that characterizes most of the Chinese economy is an institutional adaptation to an imperfect market economy. Li argues that the immature market environment in China makes ambiguous property rights often more efficient than unambiguously defined private property rights. Nevertheless, Rodrik’s approach has the merit of definitively disposing of the *one-size-fits-all* approach. Following Rodrik’s logic, appropriate institution building boils down to the task, often extremely complex, of designing the right incentives for utility maximizing agents. The task is all the more complex that the economy is not a set of markets that can be studied in isolation, but can best be described as a complex environment characterized by feedback loops. In the present context it is particularly interesting to mention the example of labour market institutions. In two widely quoted papers, Freeman (2002, (2005)<sup>2</sup> argues that the concept of “best” labour market institutions evolves over time, and is highly dependent on the macroeconomic context. He further argues that while the distributional effects of different labour market institutions may be very important, their impact on efficiency is limited, and is dominated by the interaction with other institutions. The conclusion is that there is no reason to argue in favour of convergence to a single institutional model.

Another important issue, strictly related to the quality of institutions is that of corruption. The economic literature has recognized different causal links between corruption and economic growth and has helped to highlight details and controversial aspects of the economic impact of corruption.

However, some authors like Leff (1964) and Huntington (1968) have highlighted possible positive outcomes of corruption practices as well. In particular, in a context of pervasive and cumbersome regulations, the use of bribes may increase the efficiency of the systems. Thus, bribes are needed to “grease the wheels” of sluggish economies. In these models, since the presence of distortion related to a rigid administration leads to the second best equilibrium, further distortion due to corruption may be welfare improving. A similar argument has been formalized by Lui (1985), Beck and Maher (1986) and Lien (1986). In the context of rationing characterized by queuing, such models show bribers to have positive selection effects<sup>3</sup>.

Although such literature has contributed to an in-depth study of different aspects of corruption, the limitations of this approach have been highlighted both in theoretical and empirical literature. These critics are not restricted to the way of modelling corruption as a process of bargaining between an official and private agents. Boycko, Shleifer, and Vishny (1995) point to the fact that corruption belongs to the set of non-enforceable contracts. Thus, for the models of efficient bribers to hold, the agents involved in the corruption process should be “honest” between themselves. Such limits are much stronger in case of non-centralized corruption where the effect of bribers is less predictable and often takes the form of an appeal to the threat of delay.

If compared with taxation, corruption has two distorting effects: the first is to favour high income and wealthy classes or alternatively specific groups, quite independently of any explicit efficiency criteria; the second is related to the distortion due to the non-uniform distribution of corruption options. A similar situation results when public resources devoted to an increase in productivity are diverted for private consumption. Thus, in addition to the static distorting effects, corruption can have severe effects on eco-

1 Paradoxically, Europe seems to have remained under the grips of an updated version of the Washington Consensus, imposing a limited role for macroeconomic policies, and viewing structural reforms as the only means to the end of economic growth (see Fitoussi and Saraceno, 2004).

2 See also Jean-Paul Fitoussi and Olivier Passet: *Réduction du chômage: les réussites en Europe*, Conseil d’Analyse Economique, n. 23, La Documentation Française, 2000; and Richard Freeman: *Single peaked vs. diversified capitalism: the relation between economic institutions and outcomes*, NBER Working Paper, n. 7556, 2000.

3 It is rather hard to argue in this direction as the problem is bad administration. Corruption will decrease further the degree of confidence leading to even worst administration and destroying social capital!

conomic growth: a less transparent context increases uncertainty, discouraging investment. The prevention of investment is particularly strong for innovative investments that need permits and license. The strong negative impact of corruption on the investment rate has also been empirically proved by Mauro (1995).

Policy prescriptions against corruption might take into account the prominent role of the degree of confidence in corruption, or in general of its reputation, i.e., on the share of people that are commonly expected to be corrupt. Important suggestions from the literature to tackle with such phenomenon, other than the enforcement of anti-corruption legislations and public resource allocation accountability, concern the management of bureaucrats: reducing monopoly, favour periodic rotation and the setting up of proper incentive payments. However, even in this case, no solution can be generalized to be good. In fact, most of the literature has highlighted that corruption has very different features, impacts and causal relationships depending on the different characteristics of a country and development stage.

#### 4.5

##### POLICY PRESCRIPTIONS

A recent report by the OECD (2008b) argues that in the next three decades the investment in infrastructures will need to grow considerably to keep the pace of economic growth. This is all the more true that most of the world growth will come from emerging countries where the stock of public capital is considerably lower, and hence its productivity higher. OECD (2008b) provides rough estimates of the investment need that, even with a very restrictive definition of physical infrastructures, range between 2.5% and 3.5% of GDP. A larger definition would yield substantially larger investment needs, and even more would be needed if we included in the investment definition some items of current expenditure like wages in the education and health care sectors.

This increased need will conflict with the tightening budget constraints for most governments, which result both from long term trends (ageing, increased per capita health expenditure) and from the effects of the crisis on public finances, which will take years to be reabsorbed.

The policy prescriptions of the report are then rather straightforward for what concerns the financing of infrastructure building (or maintenance). Public-Private-Partnership, increased user charges, increased involvement of other financing sources like pension funds. And the criticisms are also straightforward, as the difficulty with infrastructures is their feature of public goods, that makes private and social returns diverge; it is unclear why would PPP emerge for non-rentable public works, unless substantial subsidies were given to firms, thus renewing the problem of costs for the budget constrained public actors. The example of French highways is a good case in point: The privatization of 2005-2006, mostly due to the need of the French government to raise revenues and reduce debt, happened at a price that de facto left the substantial cost of the initial network investment on the shoulders of French tax payers, while transferring the rentable toll benefits to large private groups.

The report also mentions improvements in the regulatory framework and in governance that, while certainly useful, are not likely to provide the boost to spending capable of bridging the infrastructure gap.

It seems then unavoidable that an increase of the public capital stock passes by an increase in public spending, reversing the trend observed in the past two decades especially in advanced economies. But how can this be made compatible with the, also unavoidable, public budget constraints? Two ways deserve to be explored.

The first, universal, is an increased shift of the burden of taxation towards the very rich, that have benefited disproportionately of the strong growth period 1980-2005, and suffered less during the crisis (OECD, 2008a; 2011)). The increased tax revenues coming from the very rich could be explicitly earmarked for the provision of public goods like infrastructures, but also health care and education. But this solution assumes both that the very rich are sufficiently numerous for the tax increase to produce enough fiscal receipts and that the world is equitable enough not to embark in fiscal competition.

The second, specific to Europe, would be to strengthen and deepen the cooperation in the provision of public goods, thus better allocating the cost, and enhancing efficiency. This would mean renewed emphasis on traditional transport infrastructures, but also and more importantly, investment in green growth (energy grids, renewables, and the like)

# Chapter 5

## Growth and Productivity in the Italian Economy

### 5.1 INTRODUCTION

Italy started experiencing a slowdown in growth in the 1980's. This was followed by a halt in the growth rate before the international crises and further translation into a deep recession during the crisis. The poor performance has been compounded by a declining trend in labour and total factor productivity. However, it is important to note that this loss has key historical roots.

When the oil price shocks of the 1970s pushed many companies over the brink and made domestic wage levels unsustainable, Italy's policy aimed at maintaining real incomes, employment and production exactly where they were by increasing public expenditure which placed a tremendous burden on the public sector and publicly owned companies, impeding flexible adjustment. The public finance problem was worsened by the introduction of generous pension and health benefits, enacted in the late 1970s and early 1980s in order to mitigate social conflict. These benefits were partly financed through higher sales and labour taxation which contributed even more to increasing the already excessive labour costs and accelerated labour shedding. Government debt exceeded GDP, bringing the country close to bankruptcy in the early 1990s while most public companies were all but destroyed. Two features which need careful consideration stand out in public policies for the economy and enterprise.

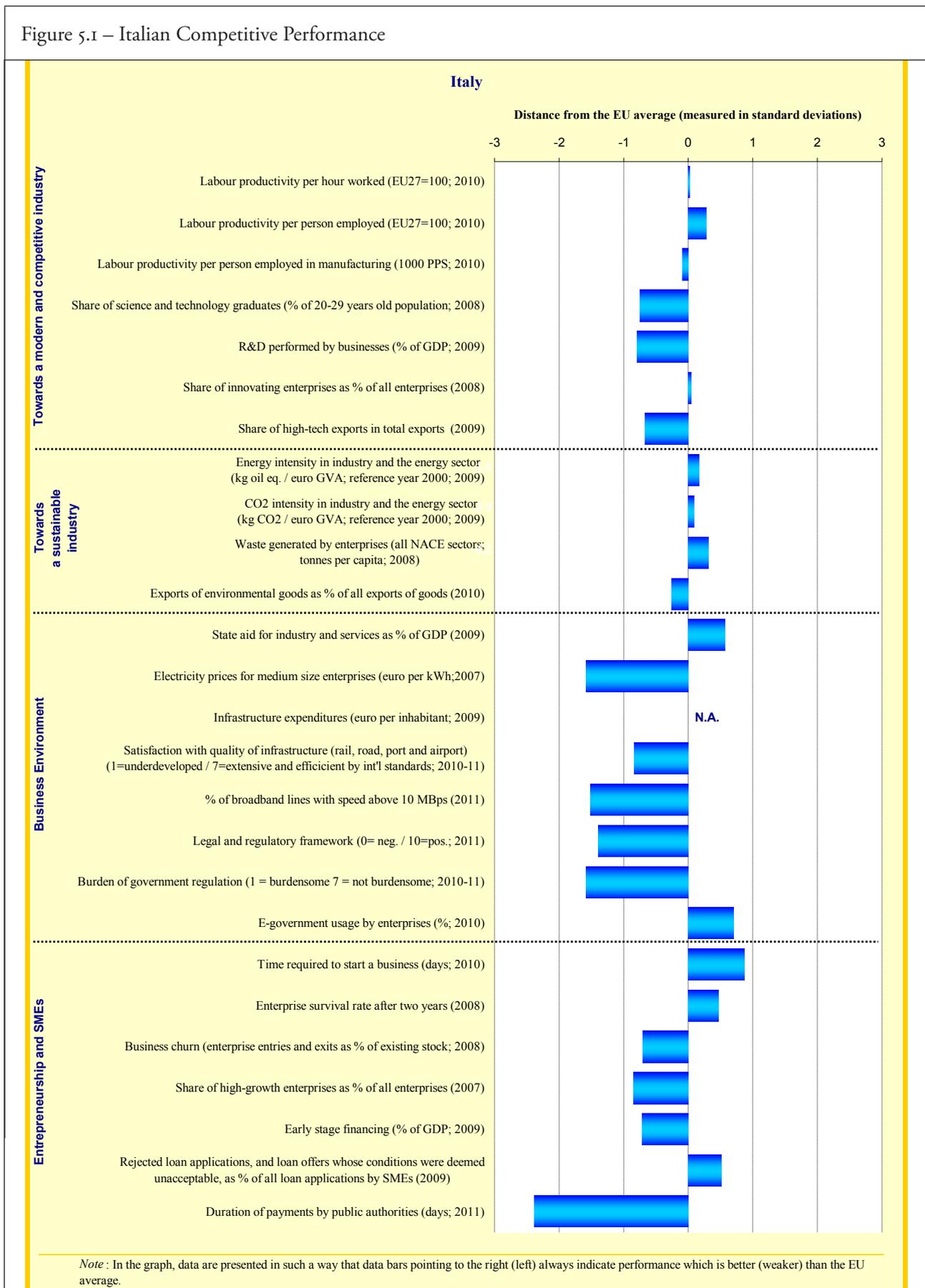
The first is the perpetuation of a "three legs subsidy system" made up of incentives, extraordinary wage support schemes (*cassa integrazione straordinaria* and *mobilità*) and extraordinary administration proceedings (*amministrazione straordinaria*) provided to public and private companies. Within this framework, protection of domestic companies has also been ensured by means of closed public procurement (around 14% on annual GDP) and a contracting system for engineering and infrastructure works that has systematically favoured local companies often violating European rules, delayed new technology adoption, and fuelled rampant corruption by politicians and administrators. Subsidies and protections were meant to make up for weak material and immaterial infrastructure – including high energy and transport costs, poor education and disastrous law enforcement – but above all they were designed to compensate for the malfunctioning of labour market that, despite the recurrent public intervention, evolved over time into a overload dualism. Bank of Italy<sup>1</sup> shows that there is hardly any evidence of positive effect on economic activity or employment derived from this tremendous flow of public money. Wage support schemes and extraordinary administration proceeding aimed to support restructuring but ended up preventing the necessary industrial change. They contributed to maintain industry specialization in less technological sectors – despite the presence of some highly competitive industries – with prevalence of labour intensive industries, low innovation and relatively low knowledge intensity.

The second quasi-permanent feature of public policies has been the instability in government finances, which require corrective measures to cover for excess public spending on a yearly basis, and often on an emergency basis. The spending for infrastructure, research and education has been systematically curtailed to create room for public wages and pensions; taxes on incomes and profits have risen to European peak levels, in exchange for services of dismal quality. In this context, the adverse effect of high taxation on private investment decisions is likely to have been compounded by the acute uncertainty generated by changes in tax rates and tax rules.

Monetary policy has been forced periodically to accommodate government deficits and inflationary wage settlements, leading to exchange rate depreciations, in order to restore the dwindling profits of private

1 Bank of Italy (2010)

Figure 5.1 – Italian Competitive Performance



companies and reabsorb excessive real wage increases. In turn, these depreciations have accommodated inefficiency and have acted as a perverse incentive to maintain an obsolete industrial specialization. Owing to the inability to control domestic costs and the continuing expansion of public spending, tighter monetary policy and a less accommodating exchange rate policy within the European Monetary System (EMS) led once again to an unsustainable real appreciation of the exchange rate, followed in the early 1990s by the ejection of the lira from the EMS and an even larger exchange rate depreciation. Only then, under the threat of national bankruptcy, there was a policy of wage moderation swallowed by the unions, and measures finally adopted to curb public spending. Once again, as in the 1970s, the fall in the exchange rate was followed by dismal productivity growth and a recovery of traditional sectors. The sales of banks and other publicly owned companies substantially reduced State presence in the economy, but market-opening measures in privatized sectors were postponed for much of the decade. In 2002 Italy shed the lira and adopted the euro; but once again government policies derailed, with a large increase in public spending leading to higher deficits and a rising public-debt-to-GDP ratio. The real exchange rate appreciated, while productivity fell as a result of increasing employment among the low skilled. However, the easy way out of nominal exchange rate depreciation was no longer available. Public and many private services remained of low quality and were closed to market rules. The recent economic, financial and debt crises hit the Italian economy in a failing condition mainly because of ignored or incomplete structural reforms.

The actual under performance of Italy is well depicted in the European Commission Report (2011a), assessing the competitiveness performance of EU Member States with respect to a number of key framework conditions. The report shows that Italian overall performance is weaker than the EU average in most of the indicators (Figure 5.1). In this chapter we will provide an analysis of the productivity performance in Italy through an industry perspective followed by an analysis of the labour market problems and that of the education system. Finally, we discuss measures that can contribute to foster growth.

## 5.2

### THE PRODUCTIVITY PERFORMANCE IN ITALY

In this paragraph we compare the Italian productivity growth with the four “families” of European countries that we considered in Chapter 2 (Box 2.3 and Figure 2.1)

This dismal performance of Italian labour productivity can be explained by the negative correlation between employment and labour productivity growth discussed in the first section. Until the mid 1990s the increasing productivity growth in Italy was sustained by a decline of labour utilization and an increase of capital intensity due to high wages. The labour market reforms of the late 1990s and early 2000s raised employment utilization, but this happened at the cost of productivity since the increase of GDP per hour was totally offset.

As we did in the second chapter (see Box 2.3), to carry out the analysis on Italian productivity we use the same EU Klems database.

