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Raising Potential Growth in France

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Many developed countries had experienced a dip in their rate of economic growth even before the outbreak of the 2008 crisis. In Europe, both France and Italy have legitimate concerns regarding their long-term growth prospects. These concerns are reinforced by the rather widespread nature of the decline in productivity gains across sectors; indeed, whilst the relative decline in the weight of the manufacturing sector within the economy as a whole has contributed to the slowing down of aggregate productivity, this structural effect, as well as the small share of new-technology producing sectors within our economy, are far from being enough to explain the general trend. Various publications of the CAE have underlined the importance of improving the functioning of the labour market, of stimulating competition in the goods and services market, of reviewing industrial policy as well as of making public spending more efficient. The authors of the present Note focus primarily on the skill level of the workforce and on the incentives for companies to invest and innovate, which could help raise the potential for growth.

Existing surveys on the skills of both young people and adults, be they or not related to the positions they hold, are a cause for concern in France. Insufficient training has the immediate effect of both lessening the productivity of employed individuals and of a high number of unemployed young and older people –a phenomenon that continues to be specific to France as opposed to most developed countries. From a company's perspective, the lack of skilled individuals within in the workforce is also an obstacle to heavily investing in the field of sophisticated technologies. The authors therefore recommend increasing the proportion of in-house training provided as part of secondary-education vocational streams, as well as making such pathways more accessible to those over the age of 25. With regards to higher education, they suggest increasing the number of places made available on technological courses to the detriment of some more general education courses and suggest introducing incentives for students to help guide them towards fields of study rich in opportunities.

In terms of productive investment, the authors note that the main impediment is the lack of profitability, rather than the shortage of funding. They recommend that the regulations in place in certain non-manufacturing sectors be adapted in order to reduce the associated cost to companies further downstream, companies who will then be able to improve their mark-up. With regards to research, they highlight France's strong position in terms of inventiveness but also the country's limited proportion of innovative companies. They recommend that the *Crédit impôt recherche* ('Research Tax Credit') scheme be made more secure for companies, and especially so for SMEs and mid-sized firms? ISEs.

These various recommendations should be seen as complementary, in order to improve the innovation ecosystem in France. They suggest that it is possible to act today in a way that encourages growth, a matter which is essential to employment and standard of living, as well as to the sustainability of our social system.

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Between the start of the crisis in 2008 and the end of 2013, the wealth produced per capita dropped slightly in France. In particular, a gradual dip in growth in France was observed prior to the crisis, whereas the rate of growth per inhabitant continued to hover around 1.7% a year in Germany (Graph 1). One issue of key importance to France (and indeed to Italy, which has undergone even more radical developments) is to establish whether the downward trend in the growth rate is inexorable or indeed whether public policy has the power to address the country's economic growth rate. The present *Note* shows that France has the leeway to raise its growth rate, notably by focusing on training its workforce and on its innovation policies.

1. Average GDP rate of growth per capita
in terms of volume, % per year

Source: IMF, WEO Data base.

A low rate of growth observed over a long period of time has major consequences not just on employment and standard of living but also on public finance. Let us take, for example, a pessimistic scenario with a long-term aggregate GDP growth rate in France of 1% per year. Cumulated over a period of 26 years, this would result in a GDP that was nearly 31% greater than that of 2014 in terms of volume. Based on an annual growth rate of 1.6% per year[1], the GDP in 2040 would be 51% greater than that of 2014. The difference is significant.

With regards to state pension schemes, this cumulative loss of GDP would increase the need for funding by 2 to 2.5 GDP points by 2040, based on the parameters of the 2014 reform. In order to rebalance such pension schemes (if one assumes that they were indeed balanced with a growth scenario of 1.6%), it would be necessary to tap into the purchasing power of the working population, or indeed to very significantly reduce pension levels.

As for the public health system, a potential growth rate of 1% would not accommodate expenditure which, keeping the ageing of the population and technological developments in mind, is expected to increase by at least a yearly 2% in real terms, if long-term health expenditure forecasts are to be believed.[2] This funding stress could then lead to further reductions in contributors' purchasing power or to more significant reductions in healthcare reimbursements.

In more general terms, the public finance trajectory is highly dependent upon long-term growth prospects. To illustrate this in simple terms, let us start with the forecast used in the multi-annual fiscal framework that runs until 2017, even though the current economic context means that public finance is marred by uncertainty. Let us work under the assumption that the impact of ageing is kept under control by moderating other public expenditure, to the extent that primary expenditure would represent a stable proportion of GDP as of 2018, with an economic growth rate of 1.6%. In such a scenario, and with a steady level of compulsory levies, public finance would be consolidated, with a debt ratio reduced by half and no deficit to deplore by 2040. If, however, economic growth reached only 1%, all other things being equal, the public deficit would stand at around 9% and debt would exceed 145% by 2040. In addition to which, one must note that this is not the worst-case scenario, given that it is based on the assumption that the interest rate will be equal to the growth rate –and not any higher than it, as could be the case in the event of market distrust.

While these figures might be considered pessimistic in the long run, they cannot be ruled out entirely. They underline the importance of growth policies not only in terms of employment and standard of living but also for the sustainability of our social system. Improving the way in which the labour market operates in order to more efficiently manage the workforce in a changing economy, notably by ensuring the better matching of supply and demand and the reduced duality of the market, would appear to be crucial. Stimulating competition in the goods and services market, reviewing industrial policy and the taxation of capital income or making public expenditure more efficient are also major avenues of development with regards to improving France's growth potential. These have been outlined in various CAE publications.[3] The present *Note* focuses primarily on the skill level of the workforce and on incentives for companies to invest and innovate.

The authors would like to thank Cyriac Guillaumin and Jean Beuve, Scientific Advisers to the CAE, for their valuable help throughout the production of the present *Note*.

[1] Figure retained by the French stability programme for 2017.

[2] See, for example, Direction Générale du Trésor (Directorate-General of the French Treasury) (2013): *Projection des dépenses de santé à l'horizon 2060, le modèle PROMEDE*, Working Paper, December.

[3] See also Aghion P., G. Cette and É. Cohen (2014): *Changer de modèle*, Odile Jacob.

Growth and productivity

The factors that determine GDP in the long term relate to supply, and therefore to factors of production and their productivity.

The most basic of productivity concepts is that of labour productivity, meaning production per person employed (per capita productivity) or indeed per hour worked (hourly productivity). France has been witnessing a downward trend in labour productivity since the 1970s, be it in per capita or hourly terms (Table 1).

