Exploring the French Productivity Puzzle

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Introduction

Labour productivity in France stands at a relatively high level in comparison to other European countries and has remained quite dynamic until the mid 2000s. According to OECD data measuring the GDP per hour worked in 2013,[1] French productivity was higher than the OECD average, Spanish or British levels and close to German and Dutch levels. In terms of dynamics, labour productivity growth over the last decade remained quite strong between 2001 and 2007, near again German trends, but slightly below the OECD average. As in most countries, the Great Recession of 2007-2008 reversed this trend. According to the most recent French National Accounts, the annual growth rate dropped to -0.5% in 2008-2009 and showed a limited recovery in 2010-2012 (+1.2%), followed by a new slowdown in 2013 (+0.5%). Although this profile is observable in most other countries, the reversal seemed slightly more pronounced in France than in the OECD between 2007 and 2009 in general, where the average annual growth rate amounted to -0.1%, but has been similar to the OECD average since 2009. In comparison to previous economic downturns, this profile is clearly atypical. The result has been a relatively low but persistent increase in the unemployment rate (as measured according to the ILO concept): 7.4% in 2008, 9.2% in 2009, 9.8% in 2012, 10.3% in 2013 and 2014. As a consequence, macroeconomic models of the French economy have failed to replicate the "under-adjustment" of employment to GDP decline and then stagnation. Simple explanations such as sector-composition effects are not relevant.

Consequently, it appears particularly hazardous to anticipate and evaluate the potential growth of the French economy over the medium run, or simply to estimate the current output gap. Now, these parameters are crucial: in the short term, they play a central role in European treaties for assessing a country's budgetary situation; in the long run, they determine the sustainability of its economic and social policies – of its public retirement schemes for example.

Nevertheless, assessing productivity trends requires microeconomic evidence on firms' behaviour, in addition to an analysis of the main changes in their productive context. In this chapter, we use aggregate data on firms' environment (labour market, financing…), as well as microeconomic data on French firms, to identify several factors that may have contributed to the productivity slowdown. Major changes in the French labour market, such as the rise in high-skilled employment and the development of very short-term contracts, appear to be good candidates for explaining the observed productivity slowdown since the recession: their contribution is estimated both at the aggregate and microeconomic level. In addition, our workplace data enable us to test the hypothesis of a structural break in the relationship between high-performance work practices and productivity between 2005 and 2011.

In the first section, we present the French productivity puzzle in greater detail. To characterise the situation of French firms, we discuss the consequences of several important changes in the labour market in the second section, and in the third we examine their financing opportunities and several supporting policies that have been implemented since 2008. In the penultimate section, we analyse several factors potentially explaining productivity trends at the firm/establishment level, including workforce composition, workplace organisation and incentive schemes; while in the final section, we propose a scenario for the future.

[1] Extracted from OECD iLibrary on December 10, 2014.

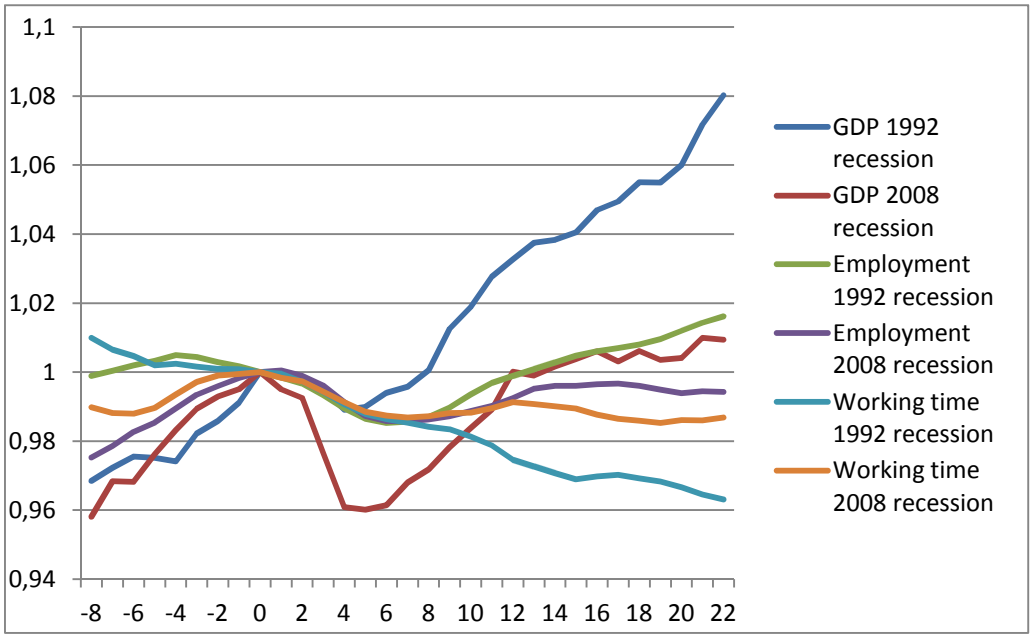
1. The French productivity puzzle

In this section, we explain why the labour productivity slowdown observed in France, at least since 2008, is puzzling. First, it does not fit with the experience from the previous recessions, and it is spread across industries. Second, it is a total-factor productivity (TFP) puzzle since the crisis has only slightly altered the level of investments.

1.1 "This time is different"

France has experienced a dramatic drop in productivity growth in the past few years. In essence, the average yearly labour productivity gains have fallen well below 1% since 2008. The comparison with the trends in GDP and employment observed around the previous crisis in 1992/1993 is particularly illustrative (Fig. 1).

Figure 1. Quarterly GDP, employment and working time indexes. 1990-1997 and 2006-2013
Base 1 = Q1.1992 (t=0) or Q1.2008 (t=0)



Source: Quarterly National Account (base 2010), INSEE. Released June 2014. Preliminary for 2012 and 2013.

The Great Recession of 2008/2009 was actually limited in France as compared to most European economies. The bottom was reached in mid 2009. The cumulative drop in GDP equalled 4%. However, the recovery has been unusually slow. The GDP level reached its pre-crisis value only in 2011. The output gap, compared with the 1992 recession, is significant: the drop in GDP was only 1% and in just two years, France recovered to the ante-recession GDP level. Steady economic growth was firmly re-established in the second part of the nineties.

Despite these huge differences in GDP trends, the changes in total employment are strikingly similar during the two years following the onset of the recessions. The drop of total employment is less than 2%. Unemployment figures are also very close.

While in 1992-1993 the adjustment of (un)employment had been proportional to changes in GDP, by 2008-2009 Okun's coefficient had fallen to about one third to one half its previous magnitude. Such

a value lies outside the range of estimations based on historical data. Consequently, no macro-simulation model for the French economy has been able to replicate accurately and, of course, to predict the employment trends in the recent years. The mirror image of this labour-market resilience is a dramatic slowdown in current productivity per head, whose growth rate has plunged; whereas, it had been globally unaffected by the crisis in the 1990s.

The trends in hours worked reinforce the enigma: contrary to Germany or the United Kingdom, average hours worked per worker has been globally flat in the past years; both national accounts (Fig. 1) and labour force surveys report this shape. The flatness of working time is not necessarily inconsistent with the declining working time during the crisis of the 1990s. Indeed, in neither case did the crisis seem to have altered the *ex ante* trend (flat or declining).

Solving this French productivity puzzle first requires exploring a straightforward explanation, one that is crucial in Spain for example: industry composition effects (see Hospido and Moreno in this volume).

1.2 The productivity recovery in the non-market sector contrasts with the slump in productivity across most of the market economy

Up to 2013, French austerity programmes have been less harsh than in numerous European countries, especially in Southern Europe. They have nevertheless led to some reduction in the size of the public sector workforce. While local administrations preserve their jobs, the average national replacement of retiring state civil servants has been on the basis of 1 for 2 retirees. Apart from specific activities such as the judiciary, workforce cuts have been widespread. Army and education staffs, particularly, have plummeted in the period leading up to 2012.

As a result, according to national accounts, the hourly productivity in the non-market economy has grown in total by roughly 6% since 2008 (Table 1), while it had been flat between 1992 and 1997/1998. The French productivity puzzle is thus primarily concentrated in private firms and the market economy where the overall hourly productivity growth came to a standstill. However, accounting for this recent experience is not straightforward.

One might first note that recent findings prove multinational firms play massively with transfer pricing between subsidiaries for the purpose of shifting billions of euros in profits from France to low-tax countries (Vicard, 2014). Several leaders of the e-commerce, based e.g. in Luxembourg, even declare a ridiculously small turnover in France. Such understatement should affect the level of the French GDP (and profits) and lead to a slight underestimation of GDP growth. However, there is no hint that this phenomenon has accelerated in recent years and cannot, therefore, account significantly for the productivity slowdown.

In contrast to Spain (where the aggregate labour productivity has increased), changes in the industry composition have not been massive and cannot explain the aggregate trend in productivity: relative declines in both manufacturing and construction have offsetting impacts on aggregate productivity.

The productivity slowdown cannot be attributed to particular market industries. An overwhelming majority of sectors are affected. It does not seem concentrated in declining companies either. According to the REPONSE survey (*RElations PrOfessionnelles et NégociationS d'Entreprise*, see Section 4 for a presentation), the share of establishments with 20 or more workers that had reduced

their employment during the 2008-2010 period is only slightly larger than during the 2002-2004 period (Table B.1 in Appendix B). This moderate reduction contrasts with the nine point jump in the share of establishments reporting a contraction of their business activity. In fact, for a given trend in production, in 2011 as compared to 2005, there were fewer establishments reporting decreases in their workforce and more declaring increases.

Table 1. Average yearly labour productivity growth by main industries 2003-2013 (Value-added in volume per hour worked)

	2003-2006	2007	2008-2013
Manufacturing, mining and quarrying and other industries	**3,9**	**2,0**	**1,3**
Mining and quarrying; energy, water supply, sewerage, waste management and remediation activities	-0,6	-0,8	-3,4
Manufacture of food products, beverages and tobacco products	3,1	2,0	0,6
Manufacture of coke and refined petroleum products	-3,7	-2,9	-13,8
Manufacture of electrical, computer and electronic equipment; manufacture of machinery	7,6	1,8	3,8
Manufacture of transport equipment	5,5	2,5	2,0
Other manufacturing	4,2	2,8	2,3
Construction	**-1,0**	**-1,5**	**-2,3**
Mainly market services	**1,5**	**-0,1**	**0,4**
Wholesale and retail trade, transportation and storage, accommodation and food service activities	0,8	0,6	-0,1
Information and communication	4,5	1,4	1,6
Financial and insurance activities	0,8	4,1	2,6
Real estate activities	0,9	-7,0	2,6
Professional, scientific, technical, administration and support service activities	1,4	-0,2	0,0
Other services (households, arts…)	1,4	-0,7	0,0
Mainly non-market services	**0,2**	**-1,5**	**1,0**
Total	**1,4**	**0,0**	**0,5**

Source: Author's computations using National Accounts (base 2010), INSEE. Released June 2014. Preliminary data for 2012 and 2013.

The focus on the market sector also provides some hints that the productivity slowdown had preceded the (not so-)Great Recession in France: in 2007 the productivity growth was already slow, especially in market services. This sluggishness suggests that the subsequent productivity slowdown could not be exclusively explained by mechanisms generated by the recession and the financial crisis.

