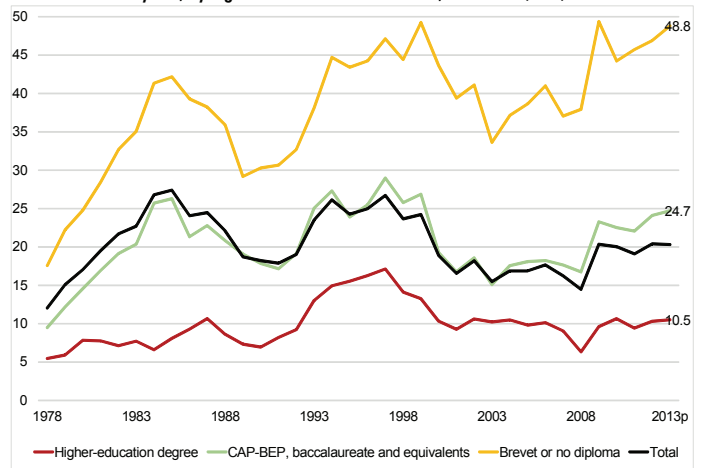# Initial and continuing education: the implications for a knowledge-based economy

■ Initial and continuing education play a decisive role in helping people to access the labour market by reducing unemployment risk and duration, and enabling them to obtain higher wages. In France, as in the other OECD countries, the rise in wage earnings procured by a higher-education degree greatly exceeds the cost of obtaining the degree (rate of return: 11.4%). Beyond the personal level, education contributes to increasing productivity, stimulates innovation and technical progress, tends to reduce passive social spending and allows fuller integration into society. These positive effects on the economy and society justify public participation in education funding.

■ Continuing education does not easily replace initial education. Beyond the acquisition of a diploma, initial education is part of a cumulative, life-long learning process: each learning period is an essential step towards future learning periods. There are two consequences to this. First, primary education is crucial, for skills deficiencies are hard to compensate later. Second, initial education facilitates access to continuing education and makes it more efficient. As a result, the main group to access continuing education today consists of employees, particularly the highest-skilled. Continuing education also benefits employer firms through productivity gains.

■ According to the OECD 2012 PISA survey, the performance of French 15-year-olds lies within the developed countries' average, but France's ranking has declined since 2000. Moreover, adult numeracy and literacy skills–as measured by the PIAAC survey–seem relatively weak in France by comparison with other OECD countries, but the education level is improving more visibly than in the other countries for the younger cohorts, owing to the rise in the number of secondary- and higher-education graduates.

■ In 2014, approximately 44% of a birth cohort completed higher education in France, compared with the European Union average of 38%. France aims to raise that proportion to 60% by 2025. To this end, the number of graduates may be expanded by measures to promote an increase in students' success rate, which is currently low for holders of "technological" and vocational baccalaureates in first-cycle university education. Their success could be eased by intensifying support programmes and guidance, and by a better adjustment of education programmes to student profiles.

■ Raising the number of graduates also requires improving the skills of higher-education entrants. Indeed, high-quality primary and secondary education is essential to pursuing and completing higher-education studies.

Note: p: provisional data.
Scope of coverage: Metropolitan France; 2011-2013 = provisional data.
Source: INSEE: Labour Force Survey.

Unemployment rate of young people having left the initial education system in the past four years, by highest educational attainment, 1978-2013 (in %)
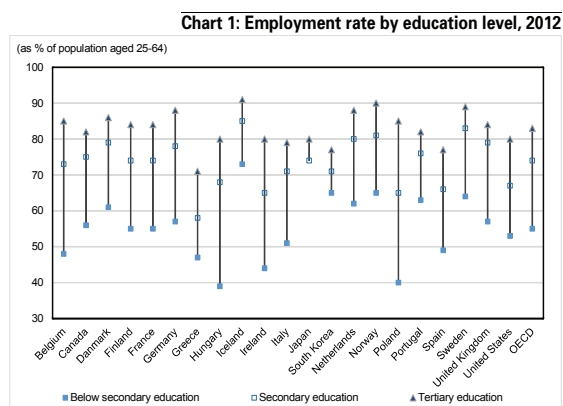
1. High-quality initial education provides unquestionable benefits for the individual and society

1.1 Access to employment and earnings are strongly linked to educational attainment

As in the other OECD countries, there is a significant, long-term link in France between educational attainment and the school-to-work transition. The proportion of 25-64-year-olds in employment in 2012 ranged from 84% for higher-education graduates to 74% for upper-secondary graduates and 55% for persons with lower attainment.

Chart 1: Employment rate by education level, 2012

(as % of population aged 25-64)

■ Below secondary education   □ Secondary education   ▲ Tertiary education

Source: OECD, Education at a glance 2014; chart, DG Trésor.