The picture of Italian labour productivity growth over the past decade at industry level is appalling: with the highest level of industry disaggregation allowed by the EU Klems database, Figure 5.2 is analogous to Figure 2.2 in Chapter 2 and shows the performance of Italy: only four sectors (post and telecommunications, electricity, gas and water supply, financial intermediation and minor manufacturing industries) out of twenty-five increased their productivity growth with respect to the period 1980-1995. The productivity growth rate decreased significantly in agriculture but also in many important manufacturing sectors (chemicals, electrical equipment, metal, transport equipment, textiles, food and beverage, etc.). In the service sector the productivity growth rate has never been sparkling, the only exception being post and telecommunications where in the second period, 1995-2007, Italy shows an average annual growth rate of labour productivity around 7%, slightly higher than Continental countries and 2% higher than Southern countries. The industry level analysis points out that wholesale and retail trade did not perform well in the first period (1980-95), but they got even worse in the second period (1995-2007). Productivity in business services, hotels and restaurants, personal and public services is on the whole low, even if it is slightly better than in 1980-95.

The awful performance of Italy’s productivity growth rate is striking not only in comparison with the best performers but also with Southern countries. Figure 2 of Chapter 2 shows that for the latter the increase in productivity growth rate between 1995 and 2007 was widespread across many sectors

(machinery, automotive trade, transport equipment, electrical equipment, textiles and footwear). Indeed the increase in productivity growth of the financial services sector has been impressive: more than 5% on annual basis for the period 1995-07.

Figure 5.2 Labour productivity growth in Italy (annual average, %)

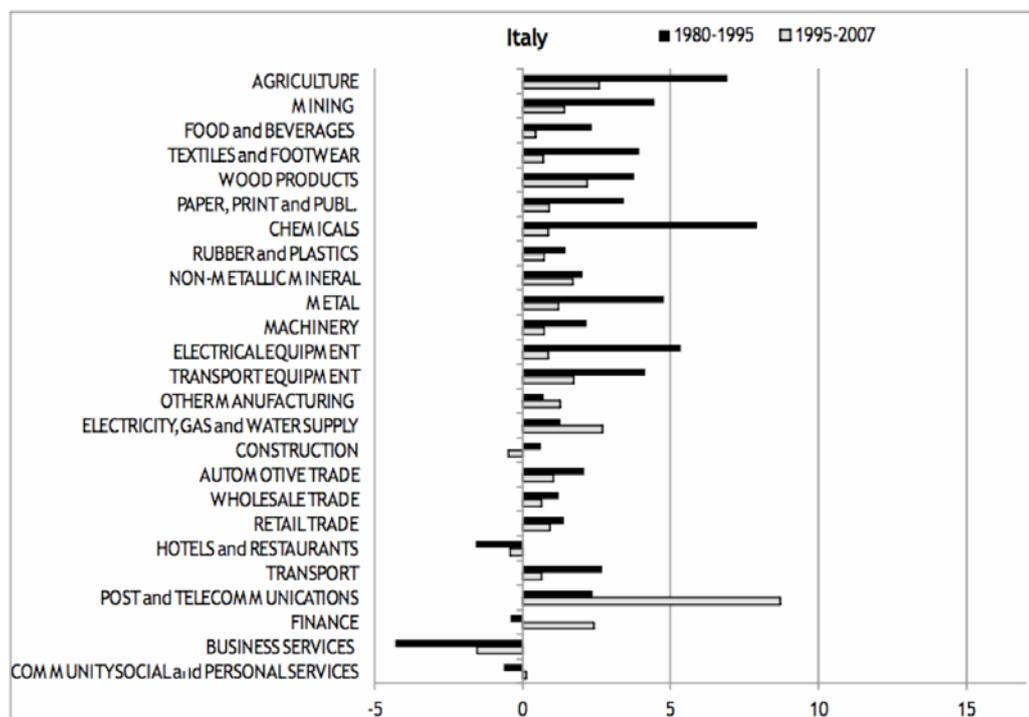


Table 5.1 Multi-factor productivity growth, 1995-2007

	Italy	Continental countries (*)	Nordic countries	Anglo-Saxon countries	Spain (**)
Total	-0,3	0,5	0,7	0,5	-0,7
ICT production	2,4	4,0	8,3	4,3	-0,6
Goods	-0,5	1,6	0,8	0,5	-0,6
Manufacturing	-0,4	2,1	1,3	1,0	-0,4
Other goods	-0,5	0,9	0,1	-0,2	-0,6
Services	-0,3	-0,2	-0,2	-0,3	-0,7
Market services	-0,7	0,0	0,4	1,0	-0,8
Distribution	-0,8	0,9	1,4	0,5	-1,1
Finance & business	-0,1	-0,7	-0,3	1,9	0,9
Personal	-1,6	-0,4	-1,4	-0,6	-2,3
Non-market services	0,1	-0,4	-0,8	-1,6	-0,6

(\*) Continental countries family does not include Luxembourg as data on MFP are not available. 2007 data for Belgium are also not available.

(\*\*) Southern countries family could not be shown as Greece and Portugal data on MFP are not available.

Source: Calculation based on EU Klems.

The widespread interpretation of the dismal productivity in Italy as the result of structural weaknesses is supported by the analysis of multi factor (MF) productivity growth that is a broad measure of the efficiency of labour and capital utilisation, and also, as we have seen in the first two chapters of a number of other variables, including regulation. Looking at Table 5.1 we see that the under performance of the Italian multi factor productivity growth is comparable only to Spain. Only two sectors show positive MF

productivity growth. This is particularly appalling for the manufacturing sector where no other group of countries but Spain has a negative MF productivity growth rate.

### 5.2.1 *The Role of the Service Sector*

A general explanation for the dismal performance in the service sector in Italy is that most of them are characterized by a low intensity of competition. Many service industries are still mainly producing for regional or domestic markets and are only to a small degree involved in international competition. This lack of competition is quantified by Bank of Italy<sup>2</sup> that points out that a large number of market services (retail, transport and communication, banking and finance, insurance, construction, electricity, gas, water, tourism, hotels and restaurants) have higher service sector mark-ups than the average of the other European countries. Although the empirical evidence<sup>3</sup> has shown that there are new channels to open up service markets, an outward orientation of service industries may not be feasible for all services, which is notably true for most personal services. Moreover some services industries do not show characteristics that are favourable for high productivity growth. This is the case with social services (health, education, etc.) where increasing efficiency is not a primary objective: data show that in Italy these services are often provided at high operating costs that vary significantly across regions and administrations.

Among services industries, the productivity gap in Italy is particularly evident in the distribution services (wholesale and retail). Looking at the US and best European performers (see Box 5.1), in wholesale productivity, growth has been mainly driven by operational drivers such as automation, a shift to higher-value products, and improved organization of functions and tasks, as well as by industry dynamics including consolidation at the wholesale and retail levels. Large wholesalers can more easily automate their warehouses to increase productivity. In retail, the main driver of higher productivity is the emergence of a clear productivity leader and a shift to higher-value products. In this view the lagging productivity growth in Italy in the distribution services is partially explained by scale of operations – even though some increase in the average scale is recently taking place – related to the difficulties of doing wholesale deliveries to retail stores in protected historic districts. The small scale hinders prominent productivity increase that are realized by big shopping malls. Moreover land and product market regulation, labour barriers including tax wedges and wage regulations and infrastructure gap create barriers to entry and weaken private investment.

#### Box 5.1 – Sweden's retail productivity revolution

Swedish retail had the highest productivity growth in Europe between 1995-05. This achievement began with the easing of zoning laws in the 1990s. This reform reduced the power of municipalities over new store openings, which led to a more than doubling in the average size of new food retail outlets between 1990 and 2000. This boost in the size of stores was part of a transformation in the structure of Sweden's retailers that included an expansion in the number of shopping centres and a trend towards integrated chains which benefited from scale advantages in purchasing, supply chains and store management and marketing. This, together with an influx of discounters and rise of new channels such as internet shopping, intensified competition. The trend of growth in private labels has increased margins to some extent as retailers captured a larger part of the value chain, eliminating relatively unproductive shops. Finally a greater use of IT technology has significantly improved efficiency of the supply chain and improved assortment and inventory management.

*Source:* McKinsey Global Institute (2010).

Business services firms in Italy have an average size lower than elsewhere in Europe. According to some interpretations,<sup>4</sup> this is why the Italian business sector has a poorer performance than other countries (for e.g. small firms are less able to off-shore some services that can be a relevant source of productivity increase). A particular subgroup of business services, professional services, under perform in Italy mainly because of: a) entry barriers: restriction and reserved rights aim to ensure a certain standard for these ser-

2 Forni et al. (2009).

3 OECD (2005).

4 Giovannetti et al. (2010).

vices, but excessive regulation is likely to reduce the supply of service providers and to hinder competition from more innovative formats; b) price fixing and regulatory requirements: in some cases they reduce incentives to improve efficiency and gains from competition; c) regulation on business conduct: the rationale for these restrictions is consumer protection but they limit completion.

The Italian tourism sector (hotels, restaurants, etc.) suffers from a low quality infrastructure, and of some touristic services – especially in the Southern regions – that impedes Italy to move-up in its market position. The underperformance of the tourism sector also depends on the lack of a focused and coherent tourism strategy where responsibilities for this sector have historically been split between different government levels.

Public service productivity has been widely studied by Bank of Italy.<sup>5</sup> It examines services offered at the central (education and justice), regional (health) and local (local public transport, waste, water, gas and nurseries) levels. In general considerable delays, measured both in terms of quality and efficiency, emerge in the international comparison with wide regional disparities, irrespective of the level of government providing the service. These delays seem linked to the organizational models adopted, the allocation of resources, the wrong incentives to operators and the regulation system. The study also points out the need to expand the information available to improve understanding of problems and the effectiveness of interventions.

Unfortunately the EU Klems database, because of its detailed disaggregation both at the industry and country level, is updated gradually (the latest year available is 2007) so we cannot appreciate the effect on productivity of reforms adopted during the present crisis.

Indeed the crisis appears to have acted as a catalyst for structural reforms. The OECD Going for Growth 2012 analysis points out that, compared to the pre-crisis period, the responsiveness to the recommendations addressed to OECD countries increased widely. Box 5.2 shows the Italian responsiveness in terms of reforms to the recommendations addressed by OECD. A lot has been done especially since 2011. It is likely that these reforms, notably the reduction of regulatory barriers to competition, strengthening incentives for innovation and labour market reforms, will address the delay of productivity performance in Italy, both in the whole economy and in the services sector. So we can expect to find improvements, in future EU Klems data with regards to the performance of Italian productivity. Nevertheless, a lot still remains undone.

An analysis of the existing best practices in Europe suggests further developments to address the productivity challenge in Italy:<sup>6</sup>

- Pulling down barriers to market entry to make room for newcomers and foreign rivals;
- Encouraging reallocation of resources (capital and labour) towards more productive uses, which may require geographical and sectoral mobility, less employment protection and stronger work incentives;
- Fostering attainment levels and quality in education and stepping up life-long learning to help people cope with faster technological change;
- Pushing the speed of technological change through R&D – including by a better balance between legitimate intellectual property protection and the anti-competitive use of patents – and accelerating the diffusion of ICT and innovation;
- Cutting wasteful subsidies and other government expenditure to create space for targeted public support to broadband infrastructure investment, which would allow exploiting the potential of the e-economy more fully.

### 5.3

#### THE MALFUNCTIONING OF LABOUR MARKET

The impact of the recent deep recession on the Italian labour market has been relatively mild in terms of increased unemployment which rose by 3.3 percentage points between the onset of the crisis (second quarter of 2007) and January 2012 to reach 9.2%, an increase smaller than the average rise for the OECD area. The crisis indeed has heavily affected Italian youth (aged 15 to 24), whose unemployment rate was around 33% at the end of 2011.

5 Bripi et al.(2011).

6 McKinsey Global Institute (2010).

## Box 5.2 – Recommendations addressed to Italy by OECD

## Priorities supported by indicators

Reduce regulatory barriers to competition (2007, 2009, 2011)

Recommendations: Reduce barriers to competition in network industries and professional, retail trade and local services.

Actions taken: The December 2011 decree introduced measures to liberalise retail trade e.g. lifting restrictions on shop opening hours and easing various entry barriers, including those for large retailers. Such measures could, however, be partly overruled by the regional authority's territorial policy. The decree also gave the competition authority the power to challenge regulations in the courts. The government introduced significant measures to liberalise the liberal professions and transport services in early 2012.

Improve access to and graduation from tertiary education (2007, 2009, 2011)

Recommendations: Link teacher's careers to performance, introduce tuition fees gradually and income-contingent repayment loans, decentralise the financing and management of universities.

Actions taken: A 2011 law separated university administrative management from teaching and research and reinforced evaluation mechanisms.

Improve the efficiency of the tax structure (2007, 2009, 2011)

Recommendations: Reduce the tax wedge on labour. Shift more taxation to consumption and property.

Actions taken: The 2011 emergency budget raised VAT and introduced an allowance for new corporate equity in company taxation. Labour taxation was reduced for young people and women by making the payroll tax deductible against the regional income tax. A new, higher, local property tax will be introduced in 2012.

*Other key priorities*

Reduce public ownership (2009, 2011)

Recommendations: Reduce state ownership, especially in TV media, transport, energy and local services.

Actions taken: Plans to privatise water services were overturned by referendum in 2011. The new government plans to pursue privatisation.

Reduce labour market dualism (2011)

Recommendations: Relax job protection on standard contracts.

Actions taken: No significant action taken but the new government is considering a comprehensive labour market reform aimed at relaxing job protection on standard contracts. Such reform is expected to be introduced along with a major welfare reform aimed at improving the safety net for the unemployed.

Decentralise wage bargaining (2007, 2009)

Recommendations: Promote greater wage differentiation by decentralising wage bargaining.

Actions taken: The social partners signed (2009) an agreement to promote private sector wage differentiation. The 2011 emergency budget allowed local bargaining to undercut national wage agreements, provided a representative union in the firm accepts to opt out of the collective agreement and signs the new agreement with the employer.

Strengthen incentives for innovation (2009)

Recommendations: Increase R&D tax incentives and improve business-academic research links.

Actions taken: The 2011-13 Budget introduced a tax credit for firms commissioning research activities to universities or public research centres.

Reform corporate governance (2007)

Recommendations: Reform bankruptcy legislation and enhance corporate governance and transparency of financial instruments.

Actions taken: In 2010, disincentives for creditors to lend and obstacles to the participation of shareholders in general meetings were reduced. The December 2011 decree prohibited cross-membership of directors and senior officers on the boards of competing financial institutions.

Source: OECD (2012b)

Moreover, the moderation in the last decade in overall unemployment appears to be entirely due to the creation of fixed-term and atypical contracts while the number of permanent jobs is still falling. This implies that the Italian labour market is becoming more segmented, with more mature workers in stable, protected jobs and many young workers in more precarious jobs.

The labour market dualism leading to unsustainable differences among insider and outsider workers and low employment rates are the two prominent shortcomings of the Italian labour market. There is also

a major problem of mismatching between wages and productivity trends that lead the unit labour cost in Italy to be notably higher than in other advanced countries. The paragraph below will try to address these issues.

### 5.3.1 Employment rate

Following significant labour market reforms in the late 1990s and in the early 2000s (see Box 5.3), labour market outcomes have improved substantially in Italy but employment rates in Italy continue to be substantially lower than in other OECD countries. In 2010 only Turkey and Hungary had a lower rate (Figure 5.3). Indeed employment rate for women in Italy shows an even higher gap than the overall. Additionally the employment rate of older workers (55-64 years) is lower in Italy than in the other OECD countries.