1. Average rate of growth for productivity per capita

	USA	Germany	France	Italy	Sweden	Spain
1971-1979						
• prod. per capita	1.22	2.91	3.28	3.20	1.06	4.06
• hourly prod.	1.68	4.11	4.30	4.34	1.68	4.70
1980-1989						
• prod. per capita	1.37	1.04	1.92	1.98	1.53	2.33
• hourly prod.	1.39	2.07	2.85	1.88	1.20	3.40
1990-1999						
• prod. per capita	2.02	1.67	1.28	1.33	2.56	1.04
• hourly prod.	1.73	2.23	1.84	1.34	2.02	1.08
2000-2013						
• prod. per capita	1.38	0.66	0.67	– 0.27	1.46	0.89
• hourly prod.	1.83	1.18	1.06	0.21	1.71	1.17

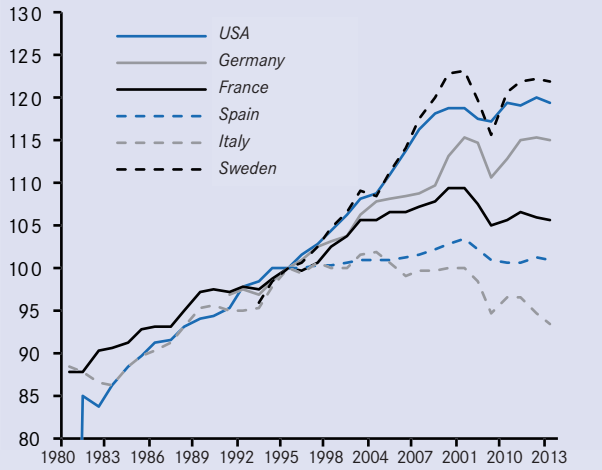
Germany, Spain and Italy have also observed a significant decline in productivity gains since the 1970s, whilst in the United States and Sweden productivity gains have remained stable or even increased over time. With a trend of a yearly 0.7% gain in per capita productivity since the start of the 2000s (1.05% prior to the 2008 crisis, 0.31% between 2008 and 2013), France can clearly not boast of high levels of potential growth.

Per capita productivity depends on both capital stock per employee and total factor productivity (TFP), that is, how efficient the combination of labour and capital is (see box). TFP is often understood as technological progress, yet it actually encompasses a number of other factors, such as infrastructures and institutions. TFP in France, however, has been rather stagnant since the start of the 2000s, while continuing to increase in Germany and even more so in the United States and Sweden (Graph 2).

A rather generalised slowdown

Does the slowdown in labour productivity and TFP concern only certain specific sectors or does it affect the economy as a whole? In order to establish this we shall look at four major sectors, these being the manufacturing sector, construction,

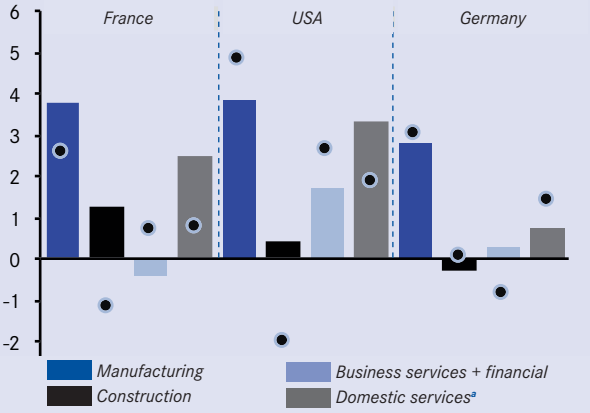
2. Total factor productivity, base 100 in 1995



Interpretation: Total factor productivity (TFP) calculated based on a Cobb-Douglas production function with a coefficient of 0.36 on capital (0.64 on labour), *cf.* Lequiller F. and A. Sylvain (2006): *Partage de la valeur ajoutée : éléments descriptifs et comparaison internationale*, 11th Symposium of the 'Association de comptabilité nationale', Paris, 18-20 Jan.

Source: Authors' calculation.

3. Average rate of growth in hourly productivity
1990-1999 and 2000-2013, as a % per year



Interpretation: histograms: 1990-1999; points: 2000-2013.

Note: [a] Retail, transport, accommodation, catering, leisure and services to individuals.

Source: Eurostat.

the business and financial services sector and other services (retail, transport, accommodation, catering, leisure and services to individuals). Graph 3 indicates a slowdown in productivity in all four sectors in France, whereas in Germany and the United States, hourly labour productivity picked up in the industrial sector over the course of the 2000s. Productivity in the business services sector accelerated by 1 percentage point in the United States, whilst that of the construction and domestic services sectors increased more rapidly in Germany. In France, meanwhile, the business and financial services sector is the only one in which the productivity growth rate improved, following a period of negative growth in the 1990s.

Productivity, production, growth

An economy's potential production is generally represented by a Cobb-Douglas function that links GDP in terms of volume Y to the amount of capital available within the economy K, the amount of work L and total factor productivity A:

$$Y = AK^{\alpha} L^{1-\alpha}$$

where α is a positive factor estimated at around 0.3. The potential GDP level corresponds to the wealth that an economy can achieve, regardless of cyclical fluctuations.

Labour productivity is then calculated by dividing GDP by L, labour input:

$$Y/L = AK^{\alpha} L^{-\alpha}$$

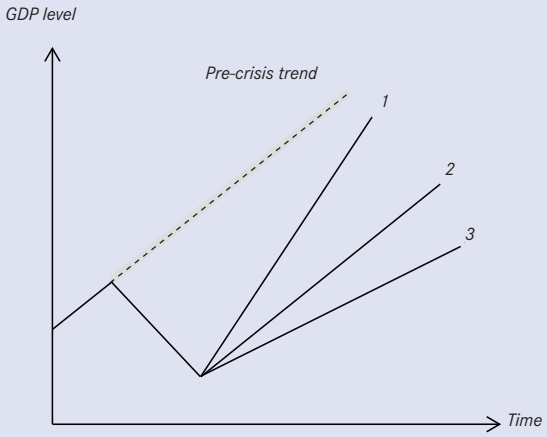
We can see that labour productivity is positively dependent on TFP A and on capital input K.

With regards to the GDP growth rate, this can be deduced from the first equation as being the total of the TFP (dA/A), capital ($\alpha\ dK/K$) and labour ($(1-\alpha)\ dL/L$) contributions.