Degrees also procure higher earnings. A 2010 cohort survey by CEREQ put average net monthly earnings for young people who had left the education system in the previous three years at €2,350 for doctorate-holders versus approximately €1,260 for holders of a "general" baccalaureate and €1,160 for a person with no diploma (see table 1).

Table 1: Median net wage by education level, at hiring and three years after exit from education system (in constant 2013 €)OECD, Education at a glance 2014

Education level	Median net monthly wage (in constant €)	
Cohort leaving school in 2010	at 1st hiring	3 years after exit
Drop-outs	1,130	1,160
CAP, BEP, additional credits	1,200	1,260
«General» baccalaureate	1,110	1,260
«Short» higher-education diplomas	1,410	1,520
M1 and other baccalaureate + 4 yr degrees	1,470	1,620
M2 and other baccalaureate + 5 yr degrees	1,680	1,920
Business school	1,990	2,290
Engineering school	2,120	2,350
Doctorate	2,100	2,350
Total	1,340	1,450

Sources: Enquête génration 2010 (previsional data), Cereq, march 2010.
Scope of coverage: First-time school leavers in 2010 in paid employment at survey date.

1.2 At the personal level, the economic benefits of initial education exceed its costs over an entire life cycle

The advantages provided by education in the labour market are an incentive for persons to seek education. However, the incentive must be weighed against education costs, including direct tuition costs and loss of earnings due to longer schooling. These costs are incurred in the short term, whereas benefits are spread over the entire life cycle.

The comparison of education costs and benefits forms the core of the human capital theory developed by Schultz (1961)[1] and Becker (1964)[2]. Their analytical framework views education as an investment. The internal rate of return to education is equal to the discount rate that makes the present value of costs equal to that of the gains from the educational investment over the entire life cycle (the present value of €10 a year from now is equal to 10 divided by the chosen discount rate, for example, inflation)[3]. In France, an investment in a higher-education degree becomes profitable if it can be funded at a rate of less than 11.4%, a value that lies within the average of the main developed countries (see table 2).

The OECD (2014) uses data from the Labour Market and Social Outcomes of Learning (LSO) network to estimate internal rates of return[4] for different countries and educational attainments (see table 2). The private rates of return exceed real interest rates irrespective of educational attainment or country. This finding suggests that most people will benefit financially from education.

Table 2: Private return to education, 2010 (in %)

	Secondary-education graduate	Higher-education graduate
United States	19.4	15.4
United Kingdom	18.2	14.3
Germany	7.5	13.4
France	10.6	11.4
Spain	35.3	11.2
Canada	13.3	10.2
Danmark	11.7	8.4
Italy	8.1	8.1
Japan	-	7.4
Sweden	16.5	7.4
Netherlands		7.2

Source: OECD, Education at a glance 2014.
Note: The rate of return to the second level of secondary education is calculated by comparing the private costs and benefits of this level with those of the first level of secondary education over the entire life cycle of male individuals. For higher education, the comparison is with the second level of secondary education..

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(1) Schultz, T. W (1961), "Investment in human capital", *American Economic Review*, 51(1), pp. 1-17.

(2) Becker, G. S. (1964), "Human capital: a theoretical and empirical analysis, with special reference to education", New York: *Columbia University Press.*

(3) The net present value (NPV) of an investment project is equal to the difference between discounted profits and discounted costs (applying a given discount rate such as the expected average inflation rate). The internal rate of return (IRR) is the discount rate for which the NPV is zero.

(4) The estimated rates of return take into account tuition expenses and forfeited income due to further education on the cost side, and higher gross wages and a lower unemployment risk on the benefit side. These factors are adjusted for redistribution effects: tax burden, social contribution levels, and social transfers including scholarships. Profits are calculated until retirement age (standardised to 64 years) and education is assumed to be free until the end of secondary school.

The effects of the rate of public subsidies to education on the private rate of return are hard to estimate. On the one hand, high public subsidies lower the direct costs borne by individuals and increase the private rate of return. On the other hand, public funding of education reduces the private return to education because of the progressive structure of the tax/benefit system: the beneficiaries of education are also the highest earners.

Chart 2 breaks down the net present value of an education investment, i.e., the sum of benefits net of costs over the entire life cycle[5]. In all countries, the benefits of a higher-education degree compared with an upper secondary diploma are essentially due to the increase in earned income. In France, the wage gain for men over the entire life cycle is €321,500. In addition to procuring higher earnings, a degree lowers the unemployment risk. The OECD estimates the value of this protection during a working life at €16,100 in France.

These results do not suffice, however, to demonstrate the effect of education on wages and employment in the strict sense, for innate or acquired personal skills can explain both high educational attainment and high earnings.