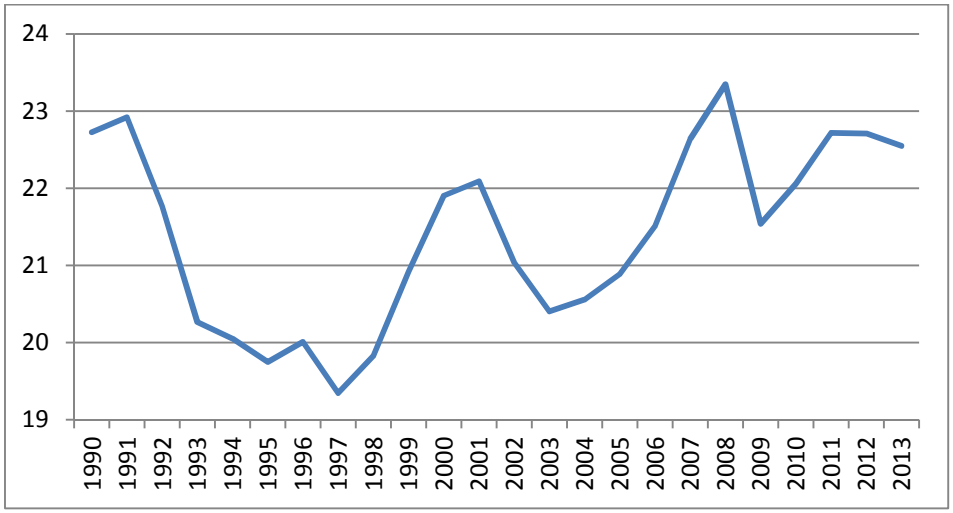
1.4 An apparent total-factor productivity (TFP) puzzle

At a macro level, the issue of investment has two aspects: Firstly, investment and then GDP may be underestimated because of the growing spending on intangibles. Secondly, altered capital deepening may participate in the labour productivity slowdown.

There are important points about the intangibles, which do not appear on balance sheets although they are the basis for future revenue generation. There is no evidence of a significant rise in intangible investments in France over the past decade. The EU INTAN/INVEST even suggests a small overall decline between 2008 and 2010 (Corado et al., 2012). In addition, Figure 1 and Table 1a provide updated statistics according to the new National Accounts (base 2010), which now include two main types of intangibles: R&D and the constitution of large databases. These statistics confirm evidence from previous research showing that accounting for intangibles is important for the level of GDP but not for GDP growth (see Nayman et al., 2011). Note that R&D spending has remained stable in France since 2008.[2] Indeed, the relative decline of the R&D dates back to the middle of the 1990s; it thus can hardly account for the recent productivity slowdown, but may rather explain the declining competitiveness since the early 2000s.

In contrast to the United Kingdom or Spain, the conventional investment rate in France has remained stable as well. This is an important difference with the previous crisis of 1992/1993 when investment contracted. Both INSEE National Accounts (Fig. 2) and Banque de France firm surveys confirm these figures. In addition, the statistics of the Banque de France show that both large, and small and medium businesses have globally maintained their levels of investment.

Fig 2. Investment rate 1990-2013. Non-financial corporate firms. Percentage of VA



Source: National Accounts (base 2010), INSEE. Published on May 15, 2014. Investments include R&D and large databases. Figures for 2012 and 2013 are preliminary.

However, the spectacular price inflation of construction has absorbed part of the investment recovery during the past decade (Askenazy, 2013). This mechanism, along with the end of process of reduction in hours worked, weakened capital deepening (capital services / hours worked). According to OECD statistics (extracted on October 15, 2014), the annual capital deepening was on

[2] This shape is consistent with micro-findings on French firms stressing that their R&D effort is in general counter-cyclical, but can become a- or even pro-cyclical for credit-constrained firms (Aghion et al., 2012).

average 2.2% from 2003 to 2012, as compared to 3.9% from 1997 to 2002. However, since 2008 property prices have been flat, or even slightly decreasing, and there has been no hint of an additional lessening of capital deepening since 2008. In other words, the productivity puzzle is also a total-factor productivity puzzle. EU KLEMS statistics – Capital, Labour, Energy, Materials, Services – show a striking drop in TFP in 2008 and 2009; the multifactor productivity estimated by the OECD in 2012 is still below its pre-recession level.

2. A new labour market affects the productivity cycle

Since the recent productivity slowdown contrasts with past experiences, we should explore significant structural changes or mechanisms that would appear to be particularly specific to the recent recession and the current stagnation. In this section, we focus on two spectacular dimensions: the major variation in the education of the workforce and in the composition of jobs, as well as on the changing labour market rules concerning self-employment and short-term contracts. We also discuss the impact of recent French pension reform on the labour supply of seniors and on employment, the effects of which do not appear clear cut. In addition, despite the apparent stagnation of the diffusion of high-performance work practices, organisational changes and the intensification of work do not seem to have abated.

2.1 The employment non-crisis for most educated workers and high-skilled occupations: deceptive productivity despite work intensification

The most outstanding change in the composition of employment relates to labour quality and education level. The employment of the poorly educated people (those without education) has fallen continuously; whereas, the employment level of the people with medium and high levels of education has increased (Figures 3a and 3b). This phenomenon results both from firms' demand for educated workers and, on the labour supply side, from the huge effort of "democratization" of education launched in the 1980s.

Figure 3a. Employment of upper-tertiary educated workers, and managers and professionals
1000 workers 1990-2012

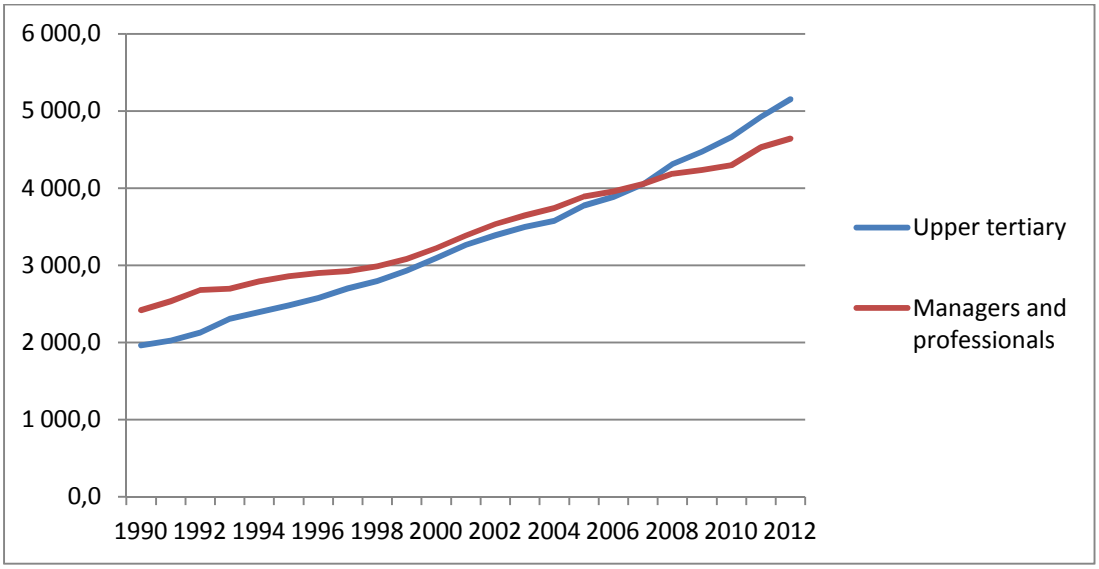
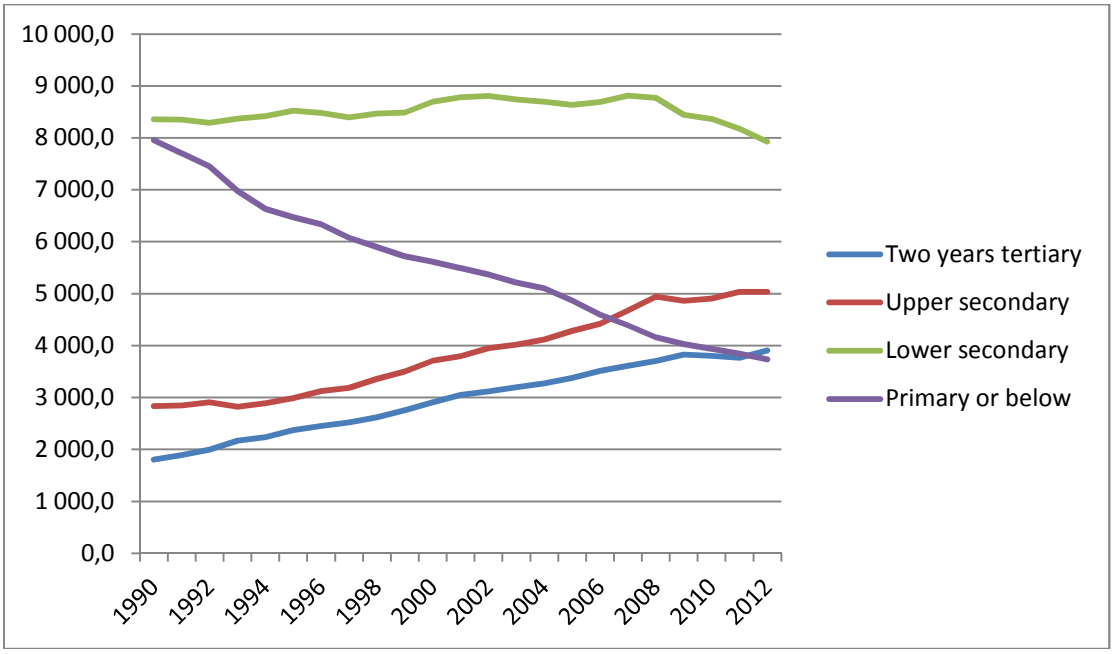


Figure 3b. Employment by education levels (except upper tertiary)
1000 workers 1990-2012



Source: INSEE estimations. French Labour Force Survey.

A spectacular fact is the continuous increase in the number of upper-tertiary educated workers in employment, as well as in the number of managers and professionals; both curves seem disconnected from the business cycle (Figure 3a).

A detailed comparison of the workforce evolution by education level during the recession of the 1990s and the most recent crisis reveals significant contrasts (Table 2). While the aggregate change in employment is similar, the last recession was associated with an acceleration in the shift of labour demand from the low or middle-educated workers to the most educated. It has been much more damaging for workers with lower-secondary through professional secondary education than the recession in the 1990s. Far from a view of a relatively "soft" recession for employment, these observations suggest that it badly hurt some categories. This mechanism also accounted for the convergence of unemployment rates of men and women because the proportion of tertiary-educated workers is larger among cohorts of women than men born since the 1970s.

Table 2. Employment levels and changes by education 2007-2012 *versus* 1991-1996
All ages, thousands

	1 991	1 996	% change	2 007	2 012	% change
Upper tertiary	2 022	2 574	27,3	4 050	5 151	27,2
Up to 2 years tertiary	1 893	2 453	29,6	3 613	3 910	8,2
Upper secondary	2 846	3 123	9,7	4 678	5 037	7,7
Short professional secondary	6 724	6 813	1,3	6 764	6 194	-8,4
Low secondary	1 629	1 668	2,4	2 050	1 729	-15,7
Primary or lower	7 702	6 333	-17,8	4 391	3 734	-15,0
Total	22 816	22 964	0,6	25 546	25 755	0,8

Source: Authors' calculations using French Labour Force Survey.

The negative impact of the last crisis is stronger for low education levels. For young people, these statements are confirmed by recent analyses of youth cohorts, showing that the inequalities in labour market integration patterns have matured with the crisis, the higher educated youth being only slightly affected by the recession (Barret et al., 2014).