Figure 5.3 – Employment to population ratio in Italy, 2012  
(% population, age 15-64)

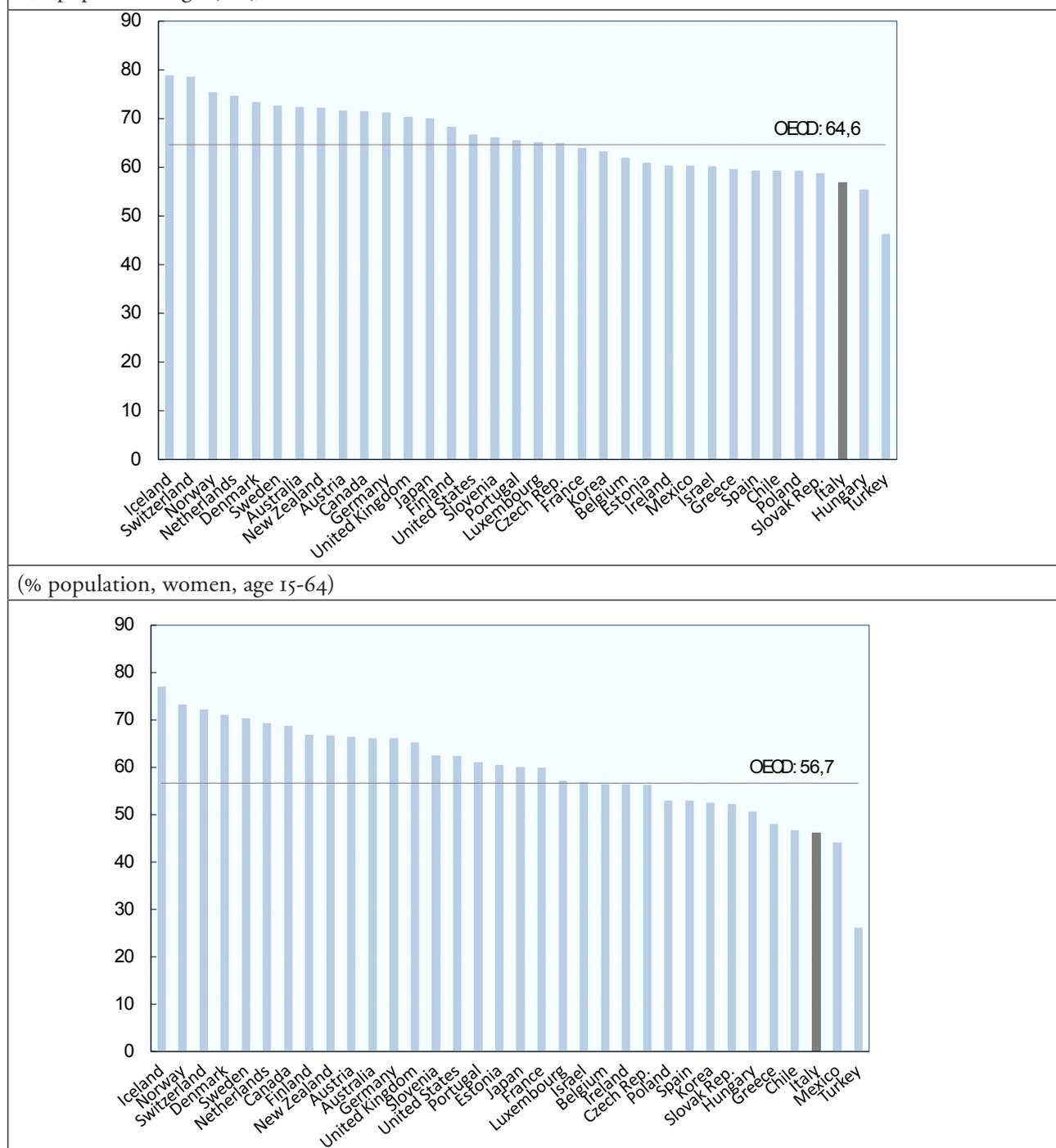
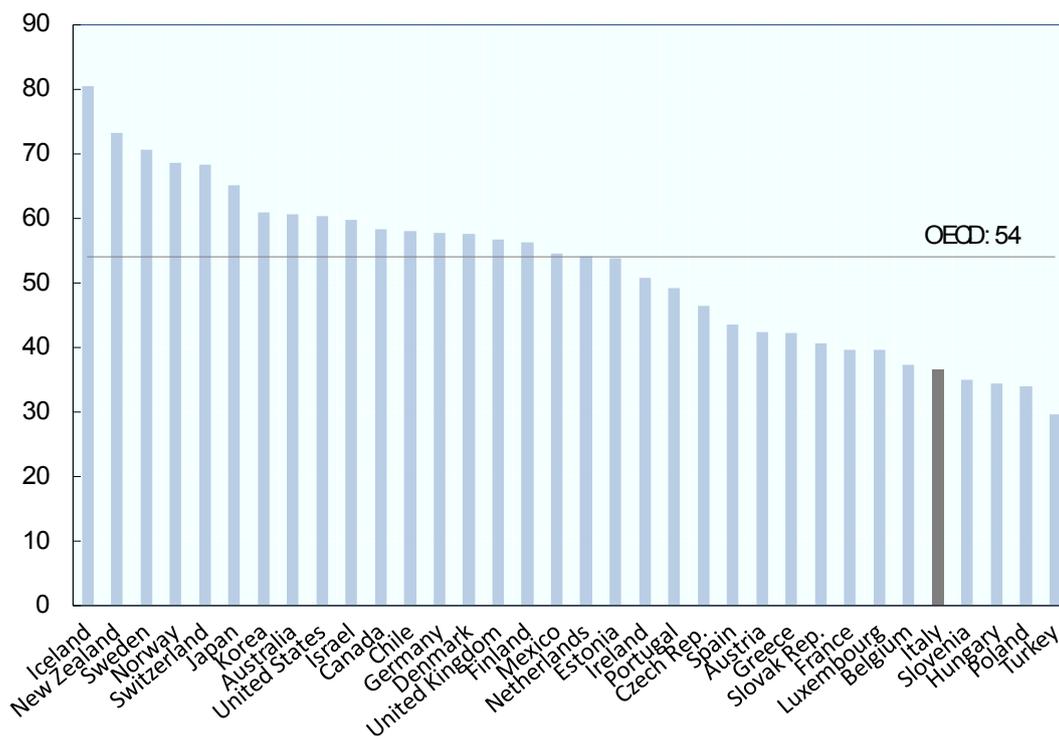


Figure 5.3 – Employment to population ratio in Italy, 2012  
(% population, older workers, age 55-64)



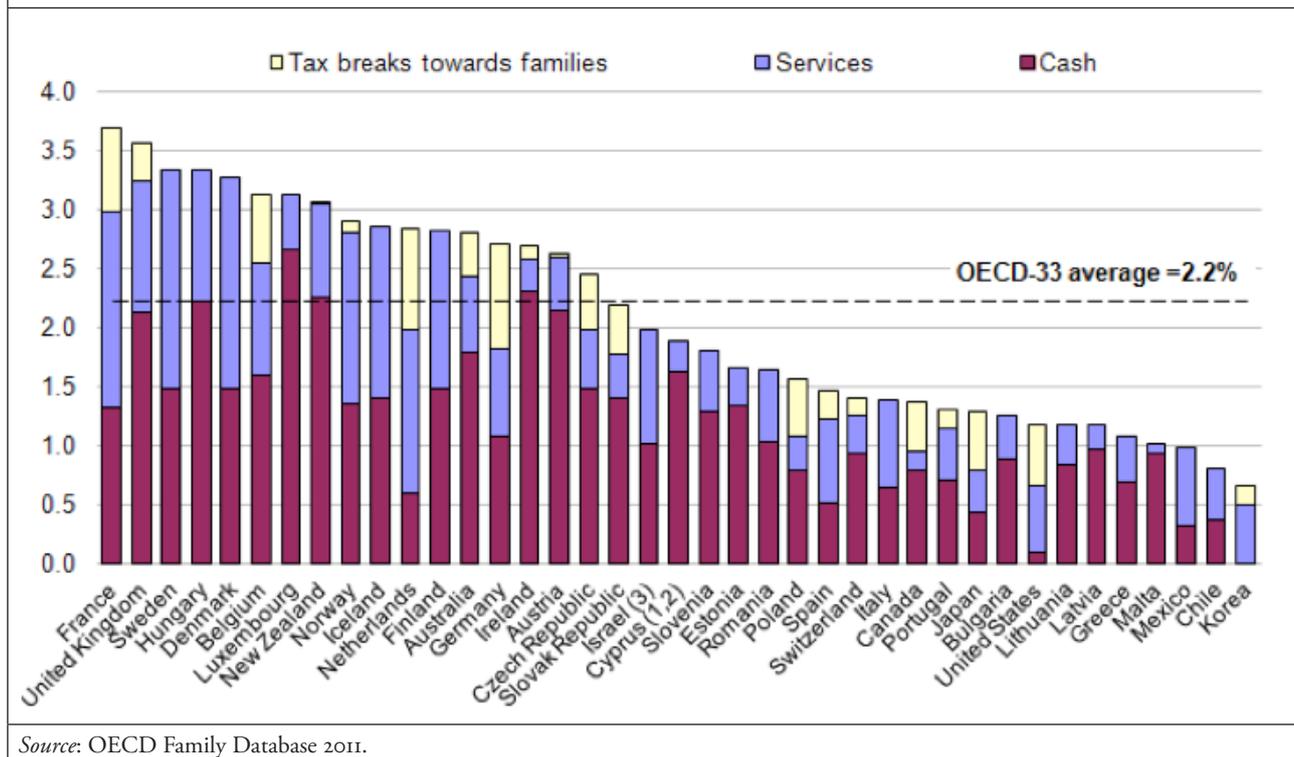
Source: OECD Employment Database.

#### Box 5.3 – Reforms aimed at increasing flexibility of the Italian labour market

The Treu reform adopted in 1997 introduced the first legislative measures meant to increase the employment rate and overall labour market flexibility. They aimed at increasing flexibility via labour market reform “at the margin,” mainly by introducing temporary contracts and providing incentives for part time work. Another law in the same year abolished the principle of a public monopoly on employment services. Efforts to increase labour market flexibility were taken forward with the 2003 Biagi reform. This reform further deregulated the use of atypical work arrangements, such as temporary agency work and part-time work, and introduced new forms of atypical work arrangements such as on-call jobs, job sharing and occasional work (*lavoro a progetto*).

Such a low rate of employment represents a major source of reduction in potential growth for Italy. The low female participation rate is largely related to difficulties of women in covering both an outside-home job and their family’s care obligations that could be decreased through an adequate policy of public spending on family benefits. These expenditures mainly include: child-related cash transfers to families with children (child allowances that vary with the age of the child and sometimes are income related, public income support payments during periods of parental leave, etc.); public spending on services for families with children (direct financing and subsidies for childcare providers and early education facilities, public childcare support through earmarked payments to parents, public spending on assistance including centre-based facilities and home help services for families in need); financial support for families provided through the tax system (tax exemptions, child tax allowances or tax credits, etc.). According to OECD analysis, Italy spends at least 1.4% of annual GDP on family benefits against the OECD average of 2.2%. France and UK spend more than 3.5% of GDP on these benefits; Scandinavian countries are all around 3% (Figure 5.4).

Figure 5.4 – Public spending on family benefits in cash, services and tax measures,% of GDP, 2007.



Source: OECD Family Database 2011.

The increase in the participation rate of older workers is mainly a matter of introducing the right incentives in the pension system. The December 2011 Italian pension reform should boost senior employers participation, but other policies, both on the demand and on the supply side, could have significant effect. The success of the Netherlands in this field is described in Box 5.4.

#### Box 5.4 – The Netherlands boost older workers' participation

The Netherlands has undertaken a reform that raised the participation rate of the 55 to 64 age group by 24% between 1990 and 2009. The main provisions adopted concern:

**Pension incentives:** pension schemes were allowed to include minimum retirement age of 63 years but only with 40 years of contribution; statutory age of retirement fixed at 65; new provisions to make early retirement less attractive.

**Non-pension financial incentives:** revision of disability pathway toward early retirement; reduction of the duration of unemployment benefits; introduction of job-search requirements for older unemployed.

**Employers' behaviour/incentives:** introduction of task-force to change employers' perception of older workers and of anti-discrimination legislation; new guidelines for redundancies; promotion of civil society involvement.

**Employability:** making training available for older workers, decentralized and specialized employment services.

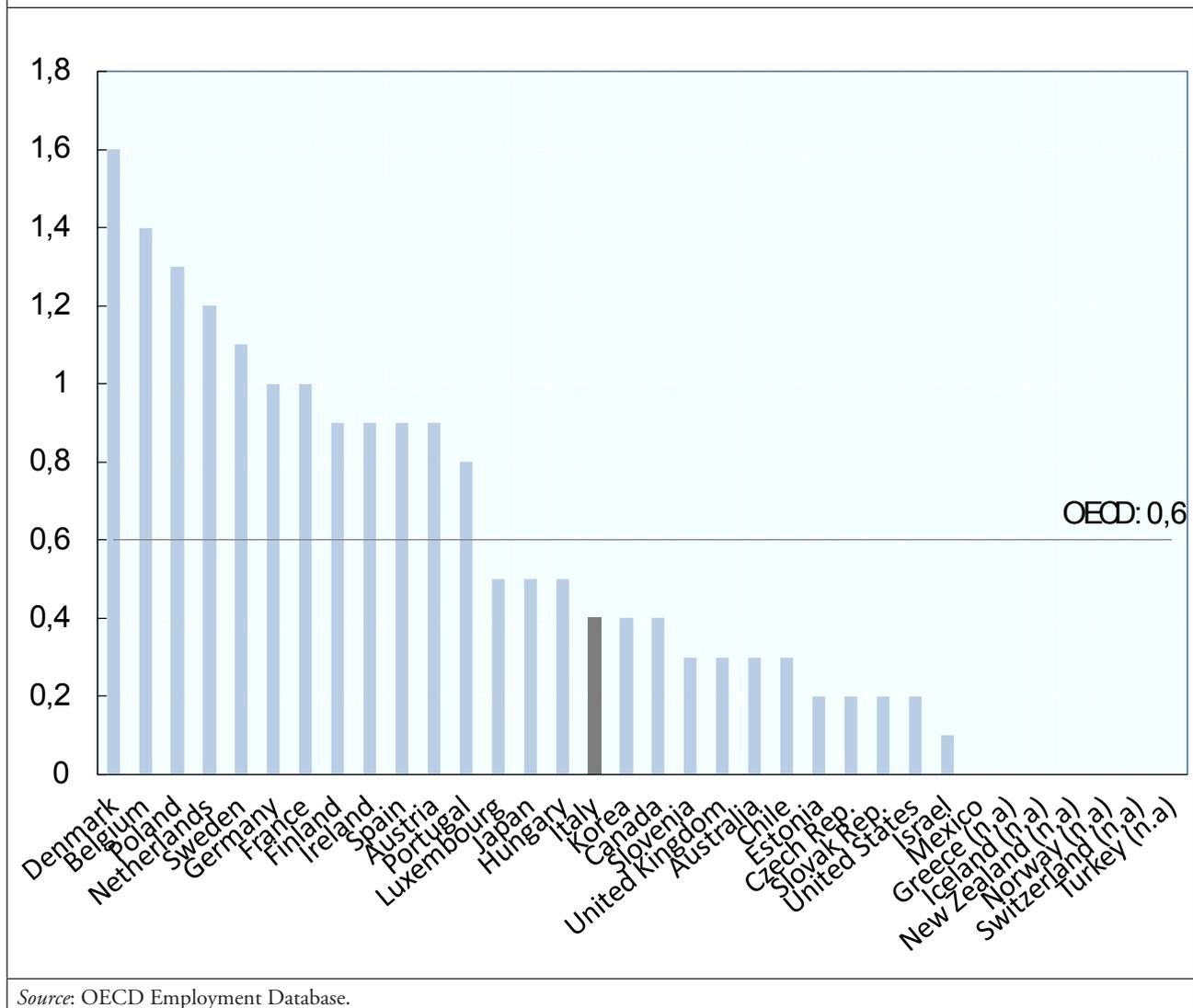
Source: McKinsey Global Institute (2010).

A final remark on the low employment rate in Italy concerns the poor investment in active labour market policies (ALMP), the public programmes that intervene in the labour market to help the unemployed find work. There are three main categories of ALMP:

- Public employment services, such as job centres and labour exchanges that help the unemployed improve their job search effort;

- Training schemes, such as classes and apprenticeships that help improving unemployed vocational skills and hence increase their employability;
- Employment subsidies, either in the public or private sector that directly create jobs for the unemployed. These are typically short-term measures which are designed to allow the unemployed to build up work experience and prevent skill atrophy.

Figure 5.5 – Public expenditure on labour market policies (Active measure, % of GDP, 2009)



According to OECD data (Figure 5.5), public expenditure for ALMP in Italy is 0.4% of GDP, below the OECD average (0.6% of GDP), and far below the levels of Germany and France (around 1% of GDP) and Denmark and Scandinavian countries (around 1.5% of GDP).