An econometric analysis is therefore needed to isolate the specific effects of education (see Box 1).

Chart 2: Level and composition of present net private value of obtaining a higher-education degree (2010 or year shown)
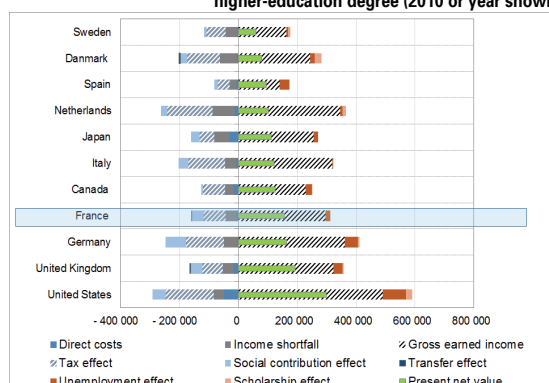
Source: OECD, Education at a glance, 2014.
Notes: * 2007 for Japan, 2008 for Italy. Costs and benefits are discounted at a rate of 3%. Countries are ranked by descending order of net present value. Data concern males only.
How to read this chart: In France, a male higher-education graduate will earn €296,964 more than a male holder of a final secondary-education diploma over his entire life cycle.

Box 1: Mincer's equation and causality between education and wages

Mincer's approach uses statistical analysis to estimate the effects of education on wages. In its simplest formulation, the effects are estimated by regressing the wage (wi) log on the number of years of schooling (si), occupational experience (expi) (measured by the difference between present age and school-leaving age) and exp squared[a]:

$$\log w_i = \alpha + \beta s_i + \delta exp_i + \gamma exp_i^2 + u_i$$

The causal identification of the effect of education on wages proves to be a delicate exercise. Education is a strongly endogenous variable, particularly because of the existence of skills (innate or acquired), which explain both high educational attainment and access to a well-paid job. To isolate the effects of education, researchers have relied, among other things, on natural experiments[b] having entailed an exogenous change in educational attainment.

Among the natural experiments most commonly used, several authors have explored the changes in legislation regarding compulsory schooling age. By comparing wages before and after the extension of the compulsory schooling period, one can effectively isolate the effect of a year of education on wages, as longer schooling is independent of personal choice. Harmon and Walker (1995)[c] explore, for example, the increase in the compulsory schooling age in the United Kingdom from 15 to 16 years in 1974. They find that this additional year of education increases wage by 14.9% for men and 10.7% for women.

For France, Maurin and McNally (2008)[d] used the events of 1968, which led to looser standards for obtaining the baccalaureate and a massive opening of higher education to the 1949 birth cohorts. From this natural experiment, they show that each additional year of higher education translates into a 14% wage rise. This very high return in France was also identified by Maurin and Xenogiani (2007)[e].

a. The addition of a term representing occupational experience squared aims to capture the decreasing concave structure of wages by age.
b. A natural experiment is an experiment in which the random assignment to treatment is generated by natural and/or political causes. This contrasts with controlled (or "randomised") experiments, in which the assignment to treatment is randomly determined by the researcher for the purposes of the study.
c. Harmon, C. and Walker, I. (1995), "Estimates of the economic return to schooling for the United Kingdom", *American Economic Review*, pp. 1278-1286.
d. Maurin, E. and McNally, S. (2008), "Vive la Révolution! Long-Term Educational Returns of 1968 to the Angry Students", *Journal of Labor Economics*, 26(1), pp. 1-33.
e. Maurin, E. and Xenogiani, T. (2007), "Demand for Education and Labor Market Outcomes Lessons from the Abolition of Compulsory Conscription in France", *Journal of Human Resources*, 42(4), pp. 795-819.

While the benefits of education are linked to schooling duration, they also depend on the quality of education supply[6]. Analysing the effects of the education funding reform in the United States from the late 1970s onwards, Jackson et al. (2016)[7] show that a 10% increase in education spending[8] over a person's entire schooling period helps to raise wages by an average 7.25%. Beyond resources, efforts focused on teaching methods (Rivkin et al., 2005[9]) or on the organisation of the education system (Hanushek et al., 2013[10]) can also help to improve knowledge acquisition by students.