It is important not to confuse the GDP level with the GDP growth rate. It is indeed the GDP level, and not its growth rate, that helps determine the level of tax revenue and therefore, ultimately, of public expenditure. A loss in potential GDP consequently serves to worsen the structural public deficit.

In France, the crisis resulted in a decline in activity in 2008 and in 2009 in particular, followed by a period of recovery that levelled off as of 2012. By the end of 2013, GDP in terms of volume barely exceeded its pre-crisis level. One key issue involves establishing whether this crisis will have a long-term effect on the economy's growth rate or indeed on its level only. There are three potential situations (see diagram):[a]

- full catch-up: following the crisis, the GDP growth rate is temporarily higher, putting the GDP level back on track with its pre-crisis trajectory. The crisis has no long-term effect on the GDP level nor indeed on its growth rate;
- loss in terms of level: the crisis results in a drop in the GDP level but not in growth potential. This then results in a long-term decrease in the potential GDP level;
- loss in terms of both level and growth: the crisis results in a drop in the potential GDP level as well as its growth rate.



In light of the studies published in recent years,[b] it would appear that situation 1 is unlikely due to a hysteresis effect (owing, in particular, to changes to the qualifications required by companies and the gradual downgrading of unemployed workers –see Couch and Placzek, 2010[c]). Ball (2014) shows that this hysteresis effect was strongly felt during the crisis and that a type-3 scenario (loss in terms of both level and growth) is observed in the majority of OECD countries. With regards to France, his results indicate that the GDP loss in terms of level hovered at around 7.5% in 2013 and would be around 8.6% in 2015, in relation to what could have been hoped for had the crisis not arisen.

[a] For a breakdown of these scenarios, as well as the transmission channels, see Aghion P., G. Cette, É. Cohen and M. Lemoine (2011): *Crise et croissance : une stratégie pour la France*, CAE Report, no 100, La Documentation française.

[b] Ball L. (2009): "Hysteresis in Unemployment: Old and New Evidence", *NBER Working Paper*, no 14818; Ball (2014), *op.cit.* See also Cabannes P-Y., V. Lapègue, E. Pouliquen, M. Beffy and M. Gaini (2011): "Quelle croissance de moyen terme après la crise ?" in *Crise et croissance : une stratégie pour la France*, CAE Report, no 100, La Documentation française for an initial summary of these studies.

[c] Couch K.A. and D.W. Placzek (2010): "Earnings Losses of Displaced Workers Revisited", *American Economic Review*, vol. 100, no 1, pp. 572-589.

It is therefore a case of a general and rather consistent slowdown in productivity in France, one that is not attributable to developments in working hours since this phenomenon is observed for both per capita productivity and hourly productivity. Whilst annual working hours may be low and have decreased significantly in France since the 1970s, the resulting dip in per capita productivity is dominated by the slowdown in hourly labour productivity.

The gap in productivity gains between France and the United States is not due to the weighting of the information technologies sector –which displays strong productivity gains– within the economy, as this weighting totals some 7% in both countries in 2007. It has since increased by one percentage point in the United States, while remaining stable in France, yet the difference remains weak. The productivity gap could, in fact, stem more from the use of new technologies by other sectors.

Explaining the slowdown in productivity in France

There are four factors that are likely to explain the slowdown in productivity in France, namely the decline of the manufacturing sector –a sector which displays strong productivity gains– within the economy, insufficient investment in productive capital (in terms of both quantity and quality), insufficient

research and development, the overly tardy distribution of new products and production processes,[4] and finally insufficient rates of employment and levels of skill.

A structural effect?

Between 2000 and 2007, the proportion of total added value in France attributable to industry decreased by 6%, at constant prices.[5] Given that the industrial sector is one that displays strong productivity gains (Graph 3), one would expect its decline to be a burden on the evolution of aggregate productivity in the economy. Having said that, orders of magnitude are low given the limited decline of the industrial sector over this period (once the price effect has been taken out of the equation). First and foremost, what we have seen above is that productivity has been constrained in almost every sector.

An investment issue?

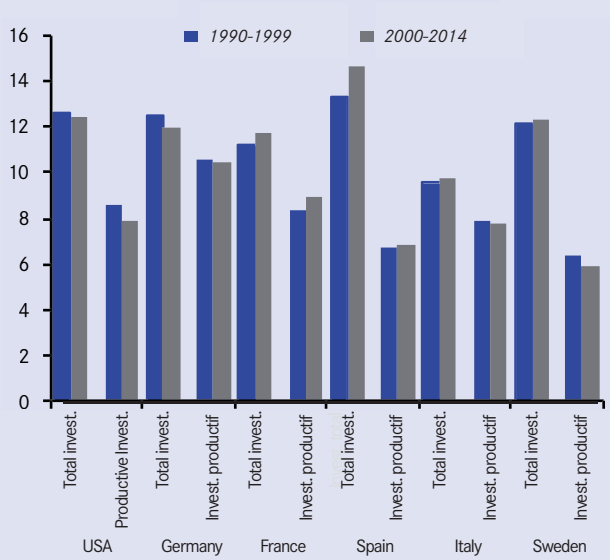
Graph 4 shows the evolution in total gross investment on the part of companies (including the construction of offices and industrial buildings) and productive investment (in machinery, equipment and software). Total investment on the part of companies is fairly high and stable in France, whilst productive investment falls within the average of OECD countries.

In France, according to the OECD, the total net capital of companies increased from 91% of GDP in 1980 to 158% in 2013, that is, more than in Sweden (80% in 2013) and the United States (92%) but less than in Germany (181%). Despite its acceleration over the course of the 1990s and 2000s,[6] the accumulation of productive capital in France remains 1 to 2 percentage points below that observed in Sweden and the United States since the 1980s.

Beyond the amount of investment and the significant weight of construction when compared to equipment, French companies have shown poor interest in investing to modernise and streamline the industrial sector since the year 2000, even though this would encourage productivity gains. They have instead opted to invest in renewing their existing capacities.[7] Investment in sophisticated capital goods is therefore low in France, as indicated by the low level of industrial automation in relation to Germany and Sweden, as well as Italy (Graph 5).