In parallel with this development, the structure of the working population by occupation has also consistently evolved over the past decade in France with an increasing demand for better educated workers. On the contrary, demand for middle occupations – in terms of wages or education requirements – has declined. The crisis has not impeded these trends and has even accelerated them. According to the INSEE estimation applying the ILO concepts, the number of managers and professionals increased by 600,000 between 2007 and 2012, while the number of skilled clerks and blue-collar workers fell by 0.7 million. Consistent with a polarisation of the labour market,[3] the number of unskilled white and blue collars remained flat.

A detailed analysis of the Labour Force Survey at the 2 digit ISCO level over the period 2002-2010 shows that the share of several high-skilled occupations has increased radically (corporate managers, physics, mathematical and engineering science professionals, teaching professionals, technicians and associate professionals, life science and health associate professionals…); whereas, the share of medium and lower-skilled occupations has been declining (clerks, office clerks, craft and related trades workers, metal machinery and related trades workers, plant and machine operators and assemblers…).[4] As in Germany (see introductory chapter), some of the dynamic occupations in France include so-called STEM jobs (Science, Technology, Engineering and Mathematics): between 2002 and 2010, the proportion of STEM jobs in the employed working population has risen from 8.1% to 9.3%, close to German level (8.9% in 2010). According to the new ISCO 2008 classification, the French and German figures remain close (7.8% STEM jobs in 2012, against 8.2% in Germany).

What would we expect to be the consequence of these developments on productivity during recession and then stagnation?

In a standard theoretical framework, the shift towards the most educated workers, who are expected to be more productive, should sustain aggregate labour productivity. The productivity puzzle is thus a priori reinforced. However, a conventional production function is not capable of explaining why the trend in highly educated employment was unaffected by the crisis and the current stagnation. In fact, job creations at this level of education have been disconnected from the recent business cycle, as they were during the 1990s, a period marked by the 1992/93 recession and the steady growth to the end of century. Mechanically, aggregate employment has not suffered much because the weight of upper-tertiary jobs has doubled in less than two decades. In the corner case in which all workers would be tertiary educated, the business cycle may translate into a productivity cycle, and Okun's coefficients may be virtually null.

The lack of correlation between the demand for the educated and the variations in GDP observed in various European countries (see introduction) may be explained by several mechanisms. On the

[3] As defined in the literature (see introductory chapter), job polarisation corresponds to a situation in which the number of high and low-skilled jobs is growing (or at least remains stable), while intermediate-skilled jobs are decreasing.

[4] See Martin Chevalier, "Construction of several job-related indicators in the LFS using ISCO (2002-2010)," mimeo March 2014.

supply side, French educated workers are more spatially mobile and have more general skills; therefore, the job matching process should be improved. On the employers' side, firms invest much more in specific human capital for educated workers; most educated employees are more likely to work in key occupations or on long-term projects that are independent from the business cycle. Firms are reluctant to fire workers with confidential information who can be hired by competitors; alternatively, when the labour contract stipulates exclusivity clauses (workers' commitment not to work for competitors), employers must pay important dismissal compensation. In addition, firms may fear the risks of a significant skills shortage when the recovery eventually comes, such as German firms experienced in the second part of the 1990s (see Bellmann et al. in this volume) and also as French employers reported at the end of the same decade. Basic statistics from the REPONSE survey confirm a labour-hoarding process in high-skilled occupations: only 40% of the establishments that reduced the employment during 2008-2010 had also slashed the number of managers and professionals. Section 4 will provide an analysis of these observations.

Table 3. Percentage changes in the number of managers and professionals according to the total workforce adjustments during 2008-2010.

Establishments with 11 or more workers

		Total employment		
		Increasing	Stable	Decreasing
Managers	Increasing	49	10	10
And	Stable	47	86	51
Professionals	Decreasing	4	5	39

Source: Authors' calculations using the REPONSE survey, 2011. Weighted statistics are representative of the establishments in the private, non-agricultural sector with a least one manager or professional in 2008 or in 2010. Weights are given by the DARES.

Fundamentally, the ongoing industrial revolution and globalisation may have altered the production technology from a conventional composition of substitutable factors (unskilled labour, skilled labour, capital) to an increasing multiplicity of O-ring occupations (webmasters, marketers...), whose jobs cannot be eliminated despite declining turnover.[5] In this framework, the continuous increase in educated employment and high-skilled occupations is not consistent with the existence of a fading industrial revolution.

The relative inelasticity of aggregate labour demand to variations in GDP mechanically impacts the apparent productivity. We can simulate an extreme case by assuming a perfect segmentation of the labour market according to education: if the composition by education of the workforce had been similar in 2007 to that one existing in 1992, the aggregated evolution of employment would have been 5% less in 2012 than observed. On the one hand, the altered composition of the workforce can thus account for up to about half the productivity slowdown in recent years. On the other hand, it may be thought that this changing composition of the workforce and occupations played a role in the relative resilience of the French labour market in recent years.

Employment rates are consistent with trends in employers' labour demand according to education rather than with breaks in the labour supply (Fig. C1, Appendix C). There is a decreasing trend of demand for lower education levels over the long run that was further amplified during the 2008

[5] For a model of European countries and associated evidences, see Ph. Askenazy, Ch. Erhel and M. Chevalier (2015), "Two workers", work in progress.

crisis. Even the medium levels of education were hit by the recent crisis. At tertiary levels of education, employment rates were stable or slightly increasing, even over the 2007-2012 period.

Additional evidence supports the view that the reorganisation of firms towards high-performance workplaces is a process that has not ended with the crisis. According to the REPONSE survey (Table 4), the use of specific practices such as autonomous work teams has continued to expand between 2004/2005 and 2010/2011, but the proportion of establishments using other practices such as total quality management has been flat or even slightly declining (Table 3). Panel observations provide a clear-cut conclusion: organisational change was not frozen during the crisis. Numerous establishments continued to modify their organisation between 2005 and 2011.

Table 4. Selected work practices in 2004/2005 and 2010/2011. Percentage of establishments

	Full samples (weighted)		Panel 05-11		
	2005	2011	*2005*	*2011*	*Changes 2005/2011*
Employee shareholding	19.8	17.5	27.7	26.8	20.0
Employee-voice group	25.2	30.6	29.1	29.0	27.4
Autonomous work team	39.3	49.2	45.1	56.2	41.8
Total Quality Management	51.3	46.1	57.6	58.1	31.3

Source: Authors' calculations using REPONSE surveys. Establishments with 20 or more workers in the non-agricultural private sector. Statistics for the full samples are weighted to be representative (according to size and industries); weights are provided by the DARES.

The observations from surveys on French working conditions are consistent with the reality of changing workplace organisation over the past few years (Algava et al., 2014). In 2005, only 14% of the workers claimed that their work environment had been significantly altered by organisational changes over the past 12 months; they were 21% in 2013. The productivity puzzle is apparently still more puzzling. Indeed, the survey waves of 1998 and 2005 suggest a pause in the intensification of work as measured by a variety of physical and cognitive dimensions. By contrast, between 2005 and 2013 the indicators of work pace have increased; those of work autonomy or of social support have declined. Over the same period, the use of information and communication technologies (ICT) has accelerated. For example, 51% of the workers use the Internet for professional activities in 2013, compared to 35% in 2005.

However, organisational changes that are not accompanied by global expansion of such practices suggest a different mechanism – that productive gains from innovative organisation may have reached saturation. We will explore this hypothesis in Section 4 using our establishment-level data in 2005 and 2011.

2.2 The rise of low-productivity jobs: the new self-employed status and very short-term contracts

In recent years, the French labour market has experienced the development of a new self-employment status, as well as a massive rise in the use of very short-term contracts (less than one month).

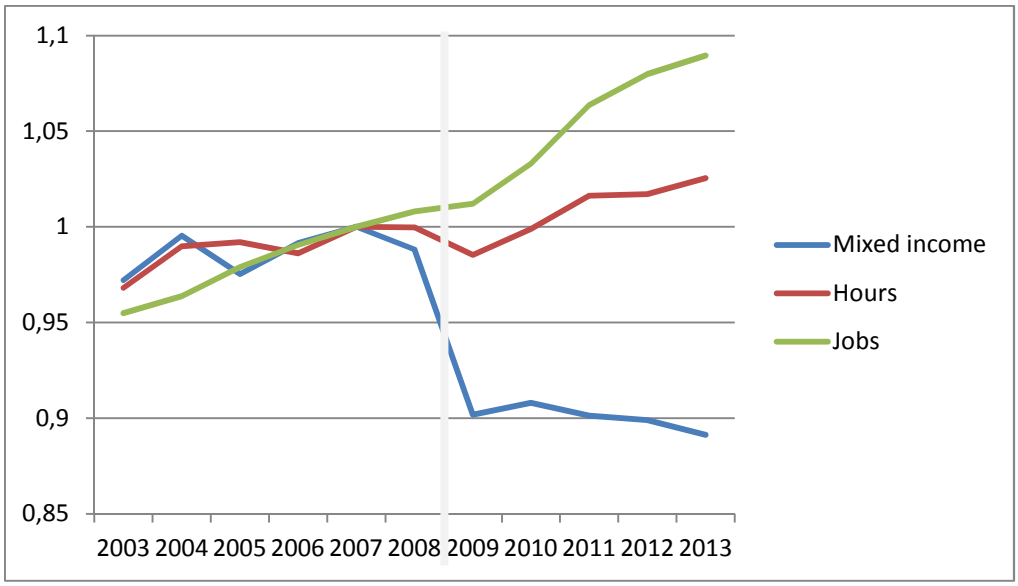
The emergence in just a few years of the "*auto-entrepreneurs*" is impressive. In 2009 a new social contribution and fiscal regime, with a status of an unincorporated enterprise, was created for self-employed individuals. Becoming an *auto-entrepreneur* (freelance entrepreneur) requires only a

simple registration on Internet. The administrative requirements are mainly quarterly declarations of turnover, again via Internet. For most freelance entrepreneurs, social contributions and income tax, proportional to the revenue, are immediately calculated (i.e., a flat tax). This status may be cumulated with a salaried job. The regime immediately met with great success: a total of 1.2 million unincorporated enterprises were created between 2009 and 2012, representing about half of total newly created enterprises.

The revenue of *auto-entrepreneurs* is very low, averaging less than one third the annual income of individuals having a "classic" self-employed status. One third of these "new" self-employed individuals combine their business activity with a salaried job, according to the *Conseil d'orientation pour l'emploi* (COE), 2014). These new self-employed entrepreneurs are less productive than classic self-employed workers. National accounts statistics show a striking disconnection between the mixed income of unincorporated enterprises and the number of hours worked by non-salaried workers since 2009, while they had followed a similar path before that date (Fig. 4). More precisely, fiscal and social records prove that the mixed income of the classic self-employed (butchers, artisans...) fell in 2009, but recovered rapidly, while their numbers declined. The divergence between income and hours worked for the whole 2009-2013 period may be attributed to the changing composition of the self-employed due to the introduction of *auto-entrepreneurs* whose productivity is low.

The impact on the aggregated productivity can be roughly estimated. According to National Accounts, hours worked by non-salaried workers represented about 15% of the total amount of hours in 2013, up from 14.5% in 2007; and mixed income was about 6.1% of total gross value added in 2013, down from 7.0% in 2007. A fall in the apparent "productivity" of non-salaried workers may thus result in a 0.2% yearly decline in aggregated labour productivity since 2007. This represents about one fifth of the productivity slowdown during this period.

Fig. 4. Non-salaried employment, total hours worked by the self-employed, and mixed income of unincorporated enterprises, 2003-2013. Volume base 1 = 2007



Source: Authors' computations using National Accounts, base 2010. Mixed income of non-corporate business is deflated by the price index for the total value added. The vertical line dates the creation of the *auto-entrepreneur* status.