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(5) Assuming a 3% discount rate and a conversion rate of USD1 = €0.78 on a purchasing power parity (PPP) basis (source: OECD, Education at a Glance, Annex 2, reference statistics).
(6) Barro, R. and Lee, J. W. (2015), "Education Matters: Global Schooling Gains from the 19th to the 21st Century", Oxford: *Oxford University Press*.
(7) Jackson, C. K., Johnson, R. and Persico, C. (2016), "The effect of school finance reforms on the distribution of spending, academic achievement, and adult outcomes", *Quarterly Journal of Economics*, 131(1), pp. 157-218.
(8) The authors implicitly assume that an increase in education spending entails an increase in the quality of education supply.
(9) Rivkin, S. G., Hanushek, E. A. and Kain, J. F. (2005), "Teachers, schools, and academic achievement", *Econometrica*, 73(2), pp. 417-458.
(10) Hanushek, E. A., Link, S. and Woessmann, L. (2013), "Does school autonomy make sense everywhere? Panel estimates from PISA", *Journal of Development Economics*, 104, pp. 212-232.

TRÉSOR
DIRECTION GÉNÉRALE

Moreover, educational measures yield a higher average return when they are aimed at individuals from the least advantaged socio-economic categories. Piketty and Valdenaire (2006)[11] show that the effects of a decrease in class size on educational achievement are twice as strong for pupils in what are known in France as "priority education areas" (*zones d'éducation prioritaires*: ZEP).

1.3 Public intervention in education is justified by social returns

Social returns to education stem from positive externalities, which Gurgand (2005)[12] classifies into two broad categories: those observed in the productive sector and non-market education externalities. In the productive sector, these externalities depend on dissemination and learning effects. Lucas (1988)[13] emphasises the fact that productivity increases through contact with skilled people. Romer (1990)[14] goes further and suggests that a higher educational attainment in a population influences the very dynamics of technical progress by fostering innovation. Higher educational attainment also contributes to personal well-being through non-market externalities such as the positive effects of education on crime levels, good citizenship and health (Grossman, 2006[15]).

Because of these two types of positive externalities, the returns to education for the community[16]– while hard to assess empirically[17]–exceed the private return. Public support for education is therefore justified economically and socially, increasing the need to invest in education, in addition to its fundamental democratic role.

1.4 Investment in education has a positive impact on public finances in the medium term

In the OECD countries, public finances support a significant part of education costs. In France, 90% of primary and secondary education expenditures and 80% of higher-education expenditures are covered by central and local government[18].

However, according to the OECD, this cost for the public finances is more than offset by the medium-term benefits. For France, the return to the public financing[19] of a higher-education degree by comparison with an upper secondary diploma in 2010 is estimated at 8.7%. This positive return is due to (1) additional tax revenues and social contributions and (2) lower social benefits paid in the form of unemployment insurance and housing subsidies. Admittedly, while education spending procure a net gain for the public finances over an individual life cycle, it requires extra outlays in the short term.

The public returns to education do not constitute a measure of the efficiency of public education policies. They reflect factors that include the tax/benefit system of the country in question: a high level of mandatory levies increases the returns, all other things being equal. Moreover, the public returns measured here are partial, for they do not take into account the public benefits resulting from the dissemination of education externalities across society.

2. The benefits of initial education can be amplified by those of continuing education, which, however, can only partly compensate the gaps and disparities of initial education

Many adults, at the end of their initial education, lack the skills and diplomas to ensure a successful entry into the labour market[20]. In France, 17% of 15-29-year-olds were neither in employment nor in the education system in 2013[21]. This indicator shows the difficulty faced by the initial education system in making acquire to an entire birth cohort the basic skills needed to find work or continue their studies.

However, continuing education cannot fill all the gaps of initial education. Beyond vocational skills, initial education allows students to acquire the generic skill–both cognitive and non-cognitive–that will give them flexibility and mobility. By contrast, continuing education programmes are more often short-term in scope and generally aim at maintaining people in, or giving them access to, specific jobs.

(11) Piketty, T. and Valdenaire, M. (2006), « *L'impact de la taille des classes sur la réussite scolaire* », *Les Dossiers d'Éducation et Formation.*

(12) Gurgand, M. (2005), « *Économie de l'éducation* », Paris: *La Découverte.*

(13) Lucas, R. E. (1988), "On the mechanics of economic development", *Journal of Monetary Economics*, 22(1), pp. 3-42.

(14) Romer, P. M. (1990), "Endogenous Technological Change", *Journal of Political Economy*, 98(5), pp. S71-102.

(15) Grossman, M. (2006), "Education and nonmarket outcomes", *Handbook of the Economics of Education*, Amsterdam: Elsevier, 1, pp. 577-633.

(16) The social rate of returns is the ratio of total benefits of education for the community to total costs. It therefore includes the net private gain for the individual, market externalities (benefiting the productive sphere) and non-market externalities (benefiting society as a whole), as well as the net positive returns for the public finances.

(17) On the one hand, analyses are hampered by the difficulty in obtaining reliable measures of human capital. On the other hand, the identification of the causal effect of education on growth is complicated by the presence of several sources of endogeneity and the lag between educational investment and its economic impact.