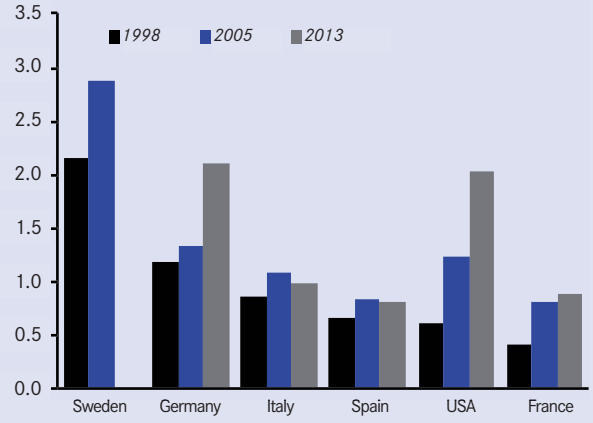
The poor level of investment in advanced technologies relates in part to the low weight of the industrial sector within the economy. Within the industrial sector itself, however, it is possible that investment was hindered by the decline in

4. Company investment, as a % of GDP



Sources: OECD and BEA.

5. Industrial robot fleets
as a % of manufacturing employment



Sources: International Federation of Robotics (IFR) and UNECE. No figures are available for Sweden in 2013.

[4] See, for example, Acemoglu D., P. Aghion and F. Zilibotti (2006): "Distance to Frontier, Selection, and Economic Growth", *Journal of the European Economic Association*, vol. 4, no 1 and Aghion P., G. Cette, É. Cohen and J. Pisani-Ferry (2007): *Les leviers de la croissance française*, CAE Report, no 72, La Documentation française.

[5] See Fontagné L., P. Mohnen and G. Wolff (2014): "Pas d'industrie, pas d'avenir ?", *Note du CAE*, no 13.

[6] The annual growth rate of the stock of productive capital increased from 2.33% over the 1980-1989 period to 3.87% and 3.23% respectively for 1990-1999 and 2000-2013.

[7] INSEE, Survey on investment in industry, see http://www.insee.fr/fr/themes/indicateur.asp?id=15

profit margins since the start of the 2000s, initiating a vicious circle between the decline in margins in the industrial sector, the ability to invest in sophisticated technologies, insufficient investment leading to a decrease in margins, etc.

Possible explanations for low margins in industry notably include the low level of competition in the business services and network activity (energy, transport, etc.) sectors, in relation to other OECD countries.[8] This limited competition increases the costs incurred by industrial companies, who cannot pass these costs on to their customers due to the international competition they are faced with.

Furthermore, obstacles to competition also hinder the adoption of innovations. Indeed, whilst certain regulations (security, environmental, etc.) can in fact encourage innovation by setting companies new objectives that can only be achieved through innovation, the barriers to entry and limits on competition imposed in some cases reduce players' abilities and incentives to innovate.[9]

An R&D issue?

Technological progress, which accounts for a significant part of the growth in TFP, stems partially from specific research and development efforts, efforts which also simultaneously encourage the assimilation of technological developments from outside of the company. One argument often put forward is that France conducts too little research or that it fails to convert the results of its research into new products, manufacturing processes and ultimately productivity growth. Is there any truth behind this?

France's R&D activity, measured in terms of the proportion of gross domestic expenditure on research and development (GERD) as a percentage of the GDP, is notably lower than that of Germany and Sweden but higher than that of Italy and Spain (Graph 6). It should be noted that France ranked above the European average of 1.98% in 2012, with 2.26% of the GDP, but below the OECD average of 2.40%.

Clearly, France is suffering from a shortfall in private R&D expenditure. Nevertheless, the gap between France and Germany in this respect is primarily the result of a structural effect caused by the lower proportion of industry in France and, within the industrial sector itself, the lower proportion of medium- and high-technology sectors, such as the manufacturing of machinery and equipment, the automotive industry, the manufacturing of electrical equipment and the chemicals industry. If France had the industrial structure of Germany but maintained the intensity of its own sectoral research by sub-sector, it would double the overall intensity of its research activities.[10]

According to the Department for Higher Education and Research, the gap between France and Germany with regards to private research stems primarily from companies with over 1,000 employees, and even more so from companies with over 5,000 employees, which invested only 10 billion euros in research in France in 2009 as opposed to the 25 billion invested in Germany. This size effect can however be partially attributed to the industrial structure; indeed, as the OECD (2014) points out, "Large French companies have a stronger presence than their German counterparts in sectors such as construction, materials, energy, distribution and luxury goods and services, in which technological intensity is not as high as that of the sectors within which the majority of large German companies operate, such as the automotive, electronics and chemicals sectors".[11]

Patent statistics are also indicative of France's weak position where private research is concerned. Indeed, the number of triadic patents per million inhabitants is distinctly lower in France than in Germany or Sweden (Graph 7).[12] The inventiveness of a country can be more accurately gauged by counting the number of priority patents submitted, that is the total number of patents submitted for the first time (and therefore entitled to priority), anywhere in the world. In this respect, France ranked 5th in the world in 2008, behind South Korea, Japan, Germany and the United Kingdom but ahead of the United States and Sweden.[13]

Whilst patents may gauge the inventiveness of a company, the proportion of companies that actually launch a new product or manufacturing process on the market is a better indication of the notion of innovation. According to the Community Innovation Surveys, the proportion of innovative companies stood at only 34% in France in 2010, as opposed to 64% in Germany, 40% in Italy, 29% in Spain and 49% in Sweden.[14]

[8] See Conseil d'Analyse Économique (CAE) (2014): "Quelles réformes pour la France ? Les préconisations du CAE", *Note du CAE*, no 15. See also Aghion, Cette, Cohen and Pisani-Ferry (2007) *op.cit*.

[9] OECD (2014): *Examens de l'OCDE des politiques d'innovation : France*.

[10] See Ministère de l'Enseignement supérieur et de la Recherche (MESR, French Ministry for Education, Higher Education and Research) (2012): "Un déficit d'effort de recherche des entreprises françaises ? Comparaison France-Allemagne", *Note d'Information du MESR*, no 12.09, available at http://www.enseignementsup-recherche.gouv.fr/reperes/telechar/ni/ni1209.pdf. See also Science, Technology and Industry (2013): *OECD Scoreboard*. In 2009, medium-high-technology industries accounted for only 3% of added value in France, as opposed to 10% in Germany.