A second significant change concerns precarious salaried work. This assertion may seem surprising in view of the pertinent OECD indexes: indeed, according to the OECD, the strictness of employment protection legislation has remained nearly stable in France over the past ten years, showing a slight decrease in 2009 for regular contracts only. The index level is close to Germany's and Spain's for regular contracts, but it stands at a very high level for temporary contracts, and for the latter it has not changed since 1991.

However, these considerations do not fully reflect the functioning of the French labour market and the trends resulting from recent reform. Previous research (Caroli, Gautié, 2008) has shown that the actual degree of flexibility is higher in France than it would appear, especially due to the existence of a large number of atypical contracts in addition to the standard temporary job contract (*contrat à durée déterminée* CDD) and temporary work agencies. Moreover, under the heading of "flexicurity", several reforms have been undertaken since 2007 that have increased labour contract flexibility. Indeed, the labour market modernisation law of 2008 authorised dissolving open-ended contracts through mutual agreement ("*rupture conventionnelle*"). The recent employment security law of June 2013 facilitated collective dismissals and introduced more obligations of functional and geographical mobility for workers. In a series of decisions, on November 16, 2003, the *Cour de Cassation* clarified the regulation of temporary contracts "*d'usage constant*". The aim of the Court of Cassation was to simplify the use of temporary contracts by employers. In industries (e.g. restaurants, entertainment...) in which the use of short-term contracts is a "cumulative experience", an employer has no quantitative limit to hiring on the bases of such contracts, even for a same worker. However, in 2008, the Court of Cassation changed again its jurisprudence, limiting the number of successive temporary contracts for a given worker on a same job for a same employer.

In the other sectors, the limit of the two consecutive contracts is impinged by the possibility for the employer to re-hire the worker after a transition period at least equal to one third (or half) of the length of the previous contract.[6] Digitalization of the hiring process helps firms to churn the workforce: the administrative declaration can be completed in just a few minutes on a dedicated Internet site.

Consequently, despite apparent stability of the legislation, the frequency of hiring on very short-term contracts (less than one month) has increased sharply since 2004: according to the records of the Social Security (ACOSS-URSSAF), the average quarterly number of private contracts signed for less than one month amounted to 3.7 million in 2013, as compared to 1.76 million in 2004 (ACOSS data, see Figure 5). In the same period, the flow of open-ended contracts and longer temporary contracts remained flat. Since July 2013, an extra social contribution has been introduced for very short-term contracts, but their number is still increasing.[7]

This upsurge has been concentrated in the tertiary sector, and particularly in those activities concerned by the "*CDD d'usage*", with spectacular increases in advertising agencies (+320% between 2000 and 2011), entertainment (+180%), and restaurants (+170%).[8] Reflecting these trends towards

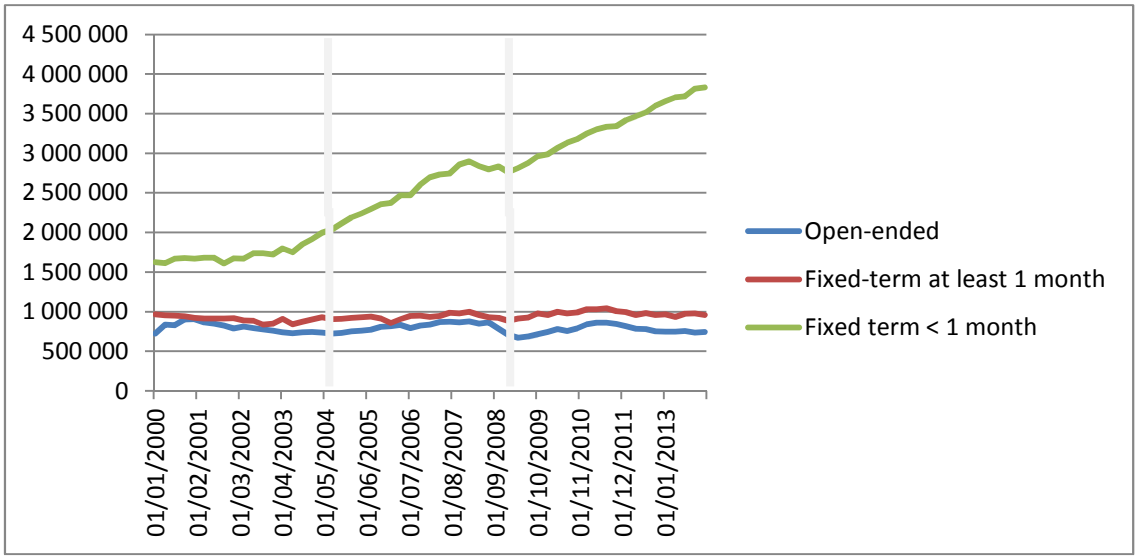
[6] For example, if a worker has been employed during two consecutive contracts of 10 days, the same employer can hire the same worker again after a delay of one week.

[7] In the first quarter of 2014, the number of contracts signed for less than 31 days amounted to 3.83 million, a new record level (ACOSS, AcossStats n°190, 2014).

[8] ACOSS, AcossStats n° 143, 2011. Updated data published on acoss.fr, January 2013.

greater external flexibility, the unemployment insurance system has been adapted in order to cover workers with shorter contribution periods (4 months instead of 6 since 2009); and in July 2014, better coverage for the recurrently unemployed.

Figure 5. Number contracts signed by duration, 2000:Q1-2014:Q1. Quarterly data



Source: ACOSS-URSSAF. The vertical grey lines date the decisions of the *Cour de Cassation* concerning the use of temporary contracts in certain sectors (*CDD d'usage*).

Even though the share of temporary employment shows only limited growth (15.1% of employees aged 15 to 64 in 2012, as compared to 12.8% in 2004), such variation in the composition of fixed-term contracts may well exert a negative impact on productivity. France might be confronted with the mirror of Spanish experience where the fall in short-term contracts explains a part of the productivity recovery in recent years (see Hospido and Moreno in this volume). Indeed, on-the-job training of these workers is by construction limited; they cannot acquire the experience or routines that improve productivity. The gain of firms would not be in productivity but in profit, since workers on these jobs are less costly: no tenure bonus, no complementary health insurance, no profit sharing, no dismissal cost has to be paid. For the *CDD d'usage*, the employer does not even have to pay the precariousness wage bonus. However, it may be argued that short-term contracts help the firm to adjust the workforce to the level of activity. If such be the case, their development may improve hourly productivity rather than hamper it.

In Section 4, we attempt to disentangle these two assumptions using microdata. In any cases, very short temporary contracts are mainly concentrated in certain tertiary activities, which in total weigh less than one third of the market economy; thus, their rise cannot explain why the productivity slowdown is observed across sectors.

2.3 Major pension and layoff reforms that do not have a clear-cut impact on productivity

Since 2003, France also experienced extensive pension reform and the introduction of a new scheme for terminating open-ended contracts.

In the 1980s and beginning 1990s, France was characterised by very low employment rates for seniors and by highly developed and generous early retirement schemes. Since the beginning of the

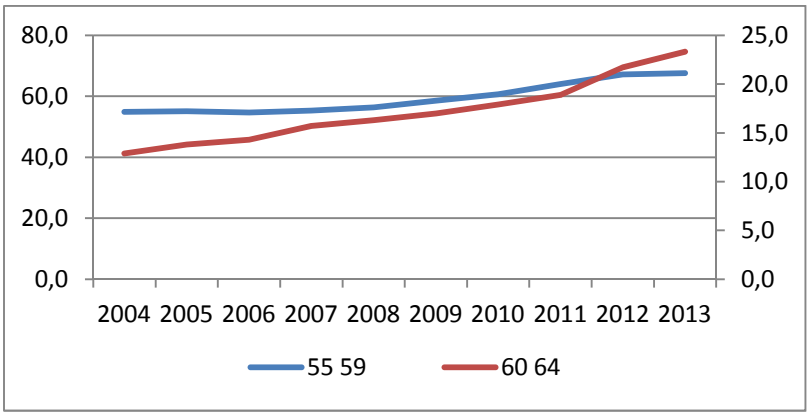
2000s, France has clearly engaged in the direction of increasing seniors' employment rate. Since 2003, successive pension reforms – the most recent being in 2014 – have created incentives to work longer: the contribution period to obtain full rate pension has been extended, up to 43 years for individuals born after January 1, 1973 according to the last reform, the retirement age being postponed to 62 years of age – with some exceptions for long careers or the case of difficult working conditions, and some pension bonuses for workers contributing longer have been introduced. In parallel with these reforms, early retirement schemes, which were heavily used in the 1980s, have been progressively focused on very specific cases (such as workers exposed to asbestos or to exceptionally arduous working conditions). The yearly inflow into programs of this kind fell from 31,000 in 2003 to less than 6,000 in 2012. In comparison, it amounted to 67,000 in 1993. Furthermore, the possibility for unemployed people over 57.5 years old to be exempted from job search while continuing to benefit from unemployment insurance was curtailed in January 2012.

Several incentives to hire senior workers have also been created on the employer's side. For example, the specific (but as yet unused) temporary contract for seniors and a few more active programmes, including the very recent "*Contrat de Génération*" that links the recruitment of a youth to the maintenance of the employment of an older worker. These policies are mainly supply oriented.

Over the same period, the increase in seniors' employment rates has been quite important for both the 55 to 59 and 60 to 64 age groups. Although some other factors might well explain this trend (including a change in the composition of the labour force aged 55+ according to occupation), and despite the fact that France remains a country with a low rate of employment of seniors in comparison to other European countries (the upward trend was more limited than in Germany), it is clear that the age composition of the workforce has changed over the past decade. More precisely, 2006 was a turning point: a steadily increasing trend contrasts with the standstill during the first part of the 2000s.

This trend has not been affected by the Great Recession. The impact on productivity is unclear. Productivity is affected if and only if firms cannot adjust the younger workforce. We intend to estimate the impact of the share of older workers in Section 4 using firm-level data.

Figure 6. French employment rates of workers 55 and older, 2004-2013. Percentage



Source: French Labour Force Survey. Left scale, 55-59 age group; right scale, 60-64 age group.

The most recent major reform concerns the separation process for workers under permanent contract: the *rupture conventionnelle*. An employer and an employee are now allowed to agree to terminate an open-ended employment contract. They negotiate a compensation package (at least the severance pay provided for in cases of dismissal). Both parties have only 15 days to withdraw their agreement, which is then sent to the labour administration for certification within another 15 days. Introduced by law in mid-2008, this procedure met with an important success. About 30,000 agreements are now signed each month, and about 94% of them are certified by the public administration. One out of six layoffs or dismissals of permanent workers is a *rupture conventionnelle*. A priori, the consequences for labour productivity are positive: by accelerating the separation, this reform should limit redundancies. Note that here again, this reform is not taken into account when calculating the strictness of the French labour law.

To sum up, although the French labour market and the structure of employment have undergone important modifications over the last ten years, their effects on productivity are not systematically clear cut. The consequences of the rising education levels are in principle ambiguous. By a composition effect, it should sustain productivity. However, labour-hoarding processes and hiring in anticipation of future or key activities are operating in favour of educated workers. Since the number of highly educated employed workers or of highly skilled occupations is a-cyclical, the economic cycle is transformed into an apparent productivity cycle: i.e., in a time of crisis, we observe a transitory decline in productivity. Such a phenomenon can account for a significant part (up to half) of the drop in productivity during the past few years. The rise in number of new, low productivity self-employed jobs, thanks to the introduction of the *auto-entrepreneur* status, has clearly depressed labour productivity as well. This development can explain up to one fifth of the aggregated productivity slowdown.