(18) MENSR-DEPP [French Education Ministry], *État de l'école 2014.*

(19) The public rate of returns is calculated as the balance between (a) direct public expenditures (such as teachers' salaries, property infrastructure and textbook purchases), transfers to private agents (scholarships and public subsidies to households for education, and transfers to other private entities for workplace training) and the tax shortfall during the years of education (income tax and social contributions) and (b) the increase in tax revenues and social contributions, as well as the decrease in social transfers (including housing subsidies and social subsidies that are not paid above a certain income threshold, but also unemployment benefits).

(20) The OECD Survey of Adult Skills (PIAAC) found that as many as 28% of adults ranked at the lowest level on the skills scale in mathematics and 20% in writing skills in 2013; the French National Agency Against Illiteracy (ANLCI) estimated the proportion of illiterates at 7% in 2015.

(21) Source: OECD, *Education at a Glance 2015*, Interim Report, January 2015.

Continuing education can also, in some contexts, exacerbate initial disparities. This is because initial education makes it possible to improve the effectiveness of continuing education, as early investment facilitates later learning processes.

2.1 France devotes major resources to continuing education

Expenditures on continuing education in France[22] totalled nearly €24 bn in 2012 (€31 bn including apprenticeship), or slightly over 1% of GDP. One-half of the total is financed by firms.

Job-seekers–who comprise 7% of the total French population aged 15-64–received 14% of total spending on continuing education, apprenticeship and the school-to-work transition for the young in 2012. Of these total expenditures, 42% concerned persons in employment in the private sector and 19% concerned public-sector workers[23].
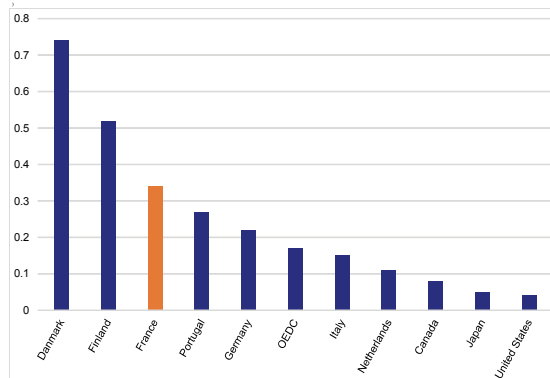
Comparisons with the other OECD countries are made difficult by differences in the definition and recording of continuing education expenditures from one country to another. France devotes relatively large resources to continuing education. Spending for job-seekers accounted for 0.34% of French GDP and 38% of "active" expenditures on employment policies in 2012, versus OECD averages of 0.17% and 30% respectively[24]. The hourly cost of training per employee in France is high[25] at €30 (in purchasing power parity[26]), i.e., slightly below Germany's €34 but above the EU-28 average of €24. However, these figures reflect an indicator of resources allocated to training programmes and should not be taken as a measure of training policies in different countries. In this connection, France is one of the European countries with a high participation of employees in classroom continuing education, at 45% versus an EU average of 38%. This may indicate both a relatively easy access of French employees to continuing education in the classroom and the prevalence of formal courses to support employee training programmes.

Chart 3: Share of paid employees having attended classroom vocational training programmes in 2010
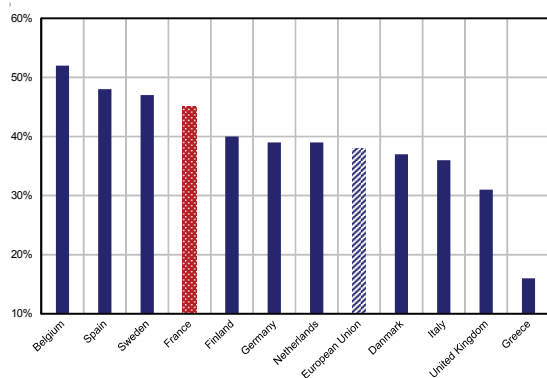
Source: Eurostat.

Chart 4: Public spending on training for job-seekers, as percentage of GDP (2012)

Source: OECD: https://data.oecd.org/fr/socialexp/depenses-publiques-cnsacrees-aux-marches-du-travail.htm#indicator-chart

2.2 Skilled employees have greater access to continuing education

The rate of access to training is a standardised European indicator[27] for measuring inequality of access to continuing education according to the characteristics of the adults concerned. In France, 50.5% of 25-64-year-olds attended a training programme in 2012[28], compared with 38.8% of job-seekers (although the latter group receives longer training) and 57.6% of persons in employment. The few long-term studies on the subject emphasise unequal access to continuing education, a situation that widens the gap between workers investing in human capital and "people permanently excluded from training, [who] may face a gradual erosion of their skills", as Bonaïti et al. (2006) point out[29].