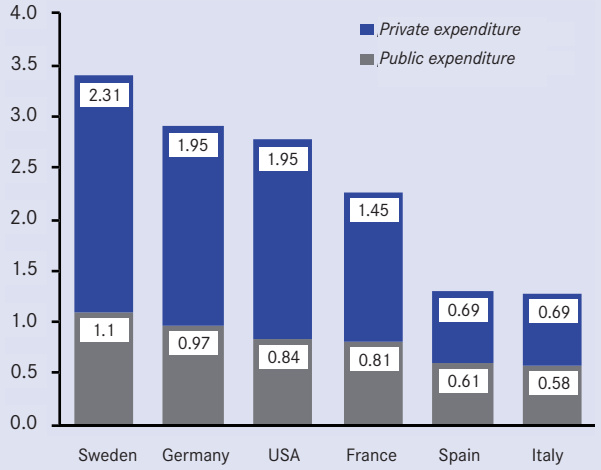
[11] OECD (2014) *op.cit*., p. 68 in the French version (unofficial translation).

[12] Triadic patents are those that are submitted to American, Japanese and European patent offices and are therefore, in principle, better-quality patents.

[13] De Rassenfosse G., H. Dernis, D. Guellec, L. Picci and B. Van Pottelsberghe de la Potterie (2013): "The Worldwide Count of Priority Patents: A New Indicator of Inventive Activity", *Research Policy*, vol. 42, no 3, pp. 720-737.

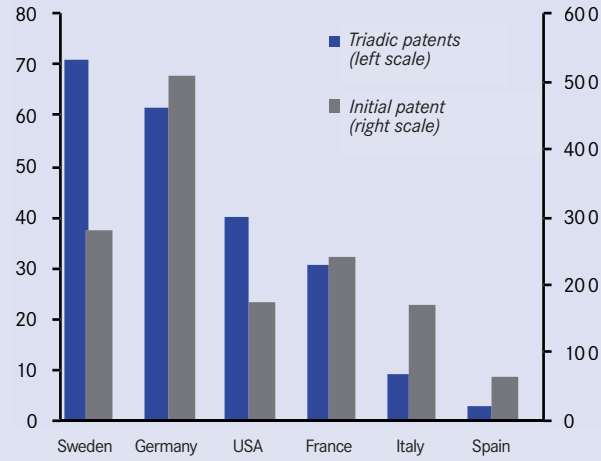
[14] Community Innovation Surveys are conducted in all European Union Member States in accordance with the guidelines outlined in the Oslo Manual, *cf*. OECD (2005): *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, 3rd edition, Eurostat. It is not easy to compare the data obtained for different countries, owing to, for example, the different ways in which certain questions are formulated, differences in sample selection processes and whether completion of the survey is compulsory or optional. Nevertheless, it is rather clear that France is under-performing.

6. R&D expenditure
as a % of GDP, 2012



Source: OECD.

7. Triadic patents and initial patent submissions
per million inhabitants, 2011



Sources: OECD et PATSTAT.

This might be explained by the more significant size of the service sectors in France, a sector in which few firms apply for patents and where product and process innovation is also less frequent. Considering only innovative companies, there appears to be little difference between countries with regards to the proportion of turnover generated by innovative products (those that are new to either the firm itself or to the market).

The workforce: employment and training

The actual workforce of a country depends on the number of people who are prepared to work (participation rate) and on the average level of training of the population.

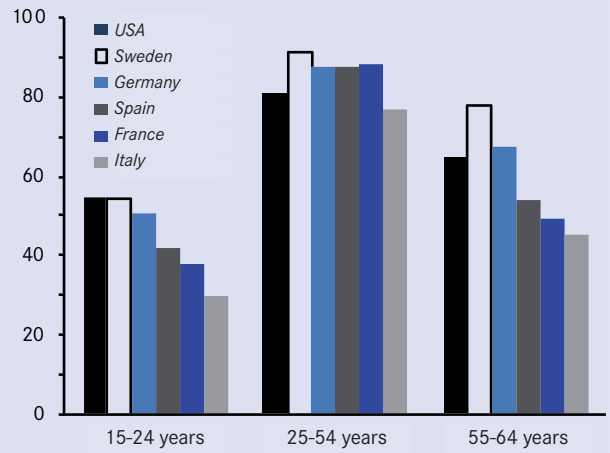
France is somewhat unusual in both respects, which both aspects having a major impact on growth either directly or through their impact on the accumulation of capital and TFP.

Labour market participation

The overall labour supply is the product of the number of working hours per person and the number of individuals who work or want to work (the 'active population'). With regards to working hours, the situation in France is comparable to that of other European countries. The effective number of hours in the working week is rather long in France whilst the number of working weeks is low, resulting in an annual average that is close to that of many other countries.

Where France (and indeed Italy) really differs, though, is in its low rate of participation among the under 25s and the over 54s (Graph 8)

8. Participation rate by age
as a percentage of given age groups, 2013



Source: OECD.

Education and employment in a globalised world

The average number of years spent in education is fairly satisfactory in France, in comparison with the rest of Europe, but it is lower than that of Germany and has decreased slightly since 2005. Within the group of countries being considered here, the results of the PISA survey[15] place France

[15] The OECD's PISA (Program for International Student Assessment) survey assesses the skills of young people of 15 years of age in the fields of reading, mathematics and science.

behind only Germany (*cf*. Table 2), with a distinct decrease observed since 2003. Meanwhile, the OECD's PIAAC survey, which focuses on the skills (written comprehension, mathematics, new technologies) of the active population awards a mediocre score, slightly below that achieved by Spain and severly behind the United States and particularly Sweden.[16]

2. Years of education and skills according to the PISA and PIAAC surveys

	Average years of education[a]	Overall PIAAC score[b]	Average score	Average PISA score[c] % of age group	
France	6.7	258	495	22.4	12.9
USA	7	267	481	25.8	8.8
Germany	7.7	275	514	17.7	17.5
Spain	6.4	260	484	23.6	8
Italy	6.8	249	485	24.7	9.9
Sweden	7.9	282	478	27.1	8

Notes: [a] In 2011, in France, individuals were in education for 6.7 years between the ages of 15 and 29 years; [b] 2013; [c] Mathematics mark, 2012; –: struggling (< level 2); + 'highly competent' (> level 5).
Source: OECD.

The differences in the scores achieved in the PIAAC and PISA surveys may be interpreted as an education-related problem. The good PISA score achieved by France does not stem from a low proportion of teenagers achieving unsatisfactory results; indeed, with 22.4% of pupils "struggling", our country very closely resembles the situations in Spain and Italy. It is rather the good results at the very top of the distribution that pull the average upwards. The contrast with Sweden is particularly interesting, with the latter achieving results that fall below those achieved in France where teenagers are concerned (PISA) but significantly above where adult skills are concerned (PIAAC), more than likely as a result of high-quality vocational training.

