

Analyses Économiques

vol. III-02 (Jan. 2004)

The Newsletter of the French Council of Economic Analysis

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EDITORIAL

Education and Growth

Report by Philippe Aghion and Elie Cohen

With **Éric Dubois and Jérôme Vandenbussche**

Education influences economic growth in a number of fairly well identified ways. The report that follows goes beyond merely reiterating this point, as it emphasises the crucial impact of the level of technological development.

Countries at the forefront of technology need to focus on innovation, higher education and building links between higher education and research. Those far from the technology frontier, on the other hand, should strive to imitate and make up ground, concentrating their efforts on primary and secondary education.

France is now close to the technology frontier, but has failed to adapt its education system accordingly. How should this issue be addressed?' This report looks at three possible scenarios –maintenance of the status quo, radical change and gradual reform– and favours the latter option. The report claims that it is better to aim for gradual reform than to continue to aspire to subjecting the French education and research system to shock therapy which will be both unfeasible and virtually impossible to implement.

Christian de Boissieu
Executive Chairman of the CAE

Education serves a number of purposes in modern societies, such as preparation for citizenship and social advancement. But the reason why education consumes such a large share of the resources produced each year (7% of French GDP for example) in all industrialised and even developing countries, is undoubtedly because education is an essential contributor to growth.

The report by Philippe Aghion and Elie Cohen looks at the French education system in terms of its contribution to economic growth. The authors demonstrate, on the basis of recent theoretical and empirical evidence, that higher education plays an increasingly important role the closer a country's technological development gets to that of the most developed countries. And the emergence of new information technology has increased the importance of education still further over the last few years. They then go on to identify the many failings of the French higher education system, which is well suited to an economic growth model based primarily on imitation, and would be far less effective when innovation becomes the main growth driver.

In order to address these shortcomings, however, the authors do not propose a radical overhaul of the system, which would be rendered impossible by opposition from the main players in the field of education. Instead, they advocate an incremental approach, with universities being granted additional resources as part of incentives aimed at promoting excellence.

The report was presented to the plenary session of 19 June 2003, and subsequently on 10 July 2003 in the presence of the Prime Minister. This letter published by the permanent members of staff at the CAE summarises the main conclusions reached by the authors.

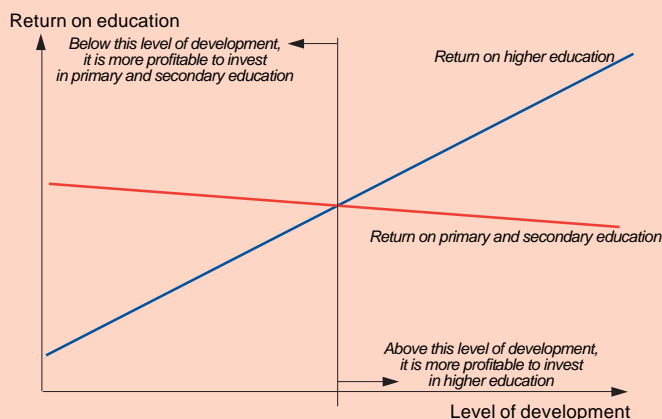
French productivity, innovation and research are declining

French productivity almost caught up with the USA during the 30-year boom following World War II, only to start to diverge at the beginning of the 1980s and then fall behind in the early 90s. This decline is a reflection of the deterioration in innovation indicators. France's share of patent applications compared to the rest of Europe or the US has declined steadily since the start of the 80s. And the impact of French scientific publications is also on the wane.

Studies on the attractiveness of France as a business location tell a different story. While these all conclude that France is handicapped by its tax regime, social legislation and cumbersome administration, they also tend to mention education as one of the country's assets. This system is not only considered able to meet the economy's need for appropriately-trained workers and employees, but also to supply high-quality technical middle managers and senior executives.

An analysis of the relationship between education and growth clarifies this paradox.

Return on education and level of development



Explanation: The X axis shows the level of development of a particular country (measured by the level of productivity per capita), and the Y axis shows the return on education (measured by the effect on per capita productivity of an additional year of education). This return increases in line with the level of development for higher education, and decreases slightly for primary and secondary education. Beyond a certain level of development (where the two curves cross), the return on higher education exceeds that of primary and secondary education, and it becomes more profitable to invest in higher education.

Source: From table 2, chapter 1 of the CAE report 'Education and Growth'.

The importance of higher education grows as a country moves from being an 'imitator' to an 'innovator'

The economic analysis of the contribution of education to growth puts forward two mechanisms. The first stresses the accumulation of *human capital* by individuals passing through the educational system, which is what makes them more productive. Numerous macroeconomic studies have shown that an additional year of education has tended to increase the productivity of individuals in different countries at all times. In France, this extra productivity is alleged to be around 8%.

A second mechanism relates to *technical progress*. A high level of education enables us to adapt technologies developed by others more easily, or to develop new technologies. But the various stages of the education system play different roles in this process: the imitation of existing technologies requires individuals with strong technical and professional skills developed through secondary or specialised higher education, while innovation on the other hand is research-based and instead demands extensive higher

education of a more generalist nature.

For those countries far from the *technology frontier*, the more profitable growth strategy is undoubtedly to adapt the technology of the most developed countries and hence invest in primary and secondary education. When the country is sufficiently close to frontier, the potential for imitation is increasingly limited, and it becomes more profitable to invest in higher education. The empirical results presented in the report confirm these expectations.