The German labour market reform described in Box 6.5 shows that these policies can play a crucial role in sustaining employment.

#### Box 5.5 – Germany's labour market reforms

Between 2003 and 2005, under the so called Hartz Laws, Germany increased the effectiveness of its labour market services. For example, Germany reorganized its local employment agencies in order to be more accountable for their results and more focused on targeting specific profiles among the jobless.

## Box 5.5 – Germany's labour market reforms

It enforced the principle of “rights and responsibilities” among the unemployed. On one hand, Germany modified the rules for entitlement to unemployment and social assistance, reducing the duration and generosity of the benefits, and encouraging the proactive behaviour of unemployed. On the other hand, it adopted smart regulation of the labour market, facilitating new forms of employment for temporary workers. From 2005 to 2008, the number of unemployed in Germany decreased by one-third and, when the world economic and financial crisis hit, the reforms afforded the economy a measure of insulation. The impact of the crises on employment has been quite limited, with only a 0.5% rise in unemployment rate compared with 3 points of average increase in the OECD countries. A major contributor to Germany's relative resilience on employment was also its widespread use of the short-time worker scheme – *Kurzarbeit* – under which the Federal Employment Agency can subsidise part of the forgone income of employees if a company reduces working time for economic reasons. The subsidy scheme prevented companies in temporary distress from laying off workers if the jobs seemed viable in the long run. It will be important however to adjust the scheme and allow for changes in longer-term demand once the repercussions of the crisis have vanished.

To quote Megan Felter (2012):

*“In mid-2009, over 1.4 million workers and 63,000 employers participated in the program. The “largest work sharing program [] in the world, “Kurzarbeit cost the German government an estimated €5 billion but saved more than 200,000 jobs by the latter half of 2009. Under Kurzarbeit, employees working reduced hours receive a “short-time allowance” of 60% of their former full-time wages, or 67% if they have a child. Workers receive the short-time allowance from their employers. In turn, the employers submit monthly accounts to the government and are reimbursed for the funds paid in excess of the workers’ net hourly compensation. Vacation and holiday pay, however, remain the employers’ responsibility. Employers must also make social insurance contributions, although provisions limited the contributions for lost hours to 80% of normal contribution payments. The government does, however, reimburse the employer for half of these payments during the first six months, and after six months, the government is responsible for the full amount of social insurance contributions”.*

Source: McKinsey Global Institute (2010)

Finally the issue of regional disparities for employment rates is also important to consider because they are notably lower, especially for women, in the South of Italy. All the employment-boosting policies mentioned above would be useful in increasing employment rates in the Southern regions, but some decentralization in bargaining would probably be useful. A decentralized system, which integrates regional differences in productivity and cost of living into wage-setting could reduce regional participation rate disparities.

### 5.3.2 Dualism in labour market

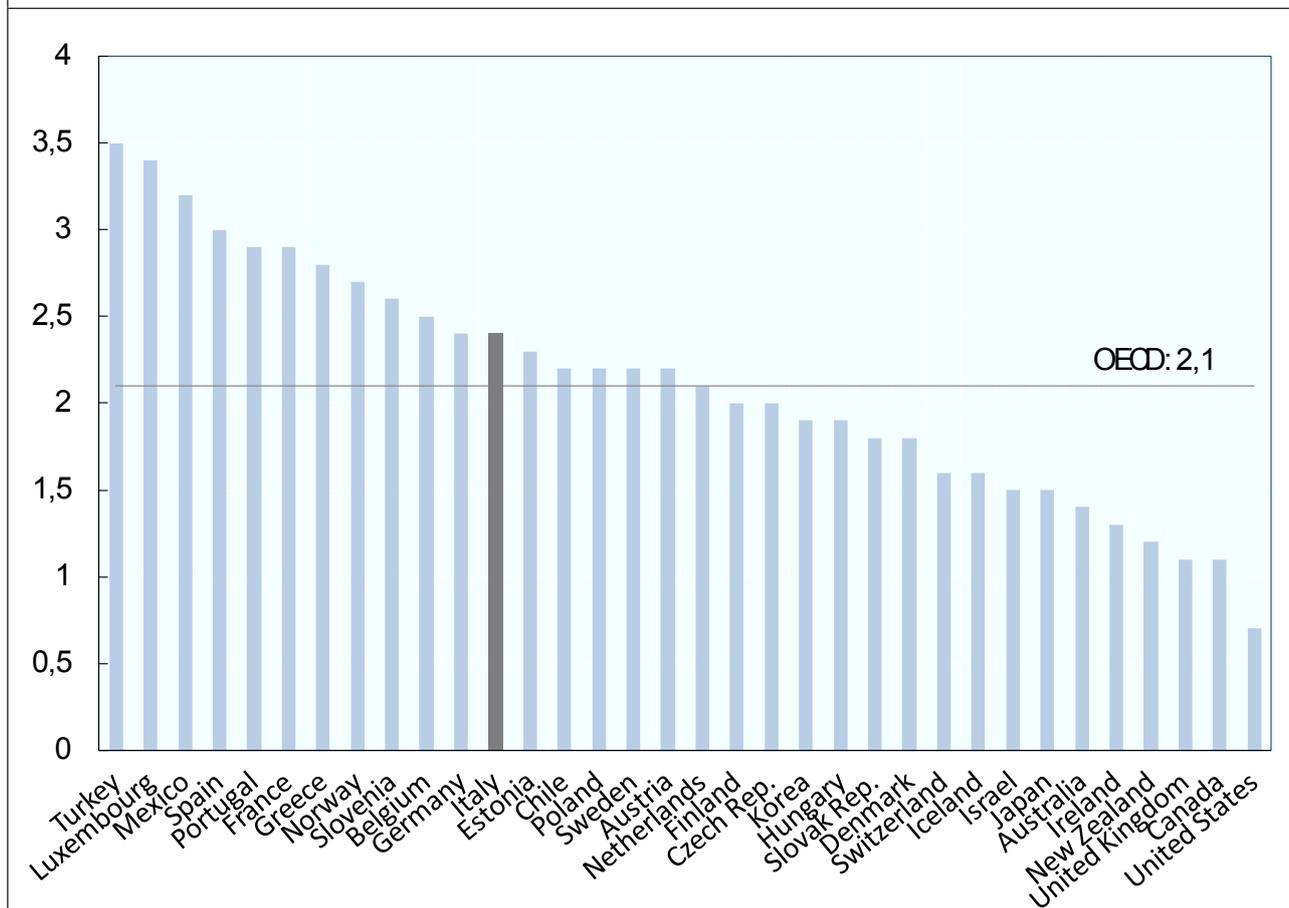
Contrary to common wisdom, the Italian labour market is not particularly rigid. This is confirmed by the OECD Labour database which shows (Figure 5.6) that Italy has an overall employment protection slightly above the OECD average.

Hence Italy's labour market is more flexible than that of Germany or France. Among the three indexes Italy has a strictness of legislations which are below average both in terms of protection against individual dismissal and in the regulation of temporary forms of employment. However, the specific requirements for collective dismissals are the narrowest and their procedure cumbersome. Furthermore, the rules for reinstatement following unjustified dismissal are stricter than the OECD average, procedures entail long lags in court decisions and the outcome of litigation is often uncertain.

Despite that, the Italian labour market represents an average of two extreme markets. That is mainly because: a) there are specific aspects of legislation that contribute to dualism and low creation of permanent jobs; b) standard contracts are more expensive. Thus, one side of the story shows that permanent highly protected workers with high gross costs both directly in terms of high fiscal and contributive wedge than indirectly in terms of social rights and firing costs are in majority in Italy. The other side shows that

there are many temporary workers who face lower firing costs, fiscal wedge and social security charges. This is illustrated in Table 5.2 below that shows the composition of Italian employment (excluding self-employed), the contributive wedge and the level of social rights for each group. The result suggests that among the reasons why Italian companies resort to non-standard contracts it is certainly prominent the attempt to decrease the gross component of wages that is too high for permanent contracts.

Figure 5.6 – Employment protection legislation (overall strictness, scale 0-6, 2008)



Source: OECD Employment Database.

Table 5.2 Italian Employee contract structure (2010)

	Share over total employees	Contributive wedge	Social rights
Permanent workers	80.1	35-42%	f
Temporary workers	6.7	35-42%	f
Apprenticeship	1.7	10%	r
Other short-term contracts	2.2	0-42%	f-r
Occasional workers	6.1	27%	r
Placement and others	3.2	0%	r

Other short-term includes: CFL, “*Contratto d’inserimento*”, “*Interinale*”, *Job-sharing and Job-off*.

Occasional workers includes: “*co.co.co*”, “*occasionale*” and “*progetto*”.

Others includes: stage, “*tirocinio*”, “*pratica professionale*” and others.

Social rights: f=full, r=reduced according to ISTAT definition. Source: ISFOL Plus 2012, ISTAT, INPS.

Contributive wedge includes all social security security charges.

Source: ISFOL Plus 2012, ISTAT, INPS.

Employment protection is disproportionately distributed even for the first group of permanent workers. In fact the employed people covered by Article 18 of the *Statute of workers*, (workers sheltered by mandatory reinstatement for unfair dismissals), are a minor percentage of employed people. Ichino (2011) computes that just 6 million private employees and 3.5 million public employees out of a total number of employed people of around 23 million in a workforce of over 25 million benefit from this protection.

This framework gives firms little incentive to invest in training and retaining employees as non permanent workers can be hired at lower gross costs and fired extremely easily (especially during periods of high-unemployment such as at present). It also discourages hiring of permanent workers as, during a downturn, firms find it difficult and onerous to dismiss those workers. There is also evidence indicating that a pervasive dual system, with a flexible temporary workforce and a highly protected permanent workforce, can actually increase unemployment (Blanchard and Landier 2002; Jaumotte 2010; Dao and Loungani 2010).

The adverse effect on productivity and growth caused by overload dualism in the Italian labour market has been illustrated by IMF (2011). The economic and regulatory benefits of temporary contracts reduce incentives for human capital investments and temporary employment creation tends to be in low-skill areas. Hence, reforms to rebalance such gross costs and regulatory bias along with a view to support job creation would give firms more incentives to invest on newly hired workers and to take on more deserving workers on a permanent basis.

The reduction of the segmentation of the labour market should be accompanied by a comprehensive reform of the currently fragmented unemployment benefit system. As confirmed by the last column of Table 5.2, dualism in labour market policies is indeed mirrored in dualism in social rights included the unemployment protection system: Italy's social safety net is generous for some worker groups, but virtually non-existent for others. As a consequence, rising shares of workers face high employment risk but little income insurance.

The ongoing labour market reform in Italy is trying to address some of the specific concerns outlined above. Box 5.6 briefly describes the proposal made by Monti's Government to Parliament.

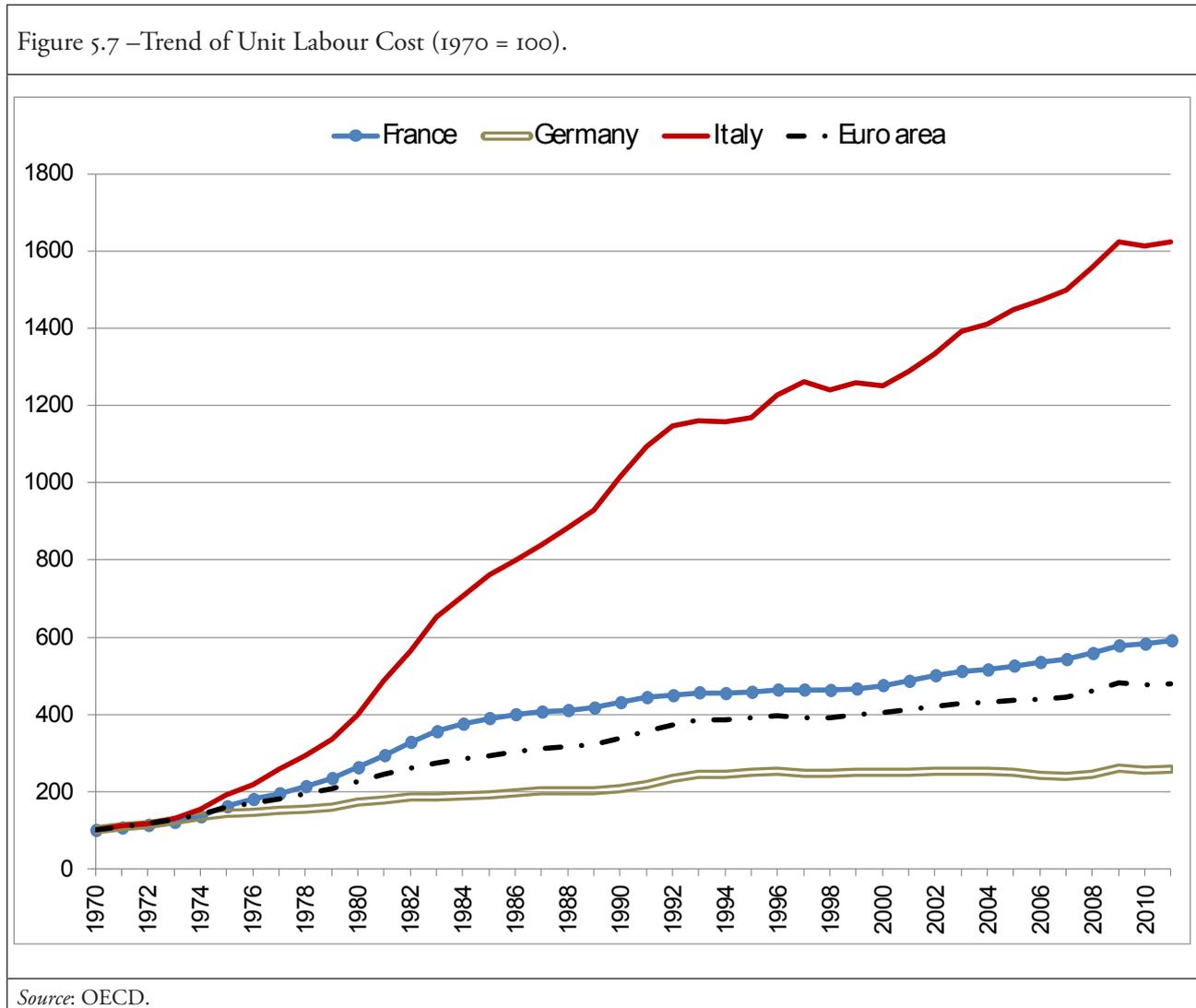
#### Box 5.6 – Monti's government labour market reform

The ongoing reform addresses the detrimental "dualism" of the Italian labour market by rendering temporary contracts more costly and reducing employment protection on permanent contracts. By expanding unemployment benefit to workers (temporary and permanent) from all sectors, the reform would also render the Italian labour market more equitable and bring it in line with European standards. The reform's main innovations are:

- 1) Changes in the provisions of Article 18 of the Statute of Workers (on mandatory reinstatement for unfair dismissals): In Italy, as in many other European countries and very differently from the US system, disputes between workers and management over termination are part of the legal system. According to various analysis, over time some features of the Italian approach have led to excessive rigidity and are relevant sources of precariousness. The reform address a specific feature: until now, if a judge found that a worker had been unfairly dismissed, the employer was obliged to reinstate the worker to his/her previous post, and pay compensation. In the government proposal, only if the dismissal is found to be discriminatory (i.e., on the basis of race, sex, religion, political or trade-union activities and participation in a strike) mandatory reinstatement would apply. Otherwise, the judge will decide between the reinstatement and the compensation. In unfair dismissals for economic reasons (firm restructuring), the worker will be entitled to a compensation (maximum 24 monthly wages). Only in those cases where the judge finds that restructuring has clearly not taken place will the employer be obliged to reinstate the dismissed worker.
- 2) Disincentives against temporary contracts: Firms will have to pay an additional 1.4% contribution on wages for temporary contracts. These revenues will fund extended unemployment benefits (see below). Free traineeships/internships will be allowed only during periods of schooling and university attendance.
- 3) Extended social safety net: Several sectoral unemployment benefits will be substituted by a universal benefit. This will cover all workers (temporary and permanent) from all sectors that can demonstrate to have worked 1 year in the previous two years. It will provide 75% of the latest wage for the 12 months following dismissal (18 months for workers older than 55). There will also be a "mini-benefit" for those with at least 13 weeks of contribution in the preceding 12 months. The universal benefit will come into force in 2017.