How are these characteristics of the education system expressed in terms of performance in the labour market? The OECD highlights a number of specific features of the French situation with regards to the relationship between employment and education. Firstly, the risk of unemployment is no less significant in France for young people with a vocational secondary education qualification (such as the CAP, the BEP or the vocational *Baccalauréat*) than it is for those who have graduated from the general stream of secondary education (and who have not acquired any vocational skills that can be directly applied to the workplace). This situation is unusual in relation to both other advanced countries and to French higher education qualifications.[17] One possible explanation for this is the negative image associated with the vocational streams offered during secondary school cycle, many of which are perceived as the route taken by pupils who have failed at school rather than as opportunities for young people whose areas of interest and capabilities lie in fields other than academia. Furthermore, vocational pathways do not offer a sufficient combination of education and work, with only 12% of those French pupils following vocational pathways doing so by means of a work-linked training programme, as opposed to nearly all such pupils in Germany.[18]

Secondly, returning to study as a mature student over the age of 25 would appear to be particularly difficult in France. According to the OECD, only 1% of young adults (25-29 years) without qualifications are undergoing training, as opposed to the OECD average of 7% and a share of over 10% in Germany and certain other northern European countries. This helps explain the difference in the findings of the PISA and PIAAC studies, as well as the fact that PIAAC scores decreases more rapidly with age in France than they do elsewhere. We also know that the low skill levels of the active population in France are not linked to training and development budgets, given that these are significant, but rather to the difficulty of finding appropriate training or reaching an agreement with the employer.[19]

Thirdly, those in France with higher education qualifications earn, on average, a higher salary than those with secondary qualifications, although the gap is of only 47%, that is, 10 points less than the OECD average. Higher education, therefore, appears to provide a lower financial return for graduates in France than elsewhere, which might limit the incentive to study at a higher level.

The French system has, in fact, changed in unexpected ways. Technical training courses (such as those provided by IUT ('University Institute of Technology') establishments) have the option of selecting students, whereas universities do not. The absence of any selection process blurs the signal effect of higher education and may partially explain the low return achieved by higher education qualifications in France. Despite the success of technical training courses, the proportion of pupils undergoing training in industrial professions decreased as a percentage of each age group between the

[16] The OECD's PIAAC (Program for the International Assessment of Adult Competencies) survey gauges the skills of adults of 16-65 years of age and their use of such skills for professional purposes, from the ability to understand and respond to written texts and to understand and use numerical and mathematical tools to the ability to solve problems in highly-technological environments. The workforce's training deficit is also central to the diagnosis outlined in the France Stratégie report (2014): *Quelle France dans 10 ans ?*, Fayard, June.

[17] Of those graduating with a Licence Pro vocational bachelor degree in 2007, for example, 88% were employed as of 2010, as opposed to 75% of those graduating with a general bachelor's degree (*cf*. CEREQ).

[18] OECD (2013): *Regards sur l'éducation*.

[19] Between 2000 and 2011, active public expenditure in the labour market fluctuated between 0.9% and 1.2% of the GDP. According to the 2012 INSEE survey on adult training, a third of respondents felt they had been prevented from undertaking some form of training at some point in time. The most frequently cited reasons were family responsibilities (34%), cost (31%), a lack of suitable training opportunities (24%) and the distance between their home and the training venue (16%). Furthermore, 30% of respondents claimed that they had not been encouraged by their employer and 22% stated that they had been turned down. On the issue of vocational training deficiencies in France see Cahuc P., M. Ferracci and A. Zylberberg (2011): Formation professionnelle : pour en finir avec les réformes inabouties, Institut Montaigne.

years 2000 and 2012, for example dropping from 3.5% to 2.7% in the 15-26 years age group.[20]

Education and technological change

One of the fundamental roles of the education system is to ensure that the skills and availability of the workforce reflect the needs of the economy, within a context of international competition and technological change.

Quantifying the gap between the actual skills possessed by the workforce and those required by companies is no easy task. One measurement that is sometimes used to gauge this is the number of vacant positions for a given rate of unemployment. Historically, for a given rate of unemployment, the number of vacant positions in France has been double that of Germany or Sweden.[21]

Direct measurements of the inadequacy of qualifications between the employee and the position held show that, in 2005, France had an 'over-qualification' rate that was lower than that of Sweden and the United States and an 'under-qualification' rate that exceeded that of both countries.[22] Indeed, the low level of adequacy between qualifications and positions could partially explain the low rate at which companies adopt new technologies. It also highlights the problems associated with the education system, and in particular the structural inadequacy of vocational streams and the low uptake of training among adults.

Which growth policy for France?

Estimating potential growth is a risky business, particularly since technological breakthroughs are very difficult to anticipate.[23] Given the major consequences that any error in forecasting would have on the sustainability of public finance, regardless of the growth policies put in place, it is essential that the public authorities anticipate a variety of scenarios, including the worst case.

> **Recommendation 1.** To make the prospective evaluation, by an independent body, of the sustainability of public finance in accordance with various potential growth scenarios, including the worst-case scenario, both systematic and public.

In order to prevent an unfortunate scenario from arising, and in accordance with the diagnosis outlined above, public action should focus on two key areas, namely the quality of the workforce and incentives for companies to invest and innovate.

The workforce

As we have seen above, the French education system has specific characteristics that make it more difficult to adapt skills to reflect companies' needs.

The first area of reform relates to secondary education. There is a need to more clearly distinguish between vocational and general education streams in order to promote the skills acquired through working in the field (a combination of studying and working) and to more quickly adapt vocational pathways to reflect companies' needs. The aim must be to bring the risk of unemployment among graduates who have followed such vocational streams down to below that of those who have followed general routes, as is the case in other European countries.

> **Recommendation 2.** To increase the amount of time spent in the workplace by those following vocational streams during secondary education. The lack of enthusiasm on the part of companies with regards to a particular training course should challenge the existence of the course in question.

France is characterised by offering courses, be they vocational or academic, which are slow to take companies' requirements into account. Information regarding vacant positions and prospective studies of professions could be used in a more active manner for the purposes of assessing which training courses meet companies' needs and thus helping to redraw the map outlining available training courses. In this respect, there is significant room for improvement in France. The introduction of the *Conseil national education-économie* ('National Council on Education and the Economy'), set up in 2013 with the aim of 'better coordinating educational and economic issues', is indeed a step in the right direction. It is important that the map of available basic vocational training courses, for which the regional level of action has been recognised as being the most appropriate one, be made more

[20] According to the REFLET database (perspectives on technical and vocational education streams) compiled by the *Centre d'études et de recherches sur les qualifications* (CEREQ, Centre for Studies and Research on Qualifications).