For wage-earners in employment and job-seekers alike, the rates of access to training vary according to educational attainment, confirming the notion that "training attracts the trained". From its standpoint, the firm has an incentive to train its highest-skilled workers, as they are the ones for whom training produces the highest returns. From the community standpoint, the low access to training by the least-skilled segment of the labour force

(22) DARES (2015), « *La dépense nationale pour la formation professionnelle continue et l'apprentissage en 2012* », no. 14, February.

(23) Delort, A. and Mesnard, O. (2015), « *La dépense nationale pour la formation professionnelle continue et l'apprentissage en 2012* », *DARES Analyses* (see table 6).

(24) OECD (2015), Public spending on labour markets.

(25) This hourly cost incorporates direct costs for registration, transport, accommodation and other items.

(26) Purchasing power parity (PPP) is an artificial monetary unit that eliminates differences in living standards between countries.

(27) Ratio of number of persons having attended at least one training programme in the 12 months prior to the survey (Adult Education Survey) or in the month preceding the survey (Labour Force Survey) to the total population.

(28) INSEE (2014), « *La formation continue* », Fiche Thématique.

(29) Bonaïti, C., Fleuret, A., Pommier, P. and Zamora, P. (2006), « *Pourquoi les moins qualifiés se forment-ils moins ?* », *Documents d'Études DARES*, no. 116.

TRÉSOR
DIRECTION GÉNÉRALE

carries a cost, particularly because of larger payments of unemployment benefits[30].

Among members of the labour force in employment, 66% of holders of degrees obtained after two years of post-baccalaureate studies ("bac + 2") have attended at least one continuing education programme during the year, versus 25% of persons with no diplomas[31]. Like employees, the least educated jobless are those who face the greatest difficulty in accessing training, as noted by Gelot and Minni (2004)[32].

Differences in access to training may be due to three types of obstacles, which can occur in combination (Bonaïti et al., 2006). First, the firm's functioning, size and business sector, and the contractual relationship (fixed-term ["CDD"] or open-ended ["CDI"] contract) are essential determinants of the opportunities offered to wage-earners in employment. Second, it is the physical and financial obstacles that create differences in personal opportunities and place greater constraints on the lowest-skilled workers[33]. Third, surveys reveal that the least skilled persons are less attracted to training. This may be due to their more limited access to information, low expected returns in the form of wage gains, or learning problems in a conventional school environment[34]. In addition, as Cahuc et al. note (2011: op. cit.), the lack of an efficient certification system for the supply of training programmes does not make it possible to guarantee the quality of training provided. Bidding procedures for job-seeker training do, however, allow a partial quality check on programmes attended.

Nevertheless, as an extension to the National Inter-Occupational Agreement (Accord National Interprofessionnel: ANI) of 14 December 2013 and the Vocational Training, Employment and Social Democracy Act of 5 March 2014, continuing-education funding has been channelled towards categories that are perceived as having the greatest training needs–in particular, employees of very small to medium-sized businesses, job-seekers and the young. This reallocation has been confirmed by the framework agreement between the "joint employer-employee fund for securing occupational paths" (*Fonds Paritaire de Sécurisation des Parcours Professionnels*: FPSPP)[35] and the government for 2013-2015. Moreover, a new compulsory contribution to the FPSPP was introduced, equal to 0.15-0.20% of the total wage bill for companies employing more than 10 people. Lastly, the 2013 conti-

nuing-education reform streamlined the system for collecting employer contributions to occupational training, a move that ended the "train or pay" arrangement. In early 2016, the government announced a doubling of training programmes for job-seekers.

2.3 Continuing education benefits the entire economy

2.3.1 Continuing education has a positive impact on wages and employment

A portion of the gains from continuing education goes to employees in the form of higher wages or greater protection against unemployment. In France, Aubert, Crépon and Zamora (2009)[36] estimate that employees recover, in the form of wages, 30-50% of the productivity gains generated by training. Fougère, Goux and Maurin (2001)[37] argue that training has no significant effect on the wages paid subsequently by the firm that financed it, but has a positive effect on the new-hiring wage for workers who change jobs. Training can offer other advantages, such as reducing the unemployment risk.

As a rule, when the empirical data show a positive estimated effect of continuing education on wages, the returns are distributed unevenly according to the wage level and/or skill level of the employee studied. Bassanini et al. (2005)[38] offer evidence to support the assumption of strongly increasing returns to training as a function of skill level, confirming the results compiled by Heckman (1999)[39]. However, Bassanini and his co-authors explain that, as long training programmes often consist in "retraining", they can entail downward wage adjustments.