### 5.3.3 Wage bargaining setback

During the last forty years wage bargaining in Italy has not been able to ensure that wage growth reflects productivity developments. The mismatch between wages and productivity evolution is the main source of the increase in unit labour cost that is significantly higher than in the largest euro area countries (Figure 5.7).



In Italy, wage bargaining is rigid.<sup>7</sup> About 60% of Italian workers are formally covered by collective bargaining agreements, a higher percentage than other European countries, being the effective coverage even higher.

The coordinated bargaining entails greater wage compression, with negative effects on relative employment, especially at the bottom of the wage distribution (Blau and Kahn, 1996). Centralized wage bargaining institutions tend to raise the relative wages of the young and less-educated and to lower employment for these groups (Kahn 2000). Wage compression also modifies the industry distribution of employment, shifting employment away from industries with low wages (Davis and Henrekson, 2000), and can exacerbate regional employment disparities. Bertola et al. (2002) highlight how centralized wage-bargaining together with a high degree of unionisation lowers the female employment rate, while preserving a high employment rate for prime-age men, as the unions tend to negotiate large wage premiums for those with a high opportunity cost of employment. The European Commission (2010) estimates that wage mark-up reductions would have significant positive impact on long-run growth. Eichengreen and

7 Schindler (2009).

Iversen (1999) contend that as growth becomes increasingly reliant on rapidly changing, science-based, skilled-labour-intensive technologies, countries with centralized wage bargaining will have to move further in the direction of decentralization.

Currently, although the bargaining system in Italy has not resulted in excessive average wage growth compared to other European economies, it has provided insufficient differentiation, leading to wage outcomes that are too restrictive for some subsets of the economy. The Italian two-level bargaining system leaves little scope for many firms to engage in firm-level negotiations, specifically for small enterprises. As a result, a predominance of nationally negotiated wages over those at the firm level exacerbates regional differences in economic development. Nationally negotiated minimum wages are less binding in the North, but too high for the South. This has two effects: first of all it increases unemployment or, more likely, irregular work, secondly it tends to perpetuate differences between wages and productivity. Indeed the lack of a broad social safety net, particularly in the Southern regions, prevents sufficient geographical mobility that could reduce regional disparities faster.

An extended use of second-level bargaining is crucial to obtain a more flexible and differentiated wage structure. A step in this direction has been taken through the June 2011 agreement (see Box 5.7) between unions and employers' representatives that confirms the validity and effectiveness of decentralized bargaining which may introduce derogations to industry-wide agreements.

Box 5.7 – Agreement for participation in industry-wide bargaining

On 28 June 2011, an agreement was signed by Italy's major union confederations Cgil, Cisl and Uil and employers' federation Confindustria. It introduces new rules on the certification of representativeness for participation in industry-wide bargaining at national level, and on the validity of company deals. It also heals the rift created between the social partners in 2009 when Cgil refused to sign an agreement on the reform of the bargaining structure. The new inter-sectorial agreement of 28 June 2011 represents the implementation of one of the main provisions of the January 2009 Framework Agreement, clause 17 of which envisaged the introduction of rules on representativeness. However, it also provides a set of rules that can be used to solve problems raised by possible divergences over the content of company-level bargaining, and particularly to guarantee the validity and effectiveness of decentralized bargaining which may introduce derogations to industry-wide agreements.

#### 5.4

##### HUMAN CAPITAL AND EDUCATIONAL SYSTEM IN ITALY

In modern economies higher education plays a crucial role in creating and spreading new knowledge and fostering innovation. Higher education institutions contribute to human capital development, providing individuals with the right skills needed to underpin the type of knowledge-based economy that allows countries to compete globally.

Higher education attainment also has a positive impact on employment outcomes: university graduates show higher rates of employment than individuals with lower levels of qualification. In addition, forecast for skill requirements in the advanced economies for the coming ten years show an increasing demand for highly skilled workers that will need to be satisfied.

The literature on economic growth shows that higher growth in human capital contributes to higher output growth. A well-functioning tertiary education system has indeed a positive impact on productivity: European Commission (2011e) estimates show a relative strong correlation between levels of higher education attainment and overall economic output, in terms of GDP per capita.

Because of globalization, Europe's industry specialization is changing: employment is shifting from primary and basic manufacturing sectors to knowledge-intensive activities which require a high-skilled workforce. As a result, investment in tertiary education becomes essential as it contributes to increase a country's ability to innovate.

Realising the potential contribution of the higher education system is therefore of crucial importance to economic growth especially for a country like Italy suffering from a dismal productivity performance.

In the sub-section below we will provide a description of the Italian higher education system mainly based on a recent OECD analysis.<sup>8</sup> A number of indicators of the country's performance in education attainment show a persistent gap between Italian universities and those of other advanced economies. These results indicate that disappointing productivity growth in Italy may be in part explained through the low learning outcomes of the higher education system.

#### 5.4.1 *The Italian higher education system can perform better*

According to OECD, when comparing the overall investments made in high-end skills and their use in different countries, the Italian labour market is characterised by low tertiary attainment as well as low employment rates among those with a tertiary education (Figure 5.8). In 2009 the proportion of the working-age population with a tertiary degree in Italy was 15%, only half the OECD average and the employment rates of those with a tertiary education reached 79% against the OECD average of 84% (and 74% in Turkey, the lowest among OECD countries). The share of second-cycle (research) degrees, although in line with the EU (27) average, remains significantly lower in Italy than in other European countries. In 2009 only 1.6 new PhD degrees per 1000 people were awarded in Italy against 3 graduates in Sweden and Switzerland.<sup>9</sup>

Further, a proxy for the quality of higher education can be found in the international rankings of universities which show that the best Italian universities lag behind the world leaders. According to the Shanghai ranking in 2011 none of the Italian universities is in the world top 100 universities (only 4 in the Top 200). Italian universities do not appear to be internationally competitive: net emigration of Italian high skilled individuals is large and it is not offset by immigration of high skilled people from other countries. In 2009 only 3.3% of all students in universities in Italy were foreigners, compared to almost 21% in the United Kingdom, 11.5% in France and 10.5% in Germany.

There are different underlying factors that affect foreign students' choice of Italy as a country of study or research. First of all, the language is a huge barrier as very few programmes are taught in English. Secondly Italy has a severe lack of students and high-level scientific facilities even if living costs are as high as in other European countries. The low scientific prestige of Italian institutions, as shown by the international rankings of universities, the underdeveloped level of international scientific networks and cumbersome administrative and immigration procedures for admission are factors that exacerbate the non-attractiveness of the Italian higher education system. In addition, according to the OECD, around 70% of the Italian brain drain is permanent (despite recent measures adopted to encourage the return of high skilled people – including tax credits and special channels of temporary recruitment – which appear to have little long-term impact).

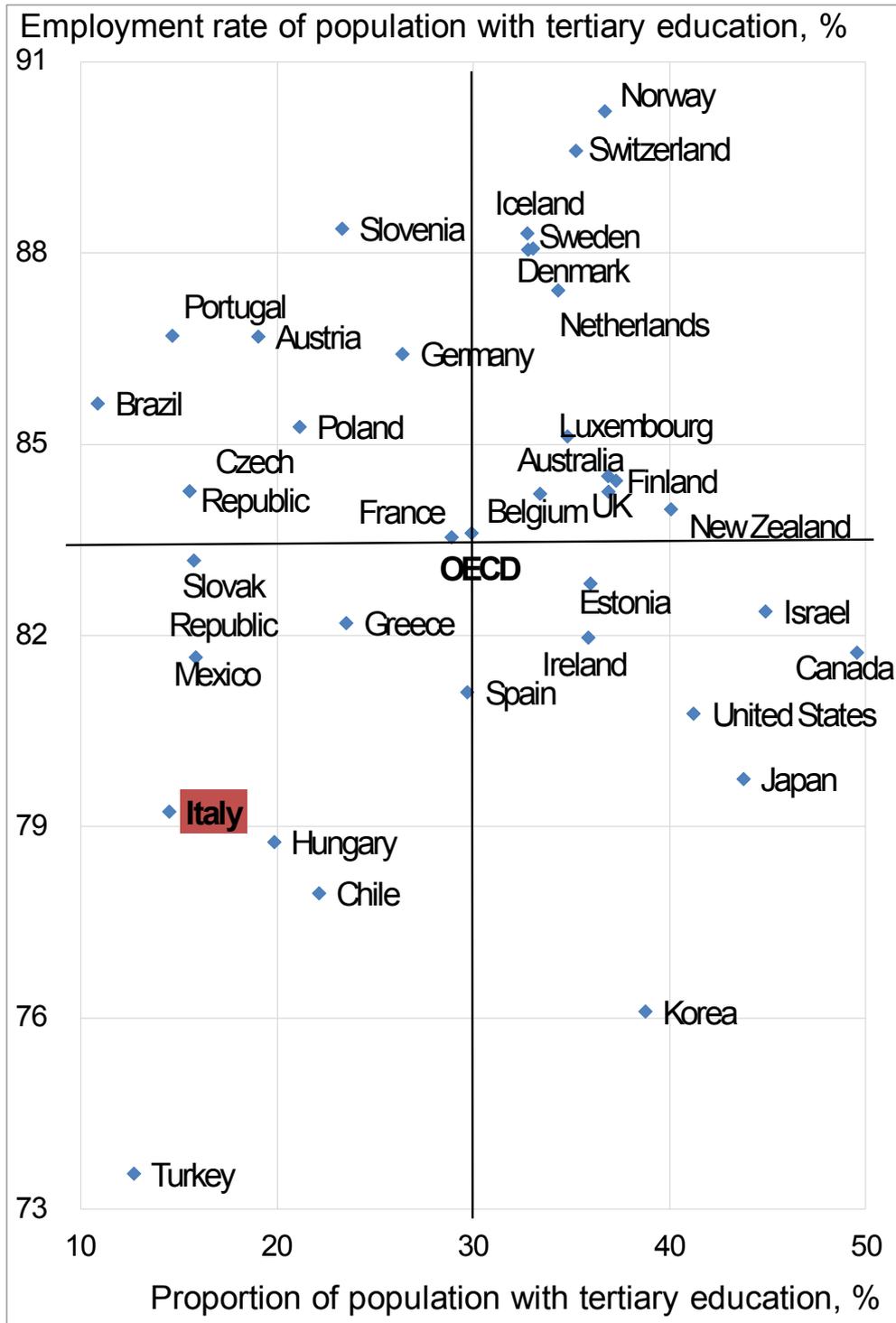
Furthermore, financial resources invested in tertiary education are lower than in other countries: in 2008, annual expenditure per student was 47% less than the OECD average; corresponding to 1% of GDP compared with an OECD average of 1.9%. Public expenditure on higher education as a share of total public expenditure was 1.7% versus 3.0% of OECD and 2.7% of EU27. Due to fiscal consolidation goals, increased spending in education is off the agenda, thus improving higher education learning outcomes needs efficiency-enhancing measures.

The geographical fragmentation of the university system can explain the high number of courses and programmes which have been activated in the past two decades: the median class size in tertiary programmes is less than 50 students (75 when excluding numerous *clauses* programmes). Rationalisation of the supply of academic courses can contribute to a more efficient use of limited resources. The OECD suggests that investment in professional/vocational tertiary education institutions (“Istituti Tecnici Superiori – ITS”) should continue.

8 OECD (2011c).

9 UNU-MERIT (2012).

Figure 5.8 – Skill acquisition and use, 25-64 year-olds with a tertiary education (2009)



Source: OECD (2011c).

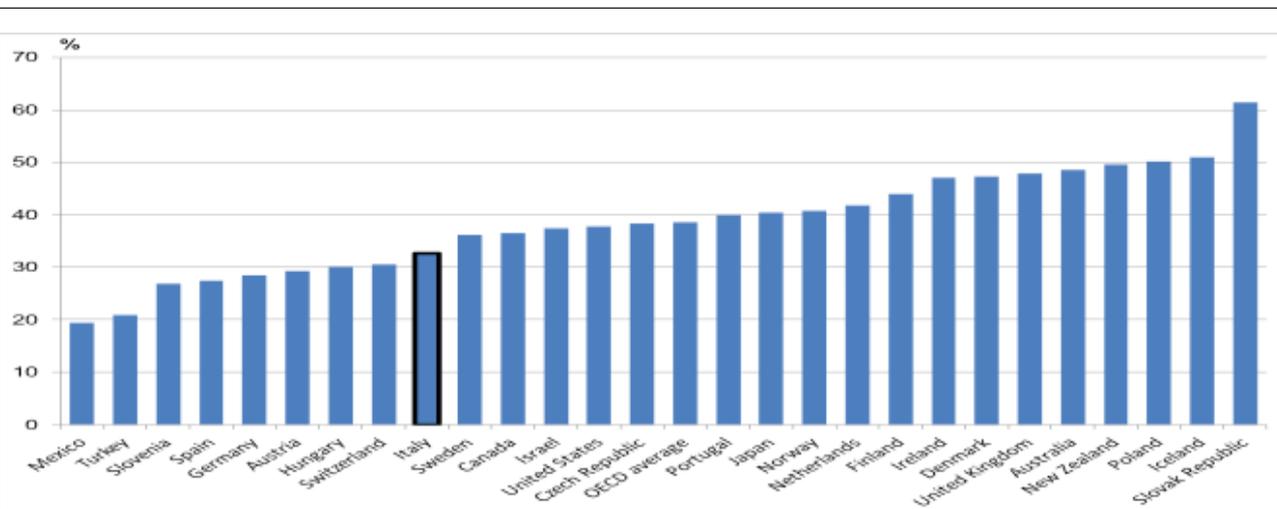
Italy shows low course completion rates, ranking 19 out of 27 OECD countries and again below the OECD average (see Figure 5.9). In addition, Italian students graduate later: most students graduate one year after the theoretical end of studies and the tail of the graduation remains long. These results have not been changed by the move to the two-tier system underlying the Bologna process since the graduation rates of students finishing on time decreased. These results, combined with the a high dropout ratio, significantly increase the cost of tertiary education, produce congestion of the universities (OECD 2011c) and lower the reputation of the diplomas for completing students.

### Box 5.8 – Moving toward more performance-based careers in Italian Universities

Italian universities are moving toward more performance-based careers and salary progression abandoning seniority-based systems. So far entry-level researchers have been earning significantly less than in other countries. Law 240/2010 raises entry-level salary for tenure-track faculty by 50%. Under the old system wages increased very quickly with seniority and independently of any criteria of academic and scientific performance, with the result that average and maximum wages for older staff are higher than in other countries. There is evidence that by the end of their career, Italian tenured professors may be earning as much as 95% of the salary of an American peer with higher productivity. Much of the growth in university budgets in recent years has gone to finance the consequences of earlier waves of promotion of senior staff (from *associati to ordinari*). However, in reality, career advancement (and salary progression) should be linked to performance (in teaching, research and patenting). Contracts could be for a fixed (and limited) number of years on initial appointments, followed by a tenure conditional on a strong record of published research, teaching and administrative service.

Source: OECD (2011c).