[21] See Hobijn B. and A. Şahin (2012): *Beveridge Curve Shifts across Countries since the Great Recession*, Mimeo, Federal Reserve Bank of New York.

[22] OECD (2011): *Perspectives de l'emploi*. Employees are considered to be over-qualified if their level of qualification is greater than the level required for the position in question and under-qualified in the opposite case. This data should be considered with care given the specific national schemes in place (such as combined employment and study programmes, which are common in certain countries but not in France), or indeed apprenticeship schemes, which have increased the proportion of 'under-qualified' workers in Germany.

[23] See the controversy surrounding the American case sparked by Gordon, R. (2014): "The Demise of US Economic Growth: Restatement, Rebuttal, and Reflections", *NBER Working Paper*, no 19895.

responsive. In order to achieve this, it is essential that the various forms of resistance and inflexibility that hinder the adaptation of the education offering be eliminated. Given the high levels of unemployment among low-skilled youth, adapting training courses to reflect the jobs available should take precedence over all other objectives.[24]

Recommendation 3. To increase incentives for regional authorities and teaching establishments to ensure that training courses evolve according to companies' needs based on regular assessments of performance levels where access to employment is concerned.

This applies to both post-*Baccalauréat* and secondary education training courses. In actual fact, the significant differences in unemployment levels among those who have completed post-*Baccalauréat* training courses suggest that such training is not sufficiently adapted to the needs of companies. With this in mind, the low rate of unemployment in various BTS and DUT vocational streams (civil engineering, construction, woodwork, mechanics, etc.) not only indicates successful professional integration but can also reveal an as-yet unfulfilled need on the part of companies, unlike certain academic pathways at bachelor's and even master's level (sociology, psychology, communication and documentation, etc.).[25] It would appear to be important, therefore, to increase the number of BTS and IUT training places available whilst maintaining the selective nature of such pathways, a key factor in ensuring the success of the students they attract. With regards to universities, relaxing the conditions governing the introduction of pathways of excellence would help to further promote university degrees. Furthermore, the student grant system could use not only family income but also the chosen study path as criteria for the awarding of grants. Maintaining an equal overall allocation, we would recommend increasing the number of grants in fields with high employment potential whilst reducing those awarded in other fields.

Recommendation 4. To increase the number of places on post-*Baccalauréat* technological training courses that have proven to offer significant employment prospects (BTS and IUT courses, technological universities and Licence Pro vocational bachelor degrees in particular). To proportionately reduce the capacity of some post-*Baccalauréat* general streams. To adjust the study grant system to better accommodate high-growth sectors.

As we have seen, few unqualified adults in the 25-29-year age bracket in France receive any form of training in comparison with the situations observed in other countries, a fact which contributes to the mediocre results achieved with regards to the skills of the workforce (PIAAC survey). We would therefore recommend opening up vocational training courses to those over the age of 25 by relaxing the conditions for enrolling on dual programmes of education and training.[26] It would also be wise to make it easier for students to take a temporary break from their studies, as is the case in the Nordic countries.

Recommendation 5. To relax the conditions governing admitting over 25s into dual programmes of education and training for those looking to follow a new career path as well as the conditions governing admittance of would-be mature students over the age of 25.

The number of hours worked, and not just the quality of jobs, is a crucial factor in increasing potential GDP. In this respect, France suffers from a low rate of participation at both the upper and lower ends of the age distribution. The CAE's proposals regarding youth employment, especially if they are poorly qualified (namely developing dual programmes of education and vocational training, increasing support in finding employment, etc.), are indeed still relevant.[27] With regards

[24] On the lack of flexibility of the map outlining available training courses see the report by the Inspection de l'Éducation nationale (2013): *Évolution des cartes de formations professionnelles et technologiques à la rentrée 2013. Synthèse des notes des correspondants académiques*, August.

[25] Over the 2003-2009 period, the rate of unemployment among those who had completed their studies within the past eleven years and held a BTS or DUT qualification (or equivalent) in the civil engineering, construction, woodworking and mechanical sectors stood at 4% whereas the unemployment rate among those with a master's degree (be it a standard or honours degree) in sociology, psychology or communication and documentation was 14%. See Martinelli D. and C. Prost (2010): "Le domaine d'études est déterminant pour les débuts de carrière", *INSEE Première*, no 1313.

[26] Apprenticeships are currently not available to the over 25s (with the exception of a few rare cases). The latter have access to professional training contracts but only when they are unemployed.

[27] Cahuc P., S. Carcillo and K.F. Zimmermann (2013): "L'emploi des jeunes peu qualifiés en France", *Note du CAE*, no 4.

to older members of the population, initial steps have been taken by relaxing the conditions governing work over the age of 65 and the possibility to combine employment and retirement. Employment among older people appears to have responded to these measures, but such schemes are still relatively under-used in France[28] and the rate of employment among older people is still a long way off that observed elsewhere.

We would suggest pursuing two complementary avenues of development, the first of which relates to the specific unemployment insurance in place for the over-50s and for which the age of eligibility has remained the same since it was first introduced, despite the increase in the life expectancy of the population. Standardising the maximum benefit period for both the over 50s and the under 50s should increase the incentive for the older age group to work. The second avenue would involve adapting the pensions system so as to take into account, when calculating pensions, all contributions made by the individual right throughout their career, including as part of combined employment and retirement schemes.[29] This would increase the incentive for those approaching the end of their working lives to reduce their working hours gradually, rather than suddenly, as can be seen to currently be the case in the vast majority of cases.

Recommendation 6. To bring the maximum unemployment benefit duration for the over 50s into line with that of the rest of the population. To take into account all the retirement contributions made when calculating pensions, including contributions made as part of combined employment and retirement schemes.

Investment and research

Taking its industrial structure into account, it would not be true to say that France undertakes too little R&D. It is also one of the most inventive countries, if the figures relating to initial patent submissions are to be believed. This does not make it any less important to support research in France. There are at least two reasons to justify state intervention in the fields of science and technology, these being the presence of externalities and the issue of research funding. It is, in fact, precisely this logic that underlies the existence of the largest public support system for private research, introduced in 1983, namely the *Crédit d'impôt recherche* (CIR – R&D tax credit scheme,5.2 billion euros in 2011).[30] The advantage of the CIR is that it is not biased in favour of a particular technology or sector, but this is also where its weakness lies, in that the CIR targets neither projects that bear externalities nor those that are struggling to secure funding. Furthermore, empirical studies have shown that, while companies respond positively to the decrease in the cost of research following the CIR, every euro spent by the State in CIR leads to barely more than a euro in research expenditure on the part of companies.[31] The 2008 reform of the CIR system made it easier to benefit from this particular tax credit but failed to increase (and indeed probably reduced) its efficiency. There is still room for improvement, particularly with regards to reducing administrative costs for SMEs and ISEs, accelerating the reimbursement process where such establishments are concerned or relaxing the preliminary procedure so as to make it possible to secure declared expenditure with the tax authorities (ruling).