For France, which is currently close to the technology frontier, this analysis demonstrates the importance of an effective system of higher education. And it is even more crucial that the higher education system operates effectively given that each time a new wave of technology comes along (such as the emergence of new information technology today), the scope for copying or introducing incremental innovations is more limited. This prompts us to consider whether the functioning of the French higher education system accounts for the loss of momentum of the country's economy and capacity for innovation.

The French higher education system is ill-suited to an innovative economy

French higher education suffers from two divisions: firstly, between the *grandes écoles* set up to educate an elite and endowed with substantial financial resources, and the universities, the poor relation of the system which, by default, pick up most of the students rejected by the *grandes écoles*; and secondly, between teaching, the preserve of the *grandes écoles* and the universities, and research, which is entrusted in numerous fields to ad hoc bodies such as the CNRS (national centre for scientific research), CEA (atomic energy commission), CENT (France Telecom research and development centre) and the CNES (national centre for space studies).

The *grandes écoles* and the specialised training courses developed by the universities over time, such as the IUTs (technical colleges) and the DUT (qualifications taken after two years at technical colleges), supply the companies with the executives they require, which explains why foreign firms rate the French education system highly. But French research pays the price for this success.

The leading scientific organisations, since they have completed their initial mission, tend to immobilise resources, halt redeployment and fail to supply the universities. They generally contribute to the under-productivity of the system.

The whole French higher education system, including the *grandes écoles*, accounts for just 1.1% of GDP, compared to 2.3% in the US. A French higher education student (again including the *grandes écoles*) costs 11% less than the OECD average. This means that once resources have been allocated to the *grandes écoles*, universities have limited resources left for research. This creates human wastage. Furthermore, France has no university entry selection; the

only 'selection' is by failure at the DEUG level (the diploma taken after two years and passed by under 50% of students), which consumes a further share of the available resources.

Human resource management in the education system is excessively rigid, constrained by the status of the university *enseignants-chercheurs* (teacher-researchers who are supposed to devote half their time to research and half to teaching), the automatic renewal of university budgets from one year to the next and weak external resources. University pay is homogenous, so there is little competition between institutions to attract the best researchers. Assessment of researchers' output is limited and, regarding their teaching, non-existent. As a result, there are no great incentives to excel, either in research or in teaching. Apart from the fact that public research in France has fallen behind and the quality of education has deteriorated, the surprising phenomenon is that the deterioration is not more pronounced and that, in the main, French teaching is of high quality!

In favour of incremental university reforms based on appropriate incentives

The French higher-education system urgently needs to adapt to the emergence of new information technologies and to fiercer competition to attract the best researchers and students. Nevertheless, Philippe Aghion and Elie Cohen are against a radical shake-up of the system. Firstly, because they believe any such reform would be scuppered by resistance. Secondly, because the changes that have taken place over the last 15 years demonstrate that gradual and continuous adjustment is possible. This is reflected in the increased strength of the universities to the detriment of the previous faculties and the definition of genuine 'establishment policies' for individual universities, brought about by the set-up of a contractual

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Education and Growth

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relationship between universities and the State at the end of the 80s. It is also reflected in the development of professional courses, and recently, the reorganisation of university cycles into the 3-5-8 system (Bac + 3, Bac + 5, Bac + 8), known as the LMD (licence-master-doctorat) reform. In conjunction with the implementation of ECTS (European Credit Transfer System) credits, this new structure will facilitate links between French and other European universities and increase competition between them.

The proposed method of reform aims to take advantage of existing levers: harness the European dynamic to encourage co-operation between French and foreign universities; encourage universities to develop training programmes that lead to qualifications and professional diplomas that form part of a continuous education process; encourage initiatives similar to Sciences-Po's (the Paris-based Institute of Political Studies) scheme to facilitate the voluntary entry of students from underprivileged backgrounds; gradually increase contract-based grants linked to 'establishment projects', and reduce those allocated on the basis of existing structures (the so-called SANREMO budget allocation system).

The authors also recommend providing additional resources (they suggest 0.5% of GDP) to new agencies set up to introduce more competition and encourage excellence in higher education. A first agency, based on the model of the UK's Economic and Social Research Council or the National Science Foundation in the US, would be entrusted with selecting the best research projects on the basis of a peer review, financing post-doctoral grants, financing the establishment of new research centres and lastly, encouraging the creation of networks, groups and alliances between different university teams on topics of common interest. The agency would facilitate the emergence of centres of excellence enjoying diversified resources and subject to regular evaluation. A second agency would be responsible for helping struggling universities (those that are either too small or suffer from high failure rates) to restructure.

Finally, the authors call for the introduction of a genuine evaluation system for teaching staff, teaching and courses.

In their comments, **Jean-Hervé Lorenzi** and **Michel Mougeot** confirm their agreement with the overall conclusions of the report. Jean-Hervé Lorenzi points out, however, that it places too much emphasis on universities. Based on work carried out by J. Heckman in the US, Lorenzi believes the education of very young children is equally critical (though this does not mean the rest of the education system should be neglected). After all, how 'could even the perfect university be expected to turn the base metal generated by the first stages of the system into gold?'. For his part, Michel Mougeot regrets the absence of any analysis of the causes of the inadequacies of the system, which would be based on a precise study of the behaviour of the various players and the information available to the State, in order to help identify the incentives required to reconcile this behaviour with the collective optimum.

Both concur in their criticism of the incremental approach advocated by Philippe Aghion and Elie Cohen. In their view, this approach seems insufficient to tackle the issues highlighted by the authors themselves. They believe the limited room for manoeuvre within the current system argues in favour of a more