2.3.2 Continuing education for people away from the world of work has ambiguous effects on unemployment duration but positive effects on the quality of new jobs found

Training programmes for people away from the world of work are one of the main components of what are known as active employment policies such as those promoted by the "Europe 2020" strategy. Continuing education has ambiguous effects on unemployment duration for job-seekers. Training can delay return to employment through a "waiting" effect of the programme and, later, by a "lock-in" effect, i.e., unavailability for work during the training period. However, once the training is completed, return to employment accelerates and the duration of jobs filled by job-seekers who have received the training increases. In an empirical study on French data, Crépon,

(30) Cahuc P., Ferracci, M. and Zylberberg A. (2011), « *Formation professionnelle des adultes: pour en finir avec les réformes inabouties* », Institut Montaigne.

(31) INSEE (2013), « *La formation des adultes: Un accès plus fréquent pour les jeunes, les salariés des grandes entreprises et les plus diplômés* », *Insee Première*, October.

(32) Gélot, D. and Minni, C. (2004), « *Les chômeurs accèdent deux fois moins que les salariés à la formation continue, mais pour des durées quatre fois plus longues* », *Premières synthèses* no. 51.

(33) Fournier, C. (2004), « *La formation tout au long de la vie à l'épreuve du genre* », Ville-École-Intégration Enjeux no. 136.

(34) Baudelot, C., Gollac, M. and Bessière, C. (2003), « *Travailler pour être heureux: le bonheur et le travail en France* », Paris: Fayard.

(35) One of FPSPP's prime missions is to contribute to the funding of occupational training programmes to help employees and job-seekers acquire and reacquire skills.

(36) Aubert, P., Crépon, B. and Zamora, P. (2009), « *Le rendement apparent de la formation continue dans les entreprises : effets sur la productivité et les salaires* », *Économie et prévision*, 187(1), pp. 25-46.

(37) Fougère, D., Goux, D. and Maurin, É. (2001), « *Formation continue et carrières salariales: une évaluation sur données individuelles* », Annales d'Économie et de Statistique, no. 62, pp. 49-69.

(38) Bassanini, A., Booth, A. L., Brunello, G., De Paola, M. and Leuven, E. (2005), "Workplace Training in Europe", no. 1640, Institute for the Study of Labor (IZA).

(39) Heckman, J. J. (1999), "Doing it right: job training and education", *Public Interest*, (135), p. 86.

Ferracci and Fougère (2012)[40] confirm these ambiguous effects and estimate that job-seeker training lengthens the total unemployment spell but increases the duration of the new-found jobs.

2.3.3 Continuing education increases firms' performance

Employers are the main source of finance for their employees' continuing education. Motivation surveys show that, for employers, the chief objectives of training are to promote flexibility in the workplace (43%) and achieve higher performance (15%).

Continuing education does indeed generate productivity gains. From a theoretical standpoint, Acemoglu and Pischke[41] (1999) demonstrate that market imperfections[42] allow employers to capture most of the gains. Aubert, Crépon and Zamora (2009) estimate that an average training effort in a firm (11 hours of training per employee per year)[43] is associated with a 1% productivity gain. Thornton and Thompson (2001)[44] confirm these results by showing that the benefits of continuing education are not confined to the trained employee but extend to the firm through total productivity.

* * *

Education raises the level of technological development and makes it possible to maintain a robust growth rate. According to Vandenbussche et al. (2006)[45], countries close to the technological cutting edge such as France must focus on innovation and R&D, while countries more distant from this cutting edge can achieve major progress through imitation and catching-up programmes. These findings have important consequences for French education and training.

According to the results of the OECD's 2012 PISA survey, the performance of French 15-year-olds lies within the developing-country average (see chart 5); however, France's ranking has slipped since 2000. Furthermore, adult competencies in numeracy (see chart 6) and literacy (measured in the PIAAC survey) seem relatively weak relative to the other OECD countries, but are improving more visibly than in most other countries for the younger birth cohorts, owing to the sharp rise in secondary-education and higher-education graduates.

Educational achievement in France is also heavily determined by the parents' social origins. The latest results of the OECD's 2012 PISA survey[46] show a low degree of fairness in the French education system. The correlation between students' socio-economic background and scholastic performance is far stronger than in most other OECD countries. It actually increased in France between 2003 and 2012 whereas it remained stable, on average, in the OECD area[47].
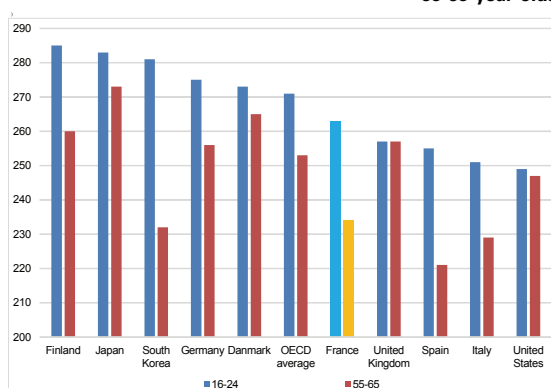
In view of these findings, France has set itself two goals: to enable 50% of 30-34-year-olds to become higher-education graduates by 2020[48] and to ensure access to continuing education for all.