Recommendation 7. To improve the efficiency of the CIR system by continuing efforts to simplify the procedure and secure expenditure for SMEs and ISEs. To supplement the 'neutral' CIR system with direct aid for research in fields with high levels of externalities and in favour of companies that offer promising projects but lack the resources to fund them.

It is often suggested that companies looking to invest in research find it difficult to secure external funding and consequently fund their efforts using capital and reinvested earnings, thus by excluding new companies. Indeed, it is primarily in the pre-start-up stage of a project that funding difficulties arise. There are few 'business angels' in France to offer the funding, managerial expertise and network connections that new businesses need, leading to investment being largely focused on the development stages rather than on the pre-start-up stage. Of the 6.48 billion euros in invest-

[28] Chéron A. (2014): "Le cumul emploi-retraite : un dispositif efficace ?", *TDTE Caisse des Dépôts*, no 39.

[29] See Bozio A. and T. Piketty (2008): *Pour un nouveau système de retraite*, CEPREMAP, no 14, Édition Rue d'Ulm.

[30] Ministère de l'Enseignement supérieur et de la Recherche (MESR, French Ministry for Education, Higher Education and Research) (2013): *Le crédit d'impôt recherche en 2011*.

[31] *Cf.* Ientile D. and J. Mairesse (2009): "A Policy to Boost the R&D: Does the Tax Credit Work?", *European Investment Bank Paper*, vol. 14, no 1 and Mulkay B. and J. Mairesse (2013): "The R&D Tax Credit in France: Assessment and *ex ante* Evaluation of the 2008 Reform", *NBER Working Paper*, no 19073. This relative 'inefficiency' of the CIR stems primarily from the fact that the tax credit is proportional to the volume of research and not to the increment thereof, as was the case prior to the 2008 reform. The incremental tax credit system has its own limits, such as causing R&D expenditure to progress in fits and starts, limiting the acceleration of R&D expenditure, increasing administration costs and the low impact of the incremental tax credit on the running costs of research. See Mohnen P. and B. Lokshin (2010): "What Does it Take for an R&D Tax Incentive Policy to be Effective?" in *Reforming Rules and Regulations: Laws, Institutions and Implementation*, Vivek Ghosal (ed.), MIT Press, pp. 33-58.

ment capital funds in 2013, venture capital accounted for only 0.64 billion.[32] With this in mind, and despite significant public support (by the end of March 2014, the *Fonds national d'amorçage* ('National Start-up Fund), managed by BPI France as part of the *Programme d'investissements d'avenir* ('Investing in the Future Programme'), had invested 0.31 billion euros in sixteen start-up funds), France still lags behind both Germany and Sweden.[33] One possible cause of this is the negative pre-tax profitability of venture capital in France, which discourages institutional investors (pension funds, insurers).[34] The fact that France exports more venture capital funds than it imports appears to indicate a lack of profitable innovation projects rather than a lack of available funds.

Recommendation 8. To conduct a study into the root causes of the poor profitability of venture capital in France. To refrain from offering support to companies that are not performing well after a few years and instead allocate the resources to supporting innovative companies at the pre-start-up stage.

It is also important to underline that lack of data has translated into a certain lack of familiarity with the specific mechanisms responsible for the poor rate of adoption of sophisticated technologies. Whilst existing studies highlight the importance of human capital, of the institutional framework, and of pathway dependency as factors in the adoption of new technologies,[35] a survey gathering the opinions of French companies on this issue would prove extremely useful in honing the diagnosis.

Finally, one of the reasons for the low levels of profit in the manufacturing sector is the high cost of intermediate services. Changes in the way sectors such as transport networks and certain liberal professions are regulated could increase competition and compress prices in these sectors, thereby lowering costs to the industry, increasing mark-ups and thus encouraging investment in equipment and research.[36]

Recommendation 9. To adapt the way in which non-manufacturing sectors are regulated, and in particular those that produce intermediate services for other sectors, such as transport networks and certain professions.

The French economy has major assets and significant margins to expand with regards to the high level of under-employment and the potential room for improvement in terms of qualifications and of dissemination of technologies within businesses. It is up to its players to put them to good use.

[32] See AFIC Report (2013): *Activités des acteurs français du capital-investissement*.

[33] According to the European Private Equity and Venture Capital Association (EVCA), total pre-start-up expenditure in 2013 accounted for 0.006‰ of the GDP in France as opposed to 0.016‰ and 0.018‰ in Germany and Sweden.

[34] Krieger E., K. Medjad, F. Iselin, R. Grandsart and V. Gerasymenko (2012): *La performance du capital-risque : entre fantasme et réalité*, Conférence Innovation, Financement et Entrepreneuriat, HEG Geneva. The authors report an internal rate of return on venture capital over a 10-year period of –0.8% in France (according to the AFIC), 34.5% in the United States (according to the National Venture Capital Association) and 1.8% in other European countries (according to the European Venture Capital Association).

[35] See Comin D. and M. Mestieri (2013): "Technology Diffusion: Measurement, Causes and Consequences", *Institute for New Economic Thinking Research*, Note no 029, for a summary of the literature on the adoption of new technologies.

[36] Bourlès and *al*. (2013) shows that a decrease in the regulation of upstream sectors has a significant impact on the TFP of those sectors further downstream. See Bourlès R., G. Cette, J. Lopez, J. Mairesse and G. Nicoletti (2013): "Do Product Market Regulations in Upstream Sectors Curb Productivity Growth? Panel data Evidence for OECD Countries", *Review of Economics and Statistics*, vol. 95, no 5, pp. 1750-1768. See also the Swedish and German experiences with regards to opening up to competition in the rail transport sector, *cf*. Centre d'Analyse Stratégique (French Centre for Strategic Analysis) (2011): *L'ouverture à la concurrence du transport ferroviaire des voyageurs*, La Documentation française. The experience of the United Kingdom is very different, but based on a model in which the State has no direct involvement in the rail system.