A greater number of very short-term temporary jobs and hoarding of older workers may well alter productivity, as would a saturation of the effects of organisational innovations. Estimating their impact requires firm-level analyses: in Section 4, using a unique employer survey, we intend to disentangle the various mechanisms at work.

However, the composition of the workforce and occupations are not the sole mechanisms that may affect productivity. In the context of a financial crisis, exploring the capital side and cost dynamics, including labour dynamics, is a priori relevant as well.

3. French private firms are in good financial health despite increasing wages

How can firms cope with flat productivity and a financial crisis at the same time? A simple solution would be wage adjustments or a reduction in distributed dividends. Strikingly, wages were increasing in private firms until recently, and dividends have remained high in comparison to their levels a decade ago. In fact, firms have benefited from low interest rates and from massive tax cuts. The adverse consequences may then have been to magnify the inefficient allocation of capital and ultimately to hamper productivity; data do not support the existence of such a mechanism. Yet, if these mechanisms do not participate directly in the productivity slowdown, they may have enabled

firms to sustain labour hoarding and recruitment of highly educated workers. We develop these points in the following subsections.

3.1 Increasing wages

In both the United Kingdom and Spain, real wage adjustments were very substantial. In the United Kingdom, their decrease should have led to a lesser increase in unemployment (see Bryson and Forth in this volume). The contrast with France is striking – at least for the first years of the recession. In the private sector, gross nominal wages slowed sharply in conjunction with the crisis: their growth rate, which had been 3% on average from 2005 to 2008, was only 1.5% in 2009-2010. However, in real terms, the annual growth in average real wages remained positive throughout the period. The growth rate dropped from 1.1% on average before the crisis to 0.7% afterward: the slowdown was real, but much more moderate than for nominal wages since inflation declined as well.

(Askenazy et al., 2013) review several factors that have played a role in wage dynamics. Since there has been no significant change in the real national minimum wage (SMIC), this factor cannot account for wage dynamics. More precisely, the lowest hourly wages have followed the Harmonized Price Index since 2008. At the same time, differences in gross wages between the first and the fourth quintiles accelerated in 2009-2010. The result has been increasing inequality within the bottom half of the wage distribution. Coudin et al. (2014) confirm this phenomenon over the 2007-2012 period. Inequality between young workers (thus, mainly new entrants to the labour market) and workers aged 25 and more also widened.

It is noteworthy that employers' organisations have still accepted to sign agreements at the branch level to increase the minimum wage.[9] At the firm or establishment level, employers have not attempted to adjust wages either. An employer may not reduce the wage elements of an employee's contract without his approval, but firms do have some significant room for manoeuvre. If an employer has an economic motive (e.g. contraction in turnover), the employee who refuses a wage cut may be laid off. Performance-based pay bonuses can be removed, and costly overtime pay as well. Company-level agreements may revise benefits conferred by previous agreements if they are not laid down in the individual's employment contract. These tools are rarely used. After a pact reached by three national trade unions and the main employer organisations, a law was passed in 2013 that provides for the possibility of temporary wage reduction within the framework of an agreement for job retention. As of June 2014, only five agreements had been signed!

Establishment-level figures confirm the prudence of employers. According to the representative survey REPONSE 2011, an overwhelming majority of French establishments with 11 or more workers have not frozen or cut wages in response to the crisis; even when adding establishments that moderate the wage evolution for some categories of workers, only 40% of the establishments were concerned. Very few have engaged negotiations to reduce working hours.

Part of wage rigidity may be explained by behavioural factors, as firms attempt to preserve incentives and a positive workplace mood. According to the 2011 REPONSE survey, although the financial situation of a firm was the overwhelming criterion in decisions concerning wages, the need

[9] Recall that most employees in France are covered by branch agreements between unions and employers' organisations. They determine a ladder of minimum wages according to a scale of occupations and tenure.

to maintain a good workplace atmosphere was also cited as crucial by a majority of establishments. The proportion even increased between 2005 and 2011. This interpretation is also supported by the fact that the amounts remuneration distributed by firms via the two main collective-performance and profit-sharing schemes, *intéressement* and *participation*, while falling in 2009, rose to overcome the pre-recession level afterwards.

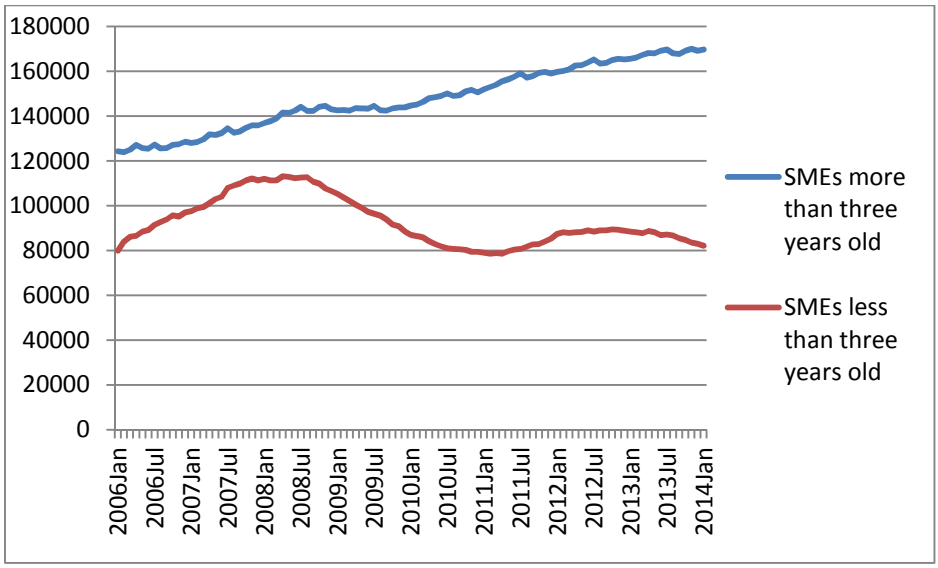
These tools were not able to overcome the impact of the drop of stock markets for employees owning shares of their firms. Near 4 million present and past employees are shareholders via specific employee schemes. Now, stock markets have not yet recovered. The CAC40 index is still 30% below its pre-crisis hit. For example, employee shareholders of Société Générale (excluding corporate management) who own near 7.5% of the capital experienced a dramatic drop of the value of shares from 158 Euros to 20 Euros; December 12, 2014, the value was 35 Euros i.e. employee shareholders of the second French bank still lost a total of roughly 10 billion Euros compared to the spike. Consequently, the drop of stock markets may have weakening the incentive impact of employee shareholding. We will explore this hypothesis in section 4 using again the REPONSE survey.

3.2 French firms sustained by low interest rates and massive tax cuts.

In contrast to the United Kingdom or Spain, there is no clear credit rationing for private firms in France, especially for small and medium-sized enterprises (SMEs). According to the records of the Banque de France, corporate loans to young firms after their creation and stocks loans to mature firms steadily increased (Fig. 7 for SMEs).

Firms have even benefited from declining interest rates. Both businesses linked to large groups and independant small and medium-sized firms currently face historically low interest rates. This constrasts with the double-digit rates encountered during the 1992/1993 recession. In fact, rising interest rates in the context of German reunification were one of the main causes of that recession.

Figure 7. Corporate loan stocks and loans drawn by SMEs
Millions of current euros. 2006-2014

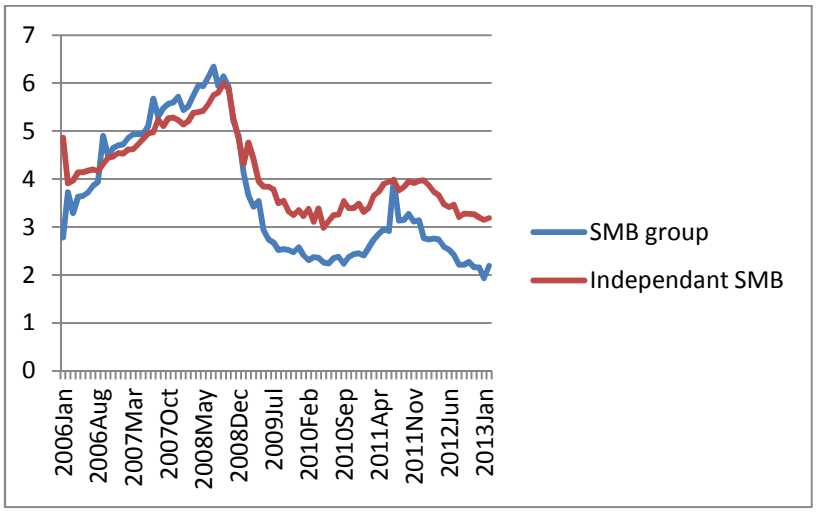


Source: Bank lending survey. Banque de France.

Various factors explain the lack of significant credit rationing in France. As we have already noted, there was no burst of a commercial property bubble. Thus, existing firms owning properties had substantial collateral as guaranty for their credits. In addition, contrary to some Southern European countries, the French public debt remained clearly sustainable. Indeed, the contraction of French GDP was relatively small. Current accounts were negative, but at a sustainable level as well. The French treasury team is particularly efficient at managing the public debt. The result has been sustained high rating for French public debt. The reduction of the ECB interest rates translated into a drop in French interest rates paid on this debt. Since interest rates on private loans are linked to these, interest rates paid by firms declined mechanically. This decrease benefited both independant firms and firms belonging to large groups (Figure 8).

In addition, while the financial crisis hurt French banks, the French government supported them early on. Most of them have grown stronger than they were before. The first French bank, BNP Paribas, absorbed European banks. The single significant exception is the bankruptcy of Dexia, but did not concern the private sector. This bank, owned by France, Belgium and Luxembourg, mainly provided loans to local administrations or public hospitals. Thanks to the ECB's quantitative easing programme, French banks were able to flood private firms with liquidity. According to Banque de France surveys, most loan applications submitted by SMEs (more than 75% of the amount initially requested) were successful.

Figure 8. Mean interest rate paid by SMEs/SMBs in percentage. 2006-2013



Source: Bank lending survey. Banque de France. Series discontinued in February 2013.

Firms also benefited from massive tax cuts and specific labour market schemes aimed at creating or saving jobs. Some were transitory, such as the measure permitting employers to pay zero social contributions on newly hired workers by small firms between 2007 and 2012. A recent evaluation study suggests that the impact of the "zero social contributions" scheme in 2009 was positive (+0.08% employment in small firms), even though this social contribution credit was not conditional on net job creation (Le Barbanchon et al., 2014). However, the scope of this programme was relatively limited (700 million euros); and contrary to one of its goals (the measure being targeted at recruits under contracts lasting longer than one month), it did not reduce the number of recruitments on very short-term labour contracts (less than one month). The use of short-time compensation (STC) was also encouraged by several changes in the rules: the generosity of the

allowance received by the worker was increased, as well as the amount of the subsidy paid by the State (in January 2009), and the number of hours covered by this subsidy (in January 2010). In addition, a new device was introduced in May 2009 making short-time work plans applicable over the long term. Nevertheless, although the use of STC actually increased (up to 1.5% of the labour force employed in some industrial sectors), its efficiency in terms of employment appeared limited. According to a recent study (Calavrezo et al., 2013), establishments using STC schemes between 2009 and 2011 were characterised by less recruitment, more economic lay-offs, more staff "separations" by mutual agreements and by greater outflow into retirement. Gonthier (2012) explores why the STC were not as widespread as in Germany. She shows that French firms benefiting from this scheme shared key characteristics with the German firms that used them: they belong to the manufacturing sector, employ mainly a permanent workforce, and are exporters. Since the manufacturing and exporting sector is far smaller in France, and since most firms were able to adjust short-term and temporary staff, fewer French firms had recourse to short-time compensation plans.