### Figure 5.9 – Graduation rates at tertiary level (2009).



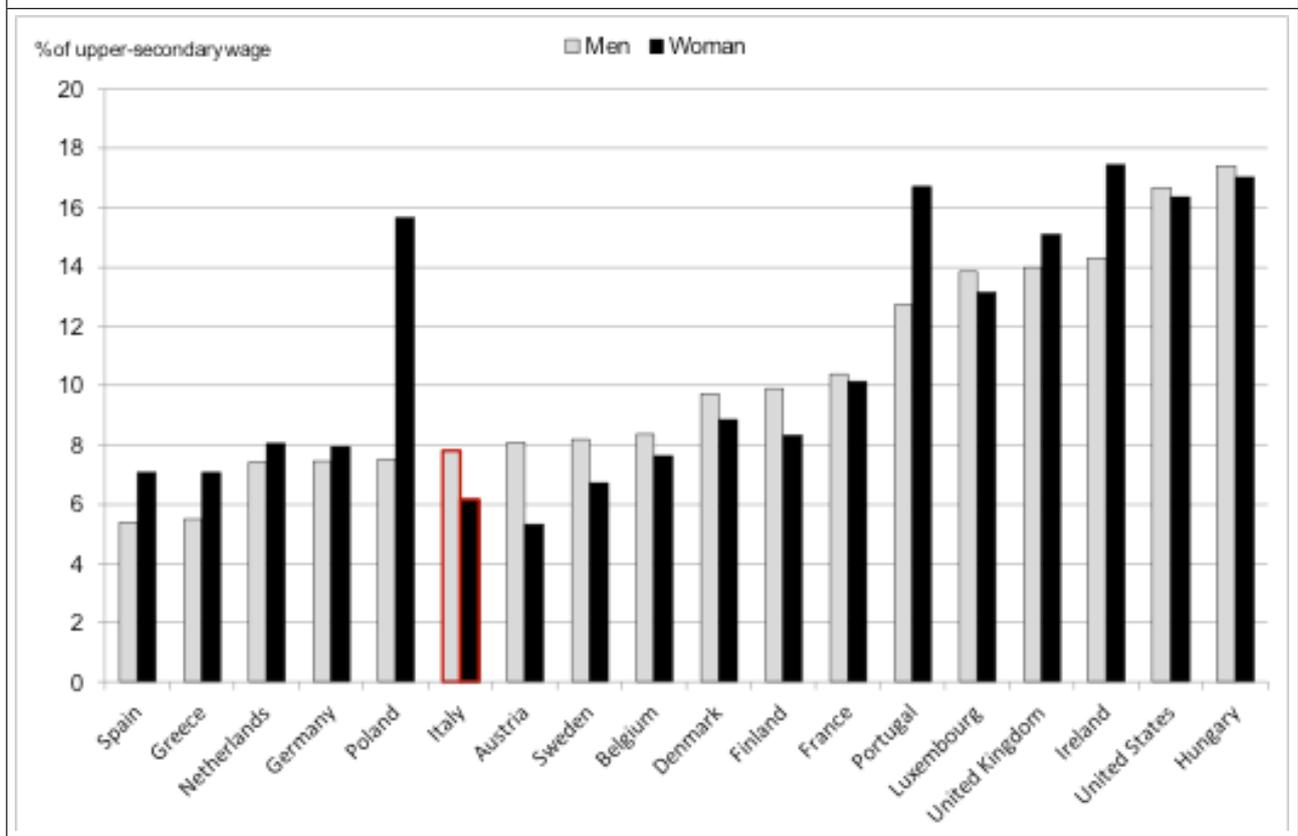
Source: OECD (2011c).

Labour market indicators also provide information on the performance of Italian tertiary education: wage *premia* of graduates in Italy are lower than in most other OECD countries (Figure 5.10). This suggests some “under pricing” of higher education in Italy even though we are aware that wage premium statistics also reflect some “inequality at the top” due to oversized multi-million compensation for CEOs, lawyers, consultants, etc., that is more widespread in some countries (USA, UK) than in other (Germany, Sweden). Entering the labour market is also more difficult for Italian young graduates: in 2009 unemployment rates of tertiary degree holders in the age group 25-29 was as high as 10%, compared with 6% in the OECD area.

The underperformance of tertiary education restricts the supply of skilled professionals. According to European Commission forecasts, in the coming ten years, there will be a lack of high-skilled workers especially in sectors important for innovation (ICT, environment R&D). This shortfall combined with the relatively high level of unemployment rates of high skilled workers in Italy provides for a skill-mismatching that must be reduced. Skill mismatch can be determined by the under performance of universities in different ways: the demand for highly-skilled workers is not completely met (Figure 5.11); according to the OECD results Unioncamere (2011) finds that the majority of the Italian employers hit upon short-

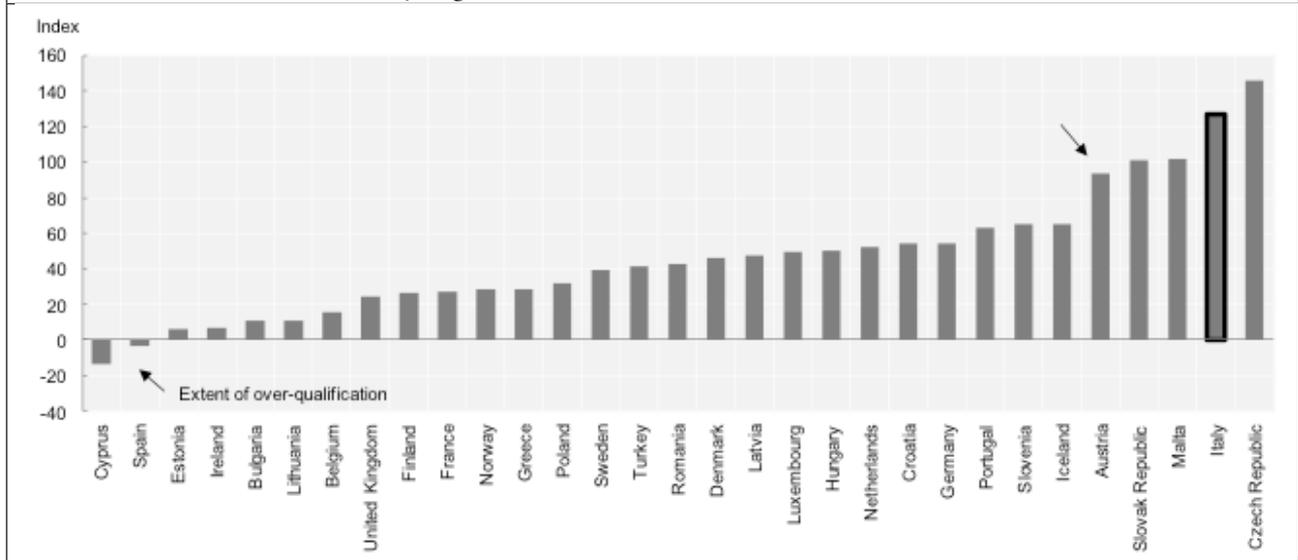
ages in the supply of higher qualifications. But there are many tertiary graduates with a “wrong” specialization that have difficulties to find a job.

Figure 5.10 – Gross wage premium per year of tertiary education, (2001)



Source: OECD (2011).

Figure 5.11 – Supply of and demand for highly skilled employees, 2009 (employees in high-skill occupations as a % of those with at least a university degree)



The index compares the number of jobs requiring a tertiary degree to the number of employees with tertiary education. A positive index means that some of the high-skill jobs are performed by employees with less than tertiary education. A negative index means that some tertiary graduates work in jobs requiring skills lower than those provided by tertiary education.

Source: OECD, Measuring Innovation Database 2011.

Skill mismatch contributes to lower productivity in two ways: the education system does not fulfil current needs of firms and there are shortages of graduates in fields that drive productivity growth. Hence, firms are unable to adjust the skill composition of their labour force as much as they would like, thereby constraining efficiency-driven changes and innovation. Thus, policies to improve the quality of higher education are paramount for increasing productivity.

#### 5.4.2 *Granting universities more autonomy*

Italian universities show a mismatch between autonomy (freedom to decide how to use their resources) and accountability (being responsible for their results). A limited autonomy relative to universities in other OECD countries is reflected in staffing and funding decisions (faculty salaries in public universities are determined centrally, and despite some reforms, recruitment procedures are seriously constrained). By contrast, Italian universities are relatively free to decide on course content and examinations with little external control; the result of which is a highly heterogeneous quality of degrees across institutions, despite the legal equivalence (*valore legale*) of all degrees (OECD, 2011d).

In order to improve autonomy, an Italian law of 2008 allowed public universities to convert into private foundations, separating the management board from academic issues, and redefining the responsibilities and powers of the university presidents. This reform has not yielded the expected results. Indeed Italian universities already have the ability to raise funds from the private sector, but rarely do so, mainly because of lack of institutional capacity. The Italian recruitment system despite several attempts of reform over the recent years has not succeeded in ensuring consistent selection of the best candidates. The main limitation of the reformed recruitment procedure is that it does not impose sufficient accountability at local level to overcome a historical lack of impartiality in the selection procedure.

Italy's current assessment framework of university performance shows that the evaluation practices are heterogeneous across universities and are not considered tools for improving the actual performance of universities, being treated rather as formal procedures. The US experience proves that evaluation practises can play a key role: in the US the quality rankings of many types of universities (national universities, small private colleges, state universities, etc.) are constantly monitored by private organizations such as, for example, US News & World Report. This kind of "hierarchy" becomes very entrenched, as students, faculty, and private contributions all flow to the highest rated institutions. Other criticisms concern the legal value of the degree for employment in the public sector, different degrees delivered by different universities are considered equivalent independently of the quality of the degree which may distort students' choices, affect competition between universities and may be a deterrent to international mobility.

Italian public university funding depends mainly on the central government and is distributed according to historical spending with a balancing share. In 2008 the share of private expenditure in total tertiary education expenditure (29%) was still lower in Italy than the OECD average (31%) and so was the change in this share between 2000 and 2008. Therefore, bearing in mind the pressure on public resources, there are a number of reasons for increasing private funding even though this is not straightforward and may entail some difficulties.

OECD suggests that a good option could be that of increasing tuition fees: they provide information on the cost of education, incentives for quality-cost comparison and incentive to improve university performances to attract students (the current level of tuition fees is around 20% lower than the OECD average, covering between 7% to 15% of the actual costs). According to Italian law, tuition fees for public universities should not exceed 20% of core funding: this constraint makes it difficult for a university to offset cuts in central government funding and it may even require them to cut fees instead, which further prevents them from increasing fees to finance improved course quality.

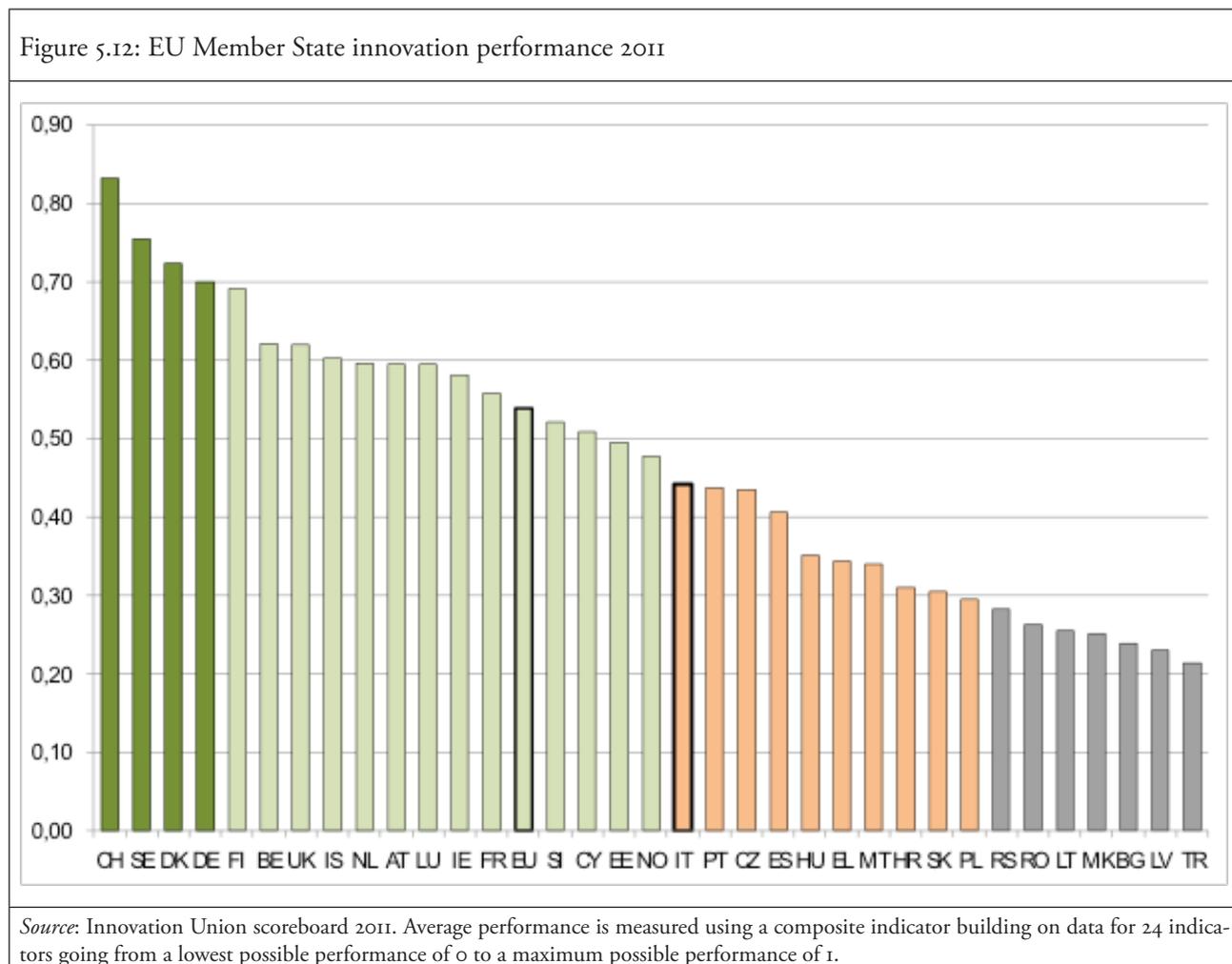
The OECD (2011c) considers Italian research to be of good quality although there is low cooperation between firms and universities leading to poor diffusion of innovation. Cooperation between universities

and business is discouraged due to several factors: high costs, risk-aversion, a weak innovation culture and lack of institutional capacity to support inventions. These factors constitute a disincentive for a patenting activity; mobility between university and industry appears low; researchers are highly dispersed across institutions which reduces the ability of the tertiary education system to respond to industry needs. More so, the research priorities of universities are different from those of the industrial R&D and industry-university financial cooperation is underdeveloped.

The contribution to innovation of Italian universities appears modest in a variety of perspectives. The quality and openness of scientific research, which can be measured by the number of international scientific co-publications, is less developed in Italy than in other countries. In 2010, Italy had around 500 co-publications per million population which was more than EU average (300) but there are large differences with other eleven EU countries which have more than 1000 co-publications. In terms of efficiency of the research system (measured by the number of highly cited publications) Italian research output is below the EU average, although the under performance in this indicator may be influenced by a bias towards English speaking countries.<sup>10</sup>

According to the OECD, Italian universities' share of patenting activity is around the European average but key countries with a lower share for their universities have a very high level of patenting activity outside universities, whereas in Italy this is almost non-existent.

These results weaken the performance of the Italian higher education system in spreading innovation into the economy. It is not surprising that Italy is considered a "moderate innovator" (UNU-MERIT 2012), that is a country showing an overall innovation performance below the international average (Figure 5.12).



The Scoreboard above provides different indicators capturing the main drivers of innovation performance external to the firm, the innovation efforts of a firm and outputs level covering the effects of firms' innovation activities. Across the eight dimensions used to calculate innovation performance, Italy is below the EU average most of the time. It performs especially bad in "human resources" (which measures the availability of a high-skilled and educated workforce) and in "firms investments": private R&D expenditure only reaches 0.67% of GDP against the EU average of 1.23% and public expenditure for R&D in Italy stands at 0.54% of GDP against 0.76% in EU(27). The situation looks better only for the number of firms that have introduced innovations in the market or within their organisation.

The interaction between universities and business is weak and it is usually driven by the need for funding universities or the individual projects of professors rather than for promoting a sustained collaboration. This lack of cooperation may depend on several factors. Firstly, the coexistence of different intellectual property rights regulations for each tertiary institution is a disincentive for researchers to patent inventions or spinoff ventures. Secondly, low mobility of tenured faculty between university and industry, no systematic interactions between university and industry due to the low entrepreneurial propensity of university boards, the underdevelopment of specialised and technological research, different priorities between academic research – centred on the discovery stage of the innovation process – and industrial research which is more development-centred, the scarcity of equity markets and venture capital dedicated to support collaboration between universities and business are other factors that could be the reasons for a lack of cooperation between universities and business.