Chart 5: 15-year-olds' performance in mathematics
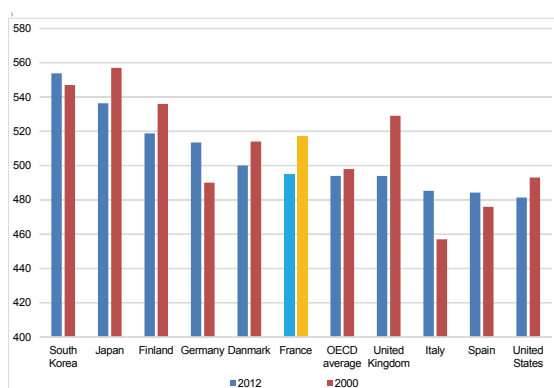
Source: OECD, Main results of 2000 and 2012 PISA surveys.

Chart 6: Numeracy competency among 16-24-year-olds and 55-65-year-olds

Source: OECD, Survey of adult skills (PIAAC), 2013.

(40) Crépon, B., Ferracci, M. and Fougère, D. (2012), "Training the unemployed in France: Impact on unemployment duration and recurrence", *Annales d'Économie et de Statistique*, no. 107-108, pp. 175-199.

(41) Acemoglu, D. and Pischke, J. S. (1999), "Beyond Becker: training in imperfect labour markets", *The Economic Journal*, 109(453), pp. 112-142.

(42) Information asymmetries and job-seeking costs.

(43) 1994-2000 data.

(44) Thornton, R. A. and Thompson, P. (2001), "Learning from experience and learning from others: An exploration of learning and spillovers in wartime shipbuilding", *American Economic Review*, 91(5), pp. 1350-1368.

(45) Vandenbussche, J., Aghion, P. and Meghir, C. (2006), "Growth, distance to frontier and composition of human capital", *Journal of Economic Growth*, 11(2), pp. 97-127.

(46) PISA (Programme for International Student Assessment) assesses the competencies of 15-year-olds in reading, mathematics and science.

(47) Keskpaik, S. and Salles, F. (2013), « *Les élèves de 15 ans en France selon PISA 2012 en culture mathématique: baisse des performances et augmentation des inégalités depuis 2003* », *Note d'information DEPP* no. 13-31.

(48) The European Union's Education and Training 2020 Strategy aims to achieve at least 40% of young Europeans aged 30-34 holding a higher-education degree or equivalent by 2020. In its Framework and Planning Act on the Future of Education (*Loi d'Orientation et de Programme pour l'Avenir de l'École*) of 23 April 2005, France set a target of "50% of an age cohort to be higher-education graduates 10 years from now".

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Ultimately, the increase in human capital requires life-long education. Beyond the acquisition of a diploma, initial education forms part of a cumulative learning process[49]: each learning stage is a prerequisite for later learning. This has two consequences. First, primary education is crucial, for skills deficiencies are hard to fill later. Second, initial education facilitates access to continuing education and makes it more efficient. Reciprocally, since initial education produces only long-term effects, it needs to be supplemented by continuing education, which seeks to achieve transition to a specific job in the near term.

For France to meet its objectives in terms of higher-education graduates, it will need to reduce–without lowering standards–the failure rate of students enrolled in bachelor's degree programmes (after three years of study, only 27.3% of baccalaureate holders enrolled in the first year of a bachelor's degree programme in 2007 had graduated; the proportion fell to 7.3% for "technological baccalaureate" holders and 2.7% for vocational baccalaureate holders)[50]; at an earlier stage, France will need to reduce school inequalities starting in primary education.

Progress towards these objectives has been helped by measures taken in recent years to reduce early exits from the education system (by systematic tracking of absenteeism, strengthening the school-parents dialogue, and introducing special curricula) and to raise the reintegration rate (through platforms for monitoring and supporting young drop-outs, and "Training-Skills-Employment" networks).

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(49) Cunha, F., Heckman, J. J., Lochner, L. and Masterov, D. (2006), "Interpreting the evidence on life cycle skill formation", *Handbook of the Economics of Education*, Amsterdam: Elsevier, 1, pp. 697-812.

(50) Path followed by a cohort of students enrolled in L1 in 2007-2008, MESR [French Education Ministry] (2015), *L'état de l'Enseignement supérieur et de la Recherche*, no. 8.

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