Overall, counter-cyclical labour market policies remained limited in 2008-2009 and had a transitory impact on employment and firms' financial situation. In reality, the most important policies have been structural tax cuts.

During Sarkozy's presidency, major taxes – including the business tax known as the "*taxe professionnelle*" – were revamped, generating a gain of roughly 7 billion euros for French firms. The research tax credit became the most generous in the OECD, costing 6 billion euros a year. For accounting purposes, this tax credit was treated as a subvention, but actually it mainly reduced the labour cost of researchers (by a least 45% for most firms). During a 24 month period, it even amounted to 120% of the labour cost for PhD holders recruited for the first time under an open-ended contract![10]

Sarkozy also introduced a "work-more-to-earn-more" policy, which was conceived before the recession. At the time, important waves of retiring baby-boomers suggested a decline in unemployment and the demand for firms to increase working time. A new scheme slashed the labour cost of overtime and the income taxes paid by workers on this overtime revenue. Billions of euros were distributed to firms. The windfall effects were huge, but this scheme helped to stabilize the number of hours worked despite the economic downturn. Thus, if the adjustments of the workforce were insufficiently elastic, it may have lowered hourly productivity. This scheme was suppressed by the new majority in 2012. No resurgence of productivity has been observed since then, and average working time has remained globally flat. In conclusion, the "work-more-to-earn-more" policy may have simply perturbed the short-term adjustment of hours worked.

More important was the introduction of a new general tax by the socialist government of Jean-Marc Ayrault. The CICE (employment and competitiveness tax credit) was proportional to gross wages (that were less than two and a half times the minimum wage), weighing about 4% of the global labour bill. This policy resulted in a permanent transfer from the public budget to firms of about 30 billion euros. The movement has not come to an end. In 2014, the government of Emmanuel Valls

[10] More precisely, the tax credit was 30%. However, the basis was four time the labour cost of a PhD: two times as a bonus for a "young PhD", plus two times for additional support costs.

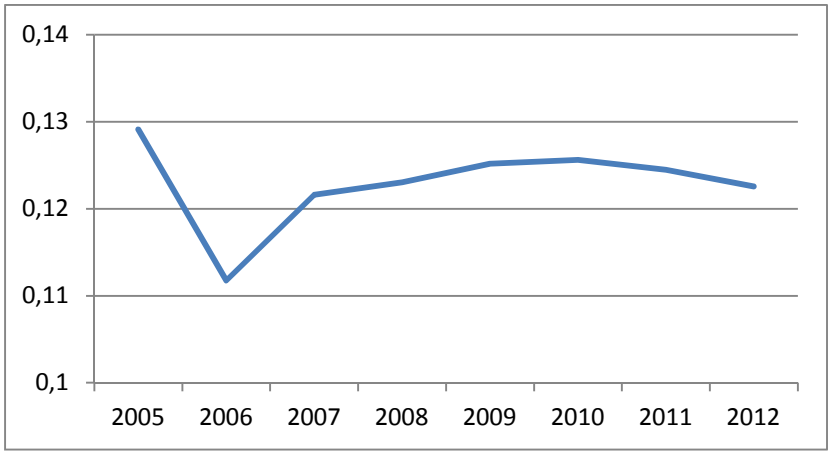
announced a series of additional, massive tax and social contribution cuts, valued at about 20 billion euros per year.

Low interest rates and tax cuts explain how corporate firms have been able to deliver dividends despite the economic downturn and the slow recovery (Fig. C2 in Appendix C). According to national accounts in base 2005 or base 2010,[11] the net dividends of non-financial corporate firms remained larger than those observed from 1960 to 2001.[12]

3.3 Has the reallocation of tangible capital been impaired?

The financial health of French firms would seem worthy of inquiry in the wake of a financial crisis and a recession. What could have been their impact on productivity? Again, it helps to hoard labour, while dismissals are costly in the short-term. However, other arguments are less clear cut. While the number of defaulting firms has increased, they remained fewer than in 1993. This observation is consistent with the lesser cleansing effect of the current recession as compared to previous ones, but it cannot explain a break in productivity.

Figure 9. Standard deviation of the ratio of gross operating profit /total gross assets. Balanced panel of French firms* 2005-2012



Source: Authors' computations. *1578 firms with at least one establishment, surveyed in REPONSE 2011 (representative survey of French establishments with 11 or more workers, private sector except agriculture) and present in the risk database from 2005 to 2012. See the next section for a complete presentation of these data.

Easy access to credit or tax cuts may also be detrimental to productivity if there is an inefficient allocation of capital due to "bad" firms being flooded with liquidity. In addition, a high level of uncertainty can freeze the reallocation across units (or firms) and reduce firms' responsiveness to demand shocks, which ultimately ought to hamper productivity (e.g. Bloom, 2009). These mechanisms come in addition to the standard frictions in capital mobility (sunk costs,...). Consequently, impaired capital reallocation may explain poor productivity gains, even if apparent

[11] There are huge discrepancies for net dividends in recent years between the national accounts, base 2005 and the national accounts, base 2010. The INSEE has not yet provided a full explanation of these differences.

[12] Using national accounts in base 2005, Askenazy (2013) notes that the ratio of net dividends/value of assets at current prices has been flat during the past two decades. This stability is consistent with the argument that firms have been obliged to provide such profit distributions to shareholders because the value of capital has dramatically increased as a result of rising property prices before the crisis.

capital deepening and investment are stable. If there is a significant misallocation, we should observe an increase in the dispersion of the economic returns to capital: i.e., the ratio of the gross operating profit to gross assets. However, the exploitation of a balanced panel of French firms does not support the existence of increasing variance of this ratio (Fig. 10), contrary to recent findings for the United Kingdom (Barnett et al., 2014).

To sum up, massive tax cuts tend to overcome increasing real wages, and rigidities in the capital allocation or the financial situation of firms can hardly account for the productivity puzzle. Consequently, in the next section, we will focus on additional micro-evidence on the labour market and on human resource (HRM) mechanisms, including the employee shareholding.

4. Quantitative microanalyses: the relationships between labour force composition, workplace and incentive practices, and productivity

The goal of this section is to explore in greater depth several previous hypotheses using establishment-level data: as a result of pension reforms, is the ageing workforce more of a deterrent to productivity? Is there a labour-hoarding process for skilled occupations? Does the labour churning of short-term contracts reduce productivity? Have some high-performance work practices including employee shareholding become less efficient for productivity over the recent years?

The core strategy is to estimate productivity functions in 2005 and in 2011 in order to identify structural breaks. Some additional estimations focusing on labour hoarding for skilled occupations have also been run using 2010-2011 data. We present the data in the first subsection and study the various hypotheses step by step in those that follow.

4.1 Databases and the basic production function

In this section, we rely on four datasets that are merged thanks to a unique identity code, the firm's Siret-Siren number. The main dataset is the REPONSE survey (*RElations PrOfessionnelles et NégociationS d'Entreprise*). It is a survey of establishments conducted jointly by the French Ministry of Labour, *Direction de l'Animation de la Recherche, des Études et des Statistiques* (DARES), and the National Institute of Statistics and Economic Studies (INSEE). It is similar to the British Workplace Employment Relations Study (WERS) – see Bryson and Forth in the present volume. Senior managers and workers' representatives are interviewed, and some workers fill out an anonymous written questionnaire. Since we focus on human resource practices, only the first part is used here. Taking roughly one hour to complete, senior managers answer survey questions in face-to-face interviews with survey enumerators. REPONSE is gathered primarily to provide consistent information on labour relations and on the internal organisation. We use two waves of this survey, 2004/2005 and 2010/2011, which were thus carried out before and after the 2008 shock. They are separate cross-sectional establishment surveys, including 3,000 observations in 2005 and 4,000 in 2011. The sample is a random selection from the exhaustive INSEE establishment records, excluding agriculture and public-sector enterprises, and it is stratified by establishment size. In 2005, only establishments with 20 or more workers were surveyed. The sample was extended to establishments with at least 11 employees for the 2011 wave. Since we aim to capture changes in the productivity function between 2005 and 2011, we restrict the sample to comparable establishments with 20 or more employees and retain a one third subsample of it as our panel.

REPONSE 2010/2011 included some specific questions about adjustments to the economic downturn. We use the question about employment variations by occupation to identify several types of adjustments according to occupation, and especially a situation of skilled-labour hoarding (where employment reductions do not concern managers and professionals).

The DARES adds to this survey aggregated information from the DADS (*Déclaration Annuelle de Données Sociales*), which are exhaustive records on employment and pay at the establishment level.[13] In particular, we know the composition by occupation and gender on the 31st of December of the year preceding the survey.

The DARES also provides a second survey, the DMMO-EMMO, which records each establishment's monthly hiring and dismissal of personnel. It is noteworthy that the survey is not fully exhaustive inasmuch as employers do not necessarily have to report infra-monthly workforce turnover: i.e., very short-term contracts. About two thirds of the establishments polled for REPONSE also figure in the DMMO-EMMO survey.

Data on the accounts of parent firms of the establishments surveyed are supplied by private commercial databases: DIANE and .Risk. They both record the fiscal data provided by firms to the *Greffes des Tribunaux de Commerce* (Commercial Courts). Although declaration of such data is mandatory, enforcement is limited. As a result, some firms prefer to keep their accounts confidential or simply forget to comply. Since these data are not conceived for research purposes, they have to be purged. In particular, we only retain firms that provide accounts on a full-year basis.

Fiscal data include gross value added, total assets and the number of employees. Our main variable of interest is the record of value added per employee. The capital intensity is captured by the record of total gross assets per employee. We thus consider productivity per head and not productivity per hour. Since we have seen that there is no trend in working time over the past decade in France, this limitation does not imply a definite bias. An alternative would have been to use the full *Déclaration annuelle de données sociales – données d'entreprises* (DADS), a survey that provides hours worked paid by employers. However, this choice would have limited replication of our analyses. In addition, due to the changing taxation on overtime that occurred in 2007 and afterward (see Section 1), the hours-based figures may be biased.

Equipped with these data, we can run total-factor productivity (TFP) estimations. Basically, we will estimate for years 2005 and 2011:

$$\text{Ln}(\textit{labour productivity}) = \alpha.\ln(\textit{Capital intensity}) + \lambda.\textit{Workforce composition} + \xi.\textit{HR-Practices} + \mu.\textit{controls} + \varepsilon \quad (1)$$

The controls may include the 2-digit industry code, the age of the establishment in 4 categories (<5 year, 5 to 9 year, 10 to 19, 20 or more), the size of the firm (20 to 49; 50 to 249; 250 to 999, 1000 or more employees), the share of women – which roughly absorbs the higher propensity to work part-time – and the share of low-skilled and medium-skilled occupations (according to ISCO classification). Standard deviations are robust and clustered by 2-digit industry code for the purpose capturing common shocks affecting the distribution of ε.

[13] More detailed records may be obtained by authorisation from the French Statistical Confidentiality Committee (Le *Comité du secret statistique*) and accessed via a secure network. For the sake of replication, we use only data that are not concerned by this authorisation process.