In recent years some initiatives to promote the interaction between public research and firms have been developed such as the Italian Technology Transfers Office and the creation of scientific and technological parks (such as the Italian Institute of technology). According to OECD (2011c), these initiatives have had some success but their effectiveness in creating the right synergies has been weak.

Financing research and innovation is suffering from discontinuity, lack of clarity and predictability: funding schemes are often difficult to access due to cumbersome procedures and bureaucracy, tax credits measures are simpler tools but easily misused through the reclassification of expenditure as R&D.

In line with the new strategy proposed by the European Commission under Europe 2020, Italian innovation policy should therefore concentrate on specific measures, aiming at reducing fragmentation of investment; modernizing the education system keeping excellence as a guiding principle; ensuring the free movement of researchers and innovators; simplifying the innovation programmes and developing the cooperation between science and business; granting better access to finance; promoting partnerships and the pooling of expertise and resources.

## 5.6

### REFORMS TO FOSTER GROWTH RAPIDLY

The ongoing policies for public sector consolidation in Italy will hopefully strengthen financial stability, improving incentives for private investment. However, positive effects will kick in only in the medium term, whereas in the short term consolidation will have a negative impact on growth. Given the difficult fiscal environment limiting policy options, Italy should therefore concentrate its efforts on reforms that can quickly boost growth: rethinking industrial policy; promoting competition in broadband and energy sector; providing well functioning institutions and a favourable environment for doing business. Last but not least, liberalizing the service sector that is instrumental in enhancing the impact of innovation and innovation diffusion, hence amplifying productivity growth.

#### *5.6.1 Rethinking industrial policy*

Since the 1980s traditional industrial policy has fallen into disrepute among academics and policy advisers. The main argument being that it prevents competition and allows governments to pick winners in a discretionary fashion, thereby increasing the scope for capture of governments by vested interests. The recent debate on climate change, the financial crisis and globalisation have invited a rethinking of indus-

trial policy which, according to Aghion et al. (2011), should no longer be regarded as an opposition to competition policy but rather a complement to it.

This renewed interest in industrial policy can also be found in the goal of a 'smart growth' set in the Europe 2020 Strategy entailing a new European industrial policy agenda, especially as the euro and the Internal Market alone have not led to higher growth. The focus is now on sectoral aid targeting selected objectives – green technologies, skill-intensive and competitive sectors – that will help achieve high and sustainable levels of growth.

An Italian strategy for growth should therefore draw inspiration from the principles mentioned above and be designed to target incentives on a few selected objectives based on efficiency criteria. This is of course a second best approach needed for the Italian business environment that is heavily regulated and in which organized interests often succeed in impeding the diffusion of innovation. In an open and competitive environment no industrial policy provided by the public sector would be necessary.

There is a need to support rather than prevent restructuring and resource mobility towards the most productive activities, encouraging innovation process, energy efficiency, ICT diffusion in the production process, in public administration, in consumption activities and in distribution. So Italy should get rid of extraordinary wage support schemes (*cassa integrazione straordinaria* and *mobilità*) and extraordinary administration proceedings (*amministrazione straordinaria*) as much as possible. Resources should be devoted to projects that respond to European standards and should be granted on the basis of uniform criteria, decided at national level and with transparent tender procedures.

All protectionist schemes at local level that may hinder competition should be avoided. A critical point for the realization of any industrial policy in Italy is the eviction of politics (central and local) from the intermediation of any incentive system as well as of all public services concessions. In international comparison Italy performs very badly in the corruption index. The Transparency International Ranking places it 69<sup>th</sup> out of 162, far below any other European country excepting Greece. In the fight against corruption, transparency is the main tool. Any incentive aimed at achieving a well defined goal should be as automatic and predictable as possible. Public goods provisions should be subject widely to the obligation of tender system with full application of European rules. Requirements of high innovative standards for public goods/services providers would boost innovation.

In a period of recession and fiscal consolidation such as the present, facilitating access to credit should be part of the industrial policy. In Italy the productive system is dominated by SMEs while non-banking means are relatively scarce since equity financing continues to play a modest role in the Italian context compared to other EU countries.

### 5.6.2 Promoting competition among service providers especially in broadband and energy sectors

A kick-start for the recovery of the Italian economy could come from the promotion of competition in some strategic sectors that are generally considered bottlenecks for growth.

**Broadband:** It is an essential infrastructure that has been proven to stimulate competition, productivity and growth and is considered the engine of the so called knowledge-information economy. In Italy, according to the Digital Agenda Scoreboard 2011 (European Commission 2011b), fixed broadband take-up by population is lower than the EU average. Only 59% of households have an internet connection. The percentage of frequent internet users is close to the European average. While the percentage of regular users (48%) is one of the lowest in the EU, the percentage of those who have never used the internet (41%) is one of the highest.

At the end of 2011, Italy was moving towards achieving the Digital Agenda for Europe target aiming at securing a basic broadband connection (in the order of 2 Mbps) for all EU households by 2013, with a significant reduction of narrow-band connections and some funds available for rural areas. However the digital divide still affects 5% of the population. Moreover, progress in the deployment of high-speed (30 Mbps) and very high-speed broadband (100 Mbps) has so far been less encouraging, both in terms of coverage and take-up.

Proposals to foster broadband investments in Italy include: a) making the regulatory environment stable, clear and neutral among competitors; b) making it easier to use existing infrastructures (water, electricity, etc.)

for installing the broadband cable; c) incentivising investments by incumbent operators through the competitive threat of alternative public and private investors (including local administrations and public utilities).

**Energy Sector:** Improvements in terms of increasing competition took place in the energy sector with electricity more advanced than gas, but a lot remains to be done since the high energy price in Italy is a major disadvantage to boost growth. Recently Monti's government has set preliminary conditions for splitting the ownership between energy producer ENI and Snam Rete Gas SpA (its gas transmission-grid), in order to promote the development of independent operators in the gas sector. This should happen within the next 18 months. The same package has introduced changes to the rules regulating the quarterly adjustments of utility tariffs, linking them to the gas spot price, with a view to lowering energy bills for households and companies. Some reduction in the price of gas in Italy has recently been observed. In the field of renewable energy, mainly solar and wind energy, Italy has done a lot of investment and will achieve EU targets (European Directive 2009/28/CE) ahead of the scheduled timetable. In Italy, energy production through nuclear power has been precluded by a referendum of the '80s that has substantially prohibited the possibility of building nuclear power plant.

### 5.6.3 Reducing administrative burdens on businesses

The Italian business environment is relatively unfavourable across the board. In 2011 the World Bank analysis, carried out annually through its Doing Business Reports, ranked Italy 87<sup>th</sup> out of 183 for the easiness of doing business, far below other industrialized countries. The burden of administrative regulation and the complex and slow judicial system are all indicators in which Italy compares unfavourably with the EU average. Italian environmental regulation is particularly burdensome and unstable. The sharing of competencies between different levels of public administration and between different bodies does not exclude duplications, is a source of delays, e.g. in authorisation procedures, and contributes to legal uncertainty.

In recent years, Italy has approved ambitious programmes for reducing administrative burden, simplifying procedures and improving relations between public administrations and business, with a strong emphasis on e-Government. Recently Monti's government too has adopted a decree to reduce red-tape (see Box 5.9). All these developments have been largely welcomed by stakeholders but their actual impact is yet unclear. In the past some of these policy interventions appeared uncoordinated and fragmented while some promising measures remain only partly implemented or are delayed by lack of resources or complex decision-making procedures or practices.

#### Box 5.9 – The “Semplifica Italia” Decree-Law of 27 January 2012

The decree belongs to the broad framework of the programme for reducing the administrative burden that has been carried in Italy over the recent years. It draws from the inputs gathered through public consultation to complement the existing simplification apparatus by providing for concrete, practical measures having immediate effects, differentiating between general measures, measures for citizens and measures for businesses. The decree addresses lengthy administrative procedures by introducing the possibility of substitutive powers at the request of private individuals to expedite administrative processes when delays are not respected. Meeting administrative deadlines becomes the direct responsibility of individual civil servants, who may be subject to sanctions. It also introduces the use of regulatory budgets for each public administration to prevent new regulation from tampering with the simplification efforts. The measures for citizens aim to reduce red tape for people with disabilities, to computerize civil acts by making public administrations communicate directly by electronic means. Further savings should result from shortened processing and delivery periods. Several administrative procedures are simplified, among which the issuance and renewal of driving licenses and technical compliance of cars. The measures for business involve, notably, simplification of procedures for participating in tenders through better use of electronic information in e-procurement, elimination of the security policy document in the privacy area, a unique environmental permit for SMEs, elimination of obsolete regulations, co-ordination and streamlining of inspections, as well as sector specific measures (agriculture, fishing, heating installations).

Source: [www.governo.it](http://www.governo.it)

Because of the economic challenges faced by Italy at this time there is no doubt that it is still necessary to reduce the administrative burden on business (including that due to the tax code). To this extent, the OECD report on Better Regulation (2012a) lists a number of challenges that Italy still has to tackle, in particular:

- Complex devolution of 2001 has brought forward the need to pay greater attention to the implications of multi-level regulatory management. While the effects of decentralisation have clearly complicated the task of regulatory management and oversight, this needs to be more clearly signposted in the current and future reforms.
- Growing awareness of the need for effective regulatory reform should be matched by a similar awareness or capacity to act in the complex network of public administrations that need to be mobilized at national and sub-national level.
- The mechanisms that could support incremental improvements in regulatory reforms and incentivize administrations to deliver better regulatory management remains poorly developed. In particular, open public consultation and communication mechanisms on regulatory activity are weak and non-systematic, giving discretionary powers to the administration to use them. Effective provisions to monitor and evaluate the programmes are lacking – with the notable exception of the administrative burden reduction strategy – preventing constructive feedback on their effectiveness.

Business activity also needs a modern public administration able to deliver efficient and high quality services. Reforms should emphasize e-government initiatives like unified service centres for the public, shared networks and data centres. Many e-government initiatives also allow enterprises to spend less on administrative procedures and devote more resources to business opportunities. E-procurement must in this regard be promoted to the maximum extent possible.

#### *5.6.4 Fully implementing Single Market legislation, in particular the services directive*

As the European Council pointed out on January 2012, “the Single Market constitutes a key driver for Europe’s economic growth. This is an area where action at EU level can do much to boost jobs and growth. It is of crucial importance that we swiftly and fully implement at the national level what we have already agreed to deliver the full potential of the Single Market”.<sup>11</sup>

A study carried out by the UK Department for Business Innovation & Skills (2011), which quantified the consequence of the full implementation of the Single Market, estimates that the economic gains for the European Union and its Member States arising from the removal of all barriers to the Single Market are potentially very substantial. Although this is a theoretical simulation, with a number of caveats to be taken into account, the study provides an order of magnitude of these gains. By 2020 EU national income would increase by 14.1% and European production by 24.4% at constant prices. This would, for Italy, translate into 13.6% of additional GDP and 14.7% additional production.

It is crucial that Italy strengthen its efforts to implement the Single Market legislation correctly and in a timely manner. Transposition delays of EU directives and other EU law infringement cases have always been a weakness of the Italian system, despite some recent progress. According to the European Commission Internal Market Scoreboard, in 2005 the share of directives not timely transposed into Italian legislation was 3.1% of the total. There has been a progressive reduction to 2.1% in November 2011, but Italy remains in the group of member states which have failed to reach the 1% transposition deficit target.

Timely transposition of EU legislation represents the first step for a full implementation of the Single Market legislation. In fact, member states need to transpose EU directives correctly. Italy under performs, being the country with the highest number of open infringement proceedings for non-conformity. In March 2012 there were 132 open infringement proceedings against Italy, of which 93 concerned cases of violation of EU law and 39 cases of no-transposition of directives. The breakdown of infringement proceeding by sectors shows that the majority of cases relates to the areas of environment, taxation, em-

11 European Council Conclusion 30 January 2012.

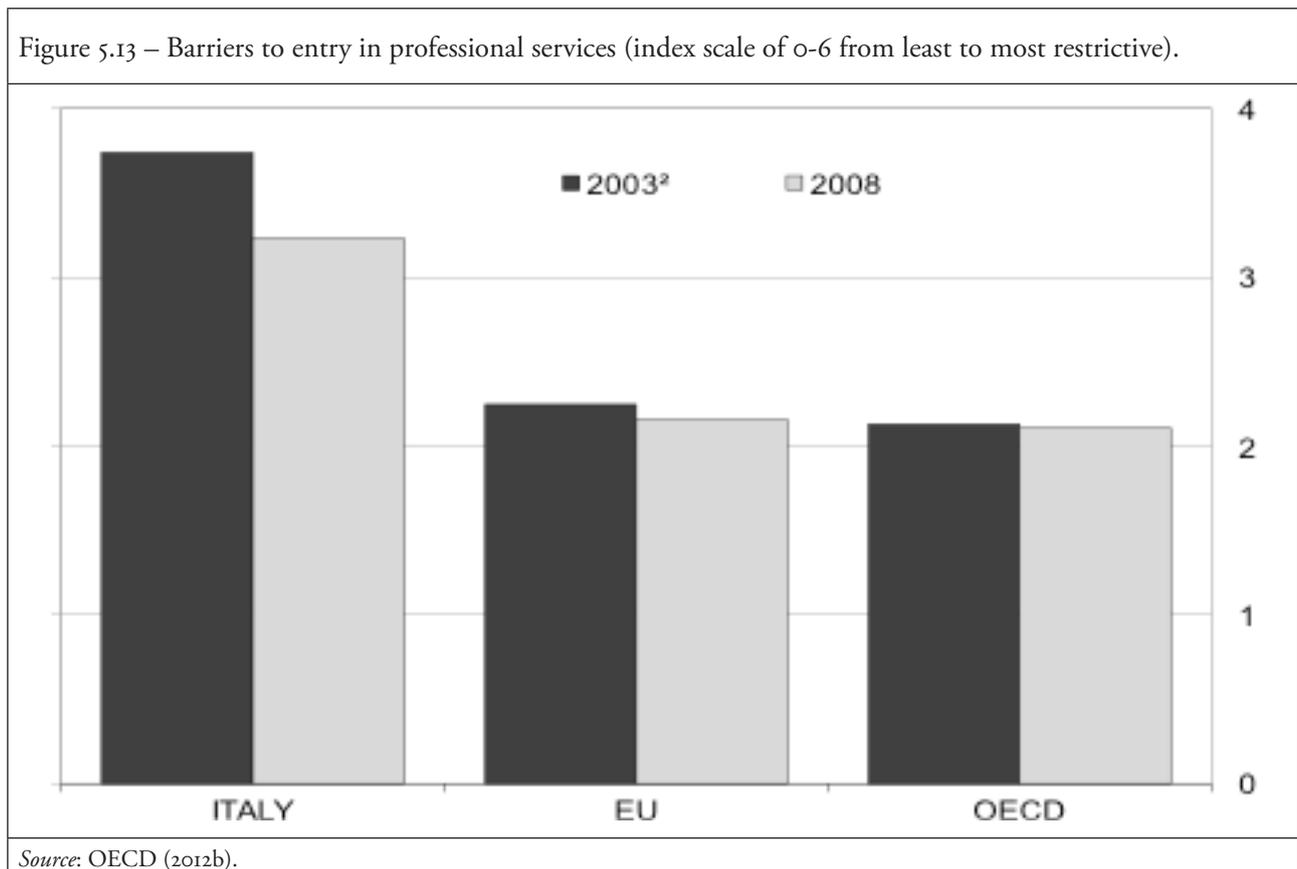
ployment and social affairs (35, 13 and 12 respectively).<sup>12</sup> This non conformity with EU law reveals the insufficient awareness by Italian public administration and national parliament of the obligations and challenges that arise from the participation to the European Union and the full functioning of the Internal Market.

The full and correct implementation of Single Market legislation is of key importance if Italy is to reap the economic and social benefits associated with the removal of obstacles to the free circulation, notably in services, if only there will be the political will to pursue them with determination and continuity.

The structural reforms necessary to create a real Single Market for services is at the core of the Europe 2020 strategy which recalls the need to create an open internal market for services consistent with the services directive. It estimates that its full implementation could increase EU trade in commercial services by 45% and foreign direct investment by 25%, bringing an increase of GDP between 0.5% and 1.5%.