The merging of DIANE and REPONSE 2005 results in a sample of about 1,600 establishments presenting data on productivity and assets in 2005. The unification of REPONSE 2011 and .Risk surveys produces a slightly larger sample of 2,000 establishments with at least 20 workers, but the panel is smaller. Compared to the full REPONSE samples, establishments in the merged datasets belong more frequently to large and multi-establishment firms. In both cases, about one third of the observations are mono-establishment firms. Detailed definitions of the variables and basic descriptive statistics are in Appendix A.

4.2 Labour force composition, hoarding and productivity

As pointed out above, labour force composition has undergone some major changes that may have impact productivity trends: in this subsection, we first provide several analyses focusing on the rise in the number of senior and qualified workers; then we address the issue of the development of short-term contracts.

Table 5 provides results from the estimation of equation (1) in 2005 and 2011, using two principal independent variables: the share of workers aged 55 or more and the share of skilled occupations.

The estimated impact of the capital intensity on productivity is similar in the equations for 2005 and 2011 (equations (1) and (3); (2) and (4)). The coefficient is close to the standard value of 1/3, which is consistent with macroeconomic figures including the capital share in value added.

Table 5. Senior workers or skilled occupations and apparent labour productivity

Dependent variable: ln(value added per employee)

	(1)	(2)	(3)	(4)	(5)	(6)
	2005	2005 Mono	2011	2011 Mono	2011 Declining	2011 Non-declining
Ln(Total assets per employee)	0.32***	0.33***	0.30***	0.30***	0.32***	0.29***
	(0.03)	(0.04)	(0.03)	(0.03)	(0.06)	(0.02)
Share of employees aged 55+	-0.41*	-0.32	-0.24	-0.34	0.08	-0.32
	(0.23)	(0.34)	(0.16)	(0.25)	(0.20)	(0.21)
Share of high-skilled occupations	0.27*	0.53*	0.26**	0.60*	0.27	0.36***
Ref.= share of medium-skilled	(0.15)	(0.27)	(0.11)	(0.25)	(0.27)	(0.11)
Establishment age, % of women, % of low-skilled						
2-digit industry, firm size	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.60	0.64	0.62	0.60	0.67	0.65
N	1591	565	1938	740	595	1341

Interpretation: Establishments with 20 or more workers in the private non-agricultural sector. Columns 2 and 4 are estimates for mono-establishment firms; column 5 for establishments with declining employment in the past 3 years, column 6 for those with non-declining employment, both according to the interviews with managers. Robust standard errors are clustered by 2-digit industry code.
*** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level.

Actually, the key coefficients are not statistically different in 2011 from the estimates for 2005, both for the whole sample and for mono-establishment firms. A higher proportion of older workers seemed to be associated with a slightly significant, lower apparent productivity in 2005, but this potential negative impact vanished in 2011. This result does not support the hypothesis of a

damaging effect on productivity of the increase in the share of older workers resulting from pension reforms.

The coefficients of the share of skilled occupations are similar in 2005 and 2011 as well. Nevertheless, while pension reforms are exogenous, potential skilled-labour hoarding is an establishment/firm decision. In particular, such labour hoarding ought logically to occur mainly in establishments with a decreasing workforce. In that case, we may observe a weaker relation between the share of skilled occupations and productivity in declining establishments. In the REPONSE survey 2011, managers are asked if the employment had declined in their establishment during the past 3 years. Columns 5 and 6 report the estimations on the two subsamples – establishments with declining employment and those with non-declining employment, as indicated by the response of their management. The relation between the share of skilled occupations and productivity clearly becomes statistically significant in non-declining establishments. On the contrary, the relation is no longer significant for declining establishments, but the magnitude of the coefficient is not altered. This heterogeneity suggests that some skilled-labour hoarding was probably implemented in certain establishments.

The full 2011 REPONSE survey enables us to describe in greater detail the labour adjustment processes during the recession years in private establishments with 11 or more workers. Indeed, it includes one question about trends in labour force categories over the 2008-2010 period, distinguishing between professionals and managers, clerks and blue-collar workers. On the basis of this question, it appears possible to know whether employment decreases have affected some categories more than others and to identify potential skilled-labour hoarding. Adjustment processes may then be related to various characteristics of the firms, including elements of information about their strategies.

The main descriptive results are the following: among establishments where total employment has been reduced, the share of firms cutting the number of blue-collar workers (50%) or clerks (62%) is higher than the share of those reducing the number of managers and professionals (35%). This result is consistent with the macro-figures on education (see the previous section). If we aggregate lower-skilled occupations (blue-collar workers and clerks), the majority of establishments reduced low-skilled occupations; whereas, the number of professionals and managers remained unchanged or even rose. In 9% of the establishments, the professionals and managers were the sole occupations affected by employment cuts; in addition, in 29% of the observations, both categories were affected. Thus, according to this variable, a skilled-labour hoarding process took place in half of the establishments in which employment declined between 2008 and 2010.

Looking at the profiles of these establishments, such skilled-labour hoarding behaviour is more frequent in industries that regularly claim to face some skilled-labour shortages: manufacturing and information and communication activities. As far as firm strategy is concerned, the proportion of skilled-labour hoarding appears to be higher in establishments positioning themselves in the competition by their prices, their innovations, the quality of their products, and the diversity of their supply, and in establishments that do not declare they set a direct profitability goal and in those that aim at reducing costs. To account for the factors correlated with this skilled-labour hoarding, we run a nested logistic regression (see Appendix B). We define the probability of being a hoarder of skilled labour as maintaining or increasing the number of managers and professionals while total employment dropped. The nested logit incorporates at a first level the choice between making

employment adjustments or not, and at the second level, the choice between having a hoarding behaviour towards skilled labour or not. At the first level, explanatory variables include the evolution of activity, sectors at a 2-digit level, size and age of the workplace, as well as variables of workforce structure (percentage of women and of seniors). At the second level, we introduce some information about firms' strategic goals, as well as work practices indicators (high-performance and high-involvement work practices,[14] including employee shareholding, decentralised worker-voice groups, quality management, autonomous work teams, job rotation). The results (Table B.1 in Appendix) confirm the specific profile of firms maintaining their skilled-labour force and reducing employment of other occupational categories: controlling for the probability of proceeding to a workforce reduction, skilled-labour hoarding is positively related to the fact of considering innovation as the main objective of the firm's strategy with regard to competitors; whereas, no correlation arises for other strategies, including product diversity. In terms of work practices, job rotation appears significantly (and positively) related to skilled-labour hoarding, while employee shareholding does not (see Section 4.3 for other interpretations).

To conclude, our evidence does not suggest a structural break in productivity caused be the increasing proportion of older workers in firms since 2006. There is no clear support for the hypothesis of changed behaviour concerning skilled occupations before and after the crisis, although these occupations have been preserved in a majority of establishments experiencing some decline in employment. On the whole, these findings are consistent with a practice of hoarding high-skilled labour, along with a continuous expansion of the highly educated in employment.

Another major change in the labour market concerns the effect of more widespread very short-term contracts on productivity and profits. Recall that we have two competing mechanisms: firms use these contracts to adjust the workforce and thus to improve productivity; firms develop these jobs despite their low productivity because they are less costly – they require no training cost, no tenure bonuses and lower related social contributions. In the first case, productivity at the firm level should be boosted; in the second case, productivity would be depressed in the search for improved profits.

Unfortunately, firms do not necessarily declare all their very short-term contracts in the DMMO-EMMO survey. Consequently, these data only support a crude exploration of the impact of job precariousness on productivity and profits. Table 6 reports estimations including the ratio of half the sum of the creations and destructions of jobs under short-term contracts over the total reference workforce in the DMMO-EMMO survey. In our samples, the churning rate was on average 0.20 in 2004 and 0.25 in 2010; this increase was much lower than figures from social security records. In both years, about 10% of establishments recorded a high churning rate (the 9th decile was 0.55 in 2004 and 0.57 in 2010), while the median value was 0.05 in both years. When industry dummies are included, there is no relation between this ratio in 2004 (or in 2010) and productivity in 2005 (or in 2011). However, the increased use of short-term contracts (CDD) was concentrated in activities that directly benefited from the decisions of the Court of Cassation (see Section 2). Therefore, most of the potential impact was industry-specific and should be captured by industry dummies. Columns 3 and 4 provide estimations without these dummies: while higher churning of CDDs was associated with higher productivity in 2005, this relation vanished in 2011. For an establishment with a churning rate in the 9th decile, the magnitude of the apparent loss in productivity was roughly 4%.

[14] See subsection 4.3 below.

Table 6. Instability of short-term contracts (DMMO-EMMO), productivity and profits

	Labour Productivity				Profit after tax			
	(1) 2005	(2) 2005	(3) 2011	(4) 2011	(5) 2005	(6) 2005	(7) 2011	(8) 2011
Short-term contract churning rate	0.04	0.07***	0.00	0.00	0.01	0.01	0.03**	0.03**
	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
2-digit industry	Yes	No	Yes	No	Yes	No	Yes	No
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.61	0.52	0.66	0.59	0.10	0.02	0.18	0.04
N	1152	1152	1457	1457	1152	1152	1457	1457

Interpretation: controls are capital intensity, share of workers aged >55, establishment age, % of women, % of low-skilled, % of high-skilled and firm size category. Profit rate is the ratio of after-tax profits to gross value added (if positive). Establishments with >20 workers in the private non-agricultural sector. Columns (1,3,5,7), standard errors clustered by 2-digit industry; columns (2,4,6,8), robust standard errors. *** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level.

By contrast, the profits after tax seem to have been positively correlated with the churning rate in 2011; whereas, we found no correlation in 2005. These findings are consistent with the second mechanism: the changing nature of CDDs hampers productivity in some activities but boosts profits.

4.3 Work practices and productivity

An extensive literature, both in management science and economics, stresses the role of "high-involvement" and "high-performance" workplace practices in business performance. High-performance practices seek to improve the flexibility and the quality of the production process in conjunction with information and communication technologies (ICT). High-involvement practices such as employee shareholding, profit sharing or labour-management information sharing, seek to enhance employees' motivation, engagement and loyalty. If the spread of these practices is well documented, for example in France during the 1990s (Coutrot, 2000), their actual impact on productivity is still an unsettled issue (for a review, see Bloom and Van Reenen, 2010). The main concern is the potential reverse causality and unobserved heterogeneity in empirical estimations. The aim of this subsection is not to resolve these caveats but rather to see if, with the same estimation procedure, we can observe structural breaks in the relations between work practices and labour productivity, before and after the Great Recession, that may have contributed to the slowdown in productivity.

Two different arguments suggest that such breaks have occurred. First, since high-performance work practices are intended to be complementary to ICT, a corollary of the hypothesis of a maturity of the ICT revolution (see the introductory chapter) is a smaller contribution of these practices to productivity growth. Second, the crisis may have blunted the incentive impact of involvement practices. With the huge adjustment of stock markets, workers who owned shares of their firms experienced a drop in the value of their savings; even if markets progressively recover, the crisis may have revealed a much more uncertain world that affects the expected value of their holdings – at least in France (Arrondel and Masson, 2011). The de-correlation between workers' effort and the

firm's performances or workforce redundancies may have slashed workers' engagement, especially in workplaces that rely on high-involvement.

The waves of REPONSE are the only French employer surveys providing information on workplace practices before and after the shock of 2008. Managers were questioned on a large variety of practices. We select here some of the key practices that are retained in numerous studies.[15] In contrast to recent research, we did not aggregate the different practices into a single index.

More specifically, two high-involvement dimensions[16] are used. Employee shareholding is reported by managers interviewed in about one third of the establishments in our samples. In most firms, managers are the main subscribers to shareholding schemes, but in some firms – even among large multinationals (*Société Générale, Auchan*...) – a large proportion of (permanent) workers hold shares. In addition, employees are the main, and even sole, shareholders of certain firms, e.g. cooperatives. The second dimension is the organised employee-voice groups in the workplace. We built a variable adding the implementation of regular workplace meetings and of employee-voice groups in working conditions and workplace organisation. This variable is then normalized to one (thus, taking on the values 0.5 or 1).