By boosting competition in the service sector, Italy would create new opportunities for domestic investment and increasing productivity, which would translate into higher domestic incomes, as well as indirectly strengthen industry through lower-cost and higher-quality services.

In 2011, a large number of country-specific recommendations for structural policies concerning the service sector were addressed to Italy by the main international institutions (ECB, IMF, European Council and OECD). They included calls to step up the full implementation of the services directive, to remove unjustified barriers to entry and to further open professional services whose barriers to entry remain substantial but are being reduced (Figure 5.13).



The services directive covers a wide range of economic activities representing around 45% of the EU economy, including large sectors such as retail, construction, business services, tourism and most regulated professions. In Italy it was implemented with some delay by means of legislative decree No. 59 of 2010 (for a brief description of the decree see Box 5.10). In adherence with the directive, the government has completed a review of existing regulations on service activities at the central, regional, and local level to ensure consistency of existing regulation on service activities at all government levels with the EU leg-

<sup>12</sup> Italian Department for European Policies, March 27 2012.

islation. The European Commission is now in the process of assessing the extent to which all the required changes in specific legislation have been implemented.

Box 5.10 – Implementing the services directive, the Legislative Decree 59/2010

Following the review of the existing regulations the decree has simplified procedures for starting a service activity: authorization schemes which result to be discriminatory and too restrictive have been substituted by less restrictive schemes, such as tacit silence or the Certified Statement of Business Start Up (SCIA – *Segnalazione Certificata di Inizio Attività*), which has replaced the existing Declaration of Business Start Up since 2010 (DIA – *Dichiarazione di Inizio Attività*). It allows a new company to start operating from the first day (whereas the DIA required a thirty day standstill). With the SCIA, public administrations should control compliance with relevant requirements in the following 60 days (or, after this period, only in exceptional circumstances such as for public safety reasons).

The number of cases in which authorization was required to start a business has been reduced; access to or the exercise of a service activity is no longer subject to an economic test on market demand, a number of requirements to start a business activity has been abolished.

However the portal “[impresainungiorno.gov.it](http://impresainungiorno.gov.it)” designated as the national point of single contact as required by the services directive has not come across as being very user friendly for entrepreneurs from abroad, for linguistic and technical reasons.

Because the services directive involves competences shared notably between the State and the regions, the implementation required a deep co-ordination activity. The Department for European Policies is in charge of such coordination. Most regions have already adopted transposition measures in the areas which fall within their competence. These notably include tourism and commerce. Where implementing regional laws or regulations have not yet been adopted, Legislative Decree 59/2010 applies until relevant regional acts are issued.

Source: European Commission (2011a).

Even though policies are in the process of being revised, Italy urgently needs a revolution in services regulation. According to the European Commission, to exploit the full potential of the service directive, it is essential to “shift from a compliance perspective to a competitiveness driven focus”.<sup>13</sup> the scope of the services directive, there are other sectors with important growth potential. In April 2012, the OECD (2012b) recommended Italy to reduce regulatory barriers to competition in network industries and professional, retail trade and local services. To this end the government has recently introduced a number of measures aiming at opening the services sector to competition although it is too early to give an evaluation on their effectiveness.

In December 2011 the “*Salva Italia*” decree introduced measures to liberalise retail trade e.g. by lifting restrictions on shop opening hours and easing various entry barriers, including for large retailers. Such measures could, however, be partly overruled by regional authorities’ territorial policy. Removing unnecessary restrictions on retail opening hours can stimulate new investment and boost consumer spending. The decree also gave the competition authority the power to challenge administrative measures in the courts.

With the “*Cresci Italia*” decree of early 2012, the government implements measures aiming at promoting competition and the removal of unjustified restrictions on economic activities in conformity with economic freedom and competition principles laid down in the Italian constitution and the EU law.

As a general principle and consistently with the service directive, article 1 of the decree provides for the elimination of all those rules which subject the start up of a business activity to quantitative restrictions, authorizations or licenses by the competent authorities which are not justified by a reason of general public interest. The decree establishes the removal of national provisions that impose bans or restrictions on economic activities and limits due to territorial planning where these are not necessary and proportionate for securing public general interest objectives. The government (*Presidenza del Consiglio dei ministri*) will

be in charge of a systemic monitoring of the restrictions to economic activities and the promotion of competition. Moreover, the decree's sectoral range of action is wide, as it encompasses a variety of economic activities which are described in Box 5.11.

These measures represent a significant step towards increasing competition in the service sector in Italy, but the legislative tools used (decrees) do not provide for a systemic framework for the regulation of services. In the medium term it would be appropriate, as recommended by both the European Council (in July 2011) and the Commission (2011a), for Italian authorities to approve an Annual Law on Competition. Taking into account the main recommendations from the National Competition Authority, it would represent a useful tool for opening protected sectors further. The European Commission suggested that the Competition Authority be empowered to effectively contest administrative and regional acts in contrast with market competition, and that it be more actively involved in regulatory impact assessment. The Annual Law on Competition could provide binding provisions and guidelines for regional and local administration, in those sectors where unjustified restrictive measures may arise.

Box 5.11 – Cresci Italia Decree, sectoral provisions

Among other provisions, the decree introduces measures that can reduce the quantitative barriers to the number of pharmacy licenses, previously limited to one in every 4,000 inhabitants. A number of prescription drugs will also be made available in para-pharmacies and pharmacies and will be able to establish their working hours, apply discounts on any item independently. New pharmacy openings are being encouraged in shopping malls, train stations and airports.

With regards to the legal sector, slots for new notaries will be opened each year until 2014. Young entrepreneurs will be allowed to open their own LLC with a minimum budget of €1 and without the assistance of a notary. Professional tariffs will be progressively abolished, and professionals will have to provide customers with an estimate for their final compensation.

Fuel stations will be allowed to sell food, newspapers and tobacco. The fuel station operators that do not own the plant will have the chance to take over it and they will then be entitled to choose their gas providers. Class actions will be simplified and made more accessible.

A new independent regulatory authority for the transport sector will be established with the task of granting fair and non-discriminatory conditions for the access to rail, port and airport infrastructures and highway networks. These measures include defining criteria for the establishment of tariffs by the competent providers; fixing minimum quality standards for transport services under the obligation of public services of general economic interest and defining the minimum content of recipients' rights, including reimbursement.

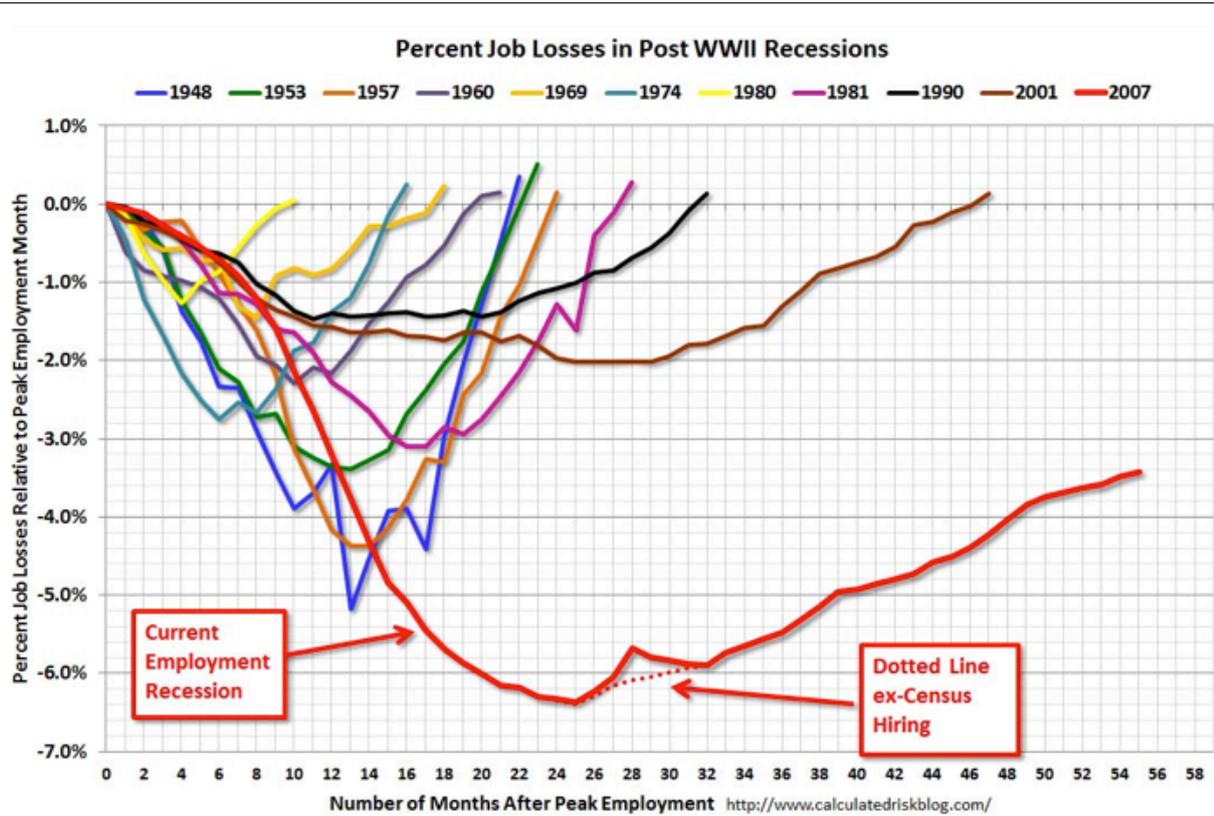


## Appendix

### Exit strategies in the labor market

The current recession had an exceptionally high impact on labor markets. In the US, the gap between the peak level of employment just before the crisis and the through, 2 years after the initial shock, was larger than 6%. Further, the recovery has been the slowest ever in the post-war period in the US. Figure A1 indeed represents the aftermaths of each of the recessions, and show in particular the percentage losses in employment over 50 months after the triggering of the recession, for all the NBER recessions since 1948. Most recessions but the current one ended after 24 months; many of the employment losses at the through were below 3%. In contrast, in the current recession, 50 months after the beginning of the recession, the employment level in the US is still 3% below the pre-recession period.

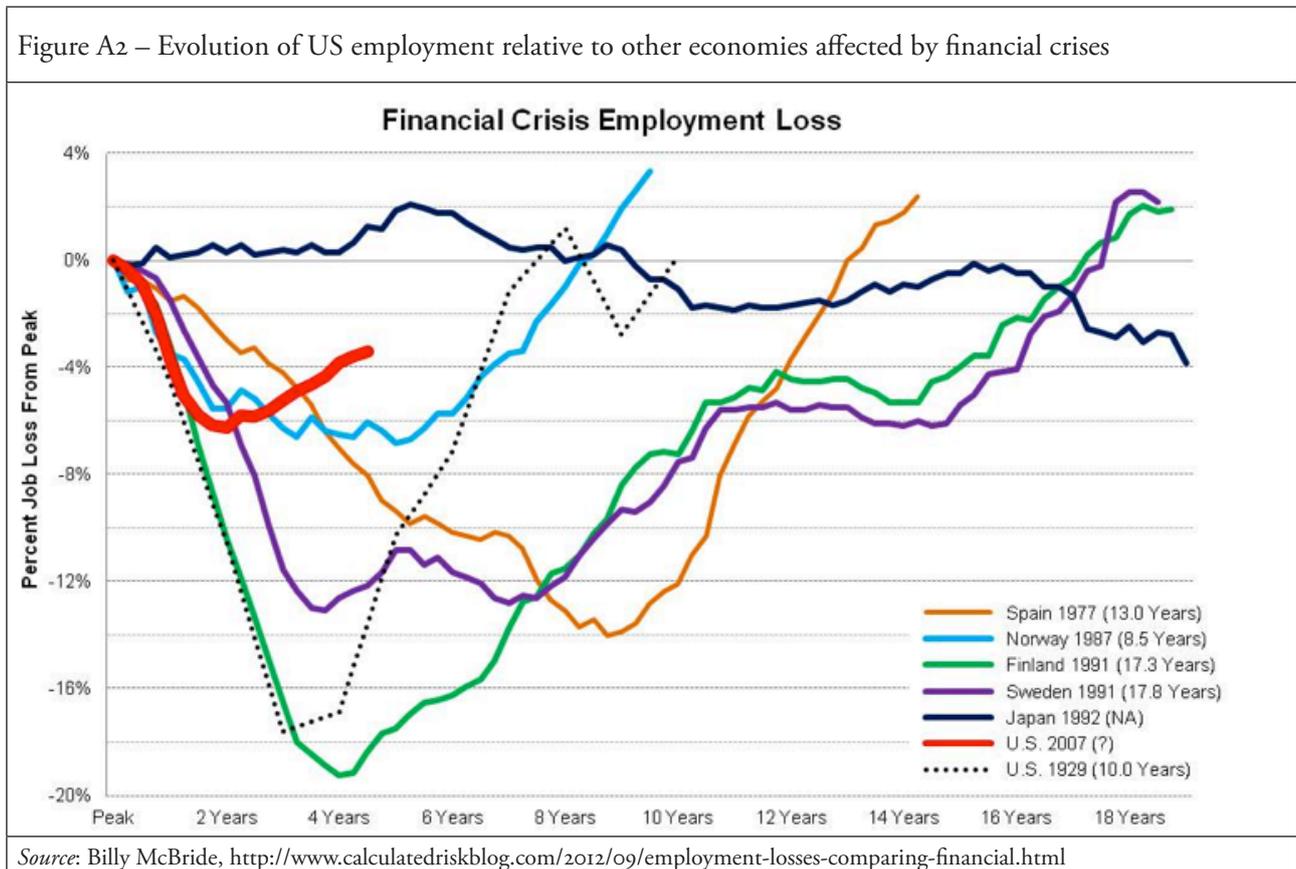
Figure A1 – Evolution of US employment during 12 episodes of recessions.



Source: Billy McBride, <http://www.calculatedriskblog.com/2012/09/schedule-for-week-of-sept-30th.html>

Why is it that the current recession is so specific? It is interesting to note that the 2001 recession was also quite slow to end, and, as the 2007 recession, had a specific cause: originating from a decline in asset prices and a contraction in the financial markets.

Indeed, financial crisis typically last very long and have extremely slow recoveries. This recession was no exception to the rule. Figure A2 further documents this, in comparing the US employment evolution to the employment paths of several non-US economies that were hit by a financial crisis over the last decades: Japan, Sweden, Norway, Finland and Spain, as well as the Great Recession in 1929 in the US. The current recession in the US is now an exception relative to these other crisis: while these crises led to very large employment losses (up to -20% in the worst cases at the trough), the current US employment losses were limited to -6% and recover faster than for the other economies, where the recovery took a decade or more.



The two charts, taken together, are suggestive of the importance of counter-cyclical fiscal and monetary policies to mitigate the initial impact of the financial shocks ; and of the importance of the resilience of labor markets, and in particular labor market flexibility and the mobility of labor, to absorb the shock.

In Europe, what is also peculiar to the current crisis is the increased divergence across Euro area countries in both labor costs and current account surpluses/deficits over the past decade. This lasted until 2009. Indeed, Figure A3 reports the evolution of nominal unit labor costs and the divergence pattern between 2000 and 2009. After 2009, significant decline in unit labor costs were observed in Ireland, and to some extent, in Greece, Spain and Portugal.

Germany's labor costs started to catch up from below towards other European countries, thanks to wage increases in 2009 and 2011. France and Italy, on the other hand, have not started their convergence yet: the unit labor costs only increased less fast after 2009. The recent 2% increase in the minimum wage in France in July will not contribute to wage moderation, while the fiscal shock in the French 2013 budget is likely to reduce firm's investment and adversely affect productivity gains. The prospect for France is increasing divergence in unit labor costs.

Note surprisingly, as reported in Figure A4, France remains on its decennial trend of growing current account deficit, while other countries display instead a pattern of convergence: the large current account deficits of Southern European countries have been reduced significantly. They are on the way to disappear. The current account surplus in Germany has not really decreased, but at least its increase has been stopped since 2007. France is the exception and the current account deficit is still growing.

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