Three dimensions of high-performance practices are studied. Quality management is captured by adding managers' declarations about quality circles and total quality management (the variable is normalized). Managers are asked about job rotation and the existence of autonomous work-teams as well.

All these variables are included in the estimates of the production function (1) for both 2005 and 2011. The results are presented in Table 7 for 2005 and in Table 8 for 2011. We use various specifications. In both tables, column (1) is based on the largest sample; controls are similar to those described in Table 5. Estimates on mono-establishment observations are given in column (2). Column (3) provides the results of the regression for an alternative subsample: the establishments present in the REPONSE 2011, which by definition are those having survived the first years of the Great Recession and thus may have unobserved characteristics that led to sustainable performance. In Table 7, column (4) presents the estimation on the large subsample of firms that are on the average older and for which accounting data in 1999 are also available in our database; we control both by the labour productivity in 1999 and by the capital intensity in 1999, in order to capture a part of the heterogeneity in the information and also to reveal potential reverse causality in the implementation of work practices.
None of the models shows a significant positive correlation between productivity and high-performance practices. We do not report here the similar results of regressions run with a regressor that is an aggregate index of these practices, in application of the idea of bundling practices. Given the methodological limitations stressed above, we do not conclude that these practices are

[15] See Posthuma et al. (2013) for a comprehensive taxonomy of high-performance work practices.

[16] Since profit-sharing schemes (*participation*) are mandatory in firms with over 50 employees, we do not consider this practice.

inefficient, but rather that our data and approach do not capture an effect of such practices on productivity.[17]

Table 7. Workplace practices and productivity in 2005

	(1)	(2) Mono-establishment firms	(3) Panel 05/11	(4)	(5) Panel 99/05
Ln(Assets per employee)	0.312***	0.333***	0.333***	0.287***	0.440***
	(0.030)	(0.038)	(0.038)	(0.051)	(0.155)
Organised empl. voice	0.124***	0.106**	0.123**	0.074***	0.130**
	(0.032)	(0.042)	(0.052)	(0.023)	(0.060)
Empl. shareholding	0.074*	0.039	0.097***	0.057*	0.015
	(0.040)	(0.033)	(0.034)	(0.033)	(0.041)
Quality management	-0.010	-0.058	-0.026	0.006	
	(0.044)	(0.058)	(0.096)	(0.042)	
Autonomous team	-0.030	0.035	0.003	-0.016	
	(0.027)	(0.040)	(0.054)	(0.026)	
Job rotation	0.002	-0.008	0.007	0.019	
	(0.022)	(0.035)	(0.038)	(0.021)	
Organised employee voice in 1999					0.009
					(0.039)
Employee shareholding in 1999					0.005
					(0.043)
Ln(Productivity per employee in 1999)				0.679***	0.848***
				(0.041)	(0.070)
Ln(Assets per employee in 1999)				-0.183***	-0.358***
				(0.041)	(0.131)
2-digit industry	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	No
N	1469	531	446	1203	463
R^2	0.60	0.65	0.68	0.72	0.72

Interpretation: controls are capital intensity, share of employees aged >55, establishment age, % of women, % of low-skilled, % high-skilled workers and firm size category. Establishments with >20 workers in the private non-agricultural sector. Robust standard errors clustered by 2-digit industry code. *** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level.

On the contrary, in estimations run on the three cross-sectional subsamples, an organised employee voice is associated with significantly higher labour productivity. The magnitude of the coefficient is large: one standard deviation implies about a 3% gain in productivity. Results are less robust for employee shareholding, but again the magnitude of the estimated coefficient is significant. The statistical weakness in mono-establishment firms may be linked to the fact that only one fifth of the

[17] For example, assuming that the spread of innovative practices is mature; then, the choice to implement a practice or not is optimal, and the econometric model cannot catch an "effect" of the practices.

managers interviewed reported employee shareholding, while one third of the managers of multi-establishment firms did.

Including the productivity level and the capital intensity in 1999 among the regressors confirms the qualitative results; however, the estimated coefficient for both employee shareholding and employee voice management are reduced by about one third. Note that the negative correlation between capital intensity in 1999 and productivity in 2005 – with the knowledge of the capital intensity in 2005 – is consistent with declining efficiency of ageing capital. Since we use the logarithm of productivity, a coefficient lower than one for past productivity is consistent with the beta-convergence of productivity (e.g. on French firms, see Chevalier et al., 2012).

The panel of establishments surveyed in 1999 and 2005 enables us to go one step further by adding the presence in 1999 of employee voice management and employee shareholding as controls for unobserved heterogeneity and potential endogeneity between practices and better performance. Column (5) may be read as a first difference between 1999 and 2005 as well. On this smaller subsample, the potential impact of employee shareholding vanishes, but the impact estimates for employee voice management are even larger.

We also experimented with instrumental variables to correct for endogeneity. We instrumented a high-involvement practice by the weighted mean average of the practice in other establishments of the full REPONSE sample operating in the same 2-digit industry; the weights are the same as the ones indicated by the DARES so as to make the survey representative of French establishments according to size and activity. Both instruments are highly correlated with the seminal variables. However, when controls are included in the estimation, standard tests[18] do not reject, and by far, the hypothesis that each of our two high-involvement practices is exogenous. Therefore, we retain OLS estimators, which should be more efficient.

Overall, our findings point to the positive impact of high-involvement practices on labour productivity in 2005. Note that if we follow the literature focusing on the intensity of the use of innovative practices, the aggregated index summing our five practices is strongly correlated with higher productivity in 2005.

Similar exercises are then run on the data from the 2011 REPONSE survey. Table 8 reports the results of the estimations of the production function in 2011. As in 2005, the job rotation and quality management variables are not significantly correlated with higher productivity; the autonomous work team variable is negatively correlated with productivity, but this relation vanishes when we control for the past productivity.

Unlike 2005, in 2011, regardless of the specification, high-involvement practices – employee shareholding, organised employee voice – are no longer associated with enhanced productivity. The estimated coefficients are close to 0, and even negative on some samples. On the largest samples (columns 1, Tables 7 and 8), coefficients associated respectively with organised employee voice and

[18] p>25% for organised employee voice and p>50% for employee shareholding, according to Durbin, Wu-Hausman tests under the assumption of i.i.d. errors, Woolbridge's robust score test, and the regression-based test when clustering.

employee shareholding, are statistically different between 2005 and 2011 at the 5% and 10% levels. They are still different just above the 10% threshold when past productivity is included (column 3).

In addition to accounting data provided by .Risk, in the REPONSE 2011 survey, managers were questioned about the relative productivity performance of their establishments. They had to scale their response from much lower than their competitors to much higher (i.e., according to 5 levels). This qualitative variable is strongly correlated with the productivity measure derived from accounting information, even within 2-digit industry categories. This variable is available for most of the establishments surveyed, and thus for a larger and rather representative sample of the French establishments. Estimations using this relative productivity measure as a dependent variable are presented in column (4). An ordered logit (column 5) again shows no significant correlation between high-performance or high-involvement practices and this productivity scale.

Table 8. Workplace practices and productivity in 2011

	(1)	(2) Mono-estab.	(3)	(4) Panel 05/11	(5) Relative productivity
Ln(Assets/employee)	0.302***	0.284***	0.361***	0.340***	
	(0.028)	(0.028)	(0.044)	(0.056)	
Organised employee voice	0.004	0.004	-0.003	-0.022	(+) ns
	(0.026)	(0.040)	(0.025)	(0.025)	
Empl. shareholding	-0.033	0.038	-0.040	-0.009	(-) ns
	(0.023)	(0.028)	(0.026)	(0.049)	
Quality management	-0.020	0.000	0.006		(+) ns
	(0.011)	(0.038)	(0.024)		
Autonomous team	-0.041**	-0.077***	0.000		(+) ns
	(0.020)	(0.028)	(0.000)		
Job rotation	-0.010	-0.043	0.008		(-) ns
	(0.019)	(0.041)	(0.017)		
Organised employee voice in 2005				0.004	
				(0.029)	
Employee shareholding in 2005				0.080	
				(0.055)	
Ln(Productivity per employee in 2005)			0.550***		
			(0.059)		
Ln(Assets per employee in 2005)			-0.264***		
			(0.047)		
2-digit industry	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	No	Yes
N	1857	717	1426	530	2569
R^2	0.63	0.61	0.71	0.60	0.03

Interpretation: controls are capital intensity, share of employees >55, establishment age, % of women, % of low-skilled workers, % high-skilled workers and firm size category (except column (5), establishment size). Establishments with 20 or more workers in the private non-agricultural sector. Column (5), ordered logit on

relative productivity indicated by the manager, and pseudo-R^2. Robust standard errors clustered by 2-digit industry codes. *** significant at the 1 % level; ** significant at the 5 % level; * significant at the 10 % level.

These contrasting results suggest a structural break in the impact of high-involvement practices after the 2008 shock. If we consider employee voice management alone, the potential loss of productivity can be up to 10% for establishments implementing both employee-voice groups and regular workplace meetings, and 5% for an average establishment in our sample. These micro-estimates should be translated into macro-figures with caution: the dispersion of estimated coefficients is large; our non-representative sample includes only establishments with 20 or more workers, for which the high-involvement practices may be more volatile; about 40% of the French private workforce belongs to smaller establishments.

Our findings are consistent with a reduction in the engagement of workers. However, the findings may also be interpreted as the result of a labour-hoarding process: firms may be reluctant to fire their own shareholders; they may retain their workforce – especially with specific human capital – and try to preserve the workers' long-term commitment. The study of the relationships between work practices and skilled-labour hoarding, however, does not support this last interpretation. When high-involvement practices are included in our nested logit (see Appendix B and subsection 4.2 above), they do not seem to boost the hoarding of managers and professionals.[19]

Whatever the interpretation, the loss of associated productivity due to lower efficiency of some of the work practices including employee shareholding is probably a reversible consequence of the economic downturn and uncertainty about potential recovery.

5. What can we expect for the future?

Since 2008, the cumulative productivity slowdown in France is huge. Compared to the dynamics observed in the first part of the 2000s or to the trend following the recession in the early 1990s, the loss of hourly productivity ranges between 5% up to 8%. It is even larger in the market economy (7 to 10%); whereas, employment reductions in the public sector workforce sustained labour productivity.

Straightforward hypotheses such as an industry composition effects due to the recession and more sophisticated explanations, such as impaired reallocation of capital or slowing organisational changes, are not relevant to the productivity puzzle, or even add to it. However this chapter describes salient mechanisms capable of disentangling the puzzle to a great extent.

Fundamentally, the France of 2014 is different from the France of the 1990s. On the one hand, the education level of the workforce rose and is still improving, thanks to the increasing spread of tertiary education. On the other hand, or rather complementarily, firms have implemented new workplace organisations. Our macro-analysis, as well as our micro-estimations using different waves of surveys of French establishments, suggest that these changes massively alter the productivity trend when a recession arises. High-skilled/educated employment is not sensitive to the business

[19] Employee shareholding is even negatively related with skilled-labour hoarding, suggesting that a higher participation of workers would more likely favour a more homogenous adjustment of the workforce when employment cutbacks are implemented.

cycle. The lack of adjustments translates into an apparent pro-cyclical productivity phenomenon that can explain up to half of the productivity slowdown since 2008. In addition, organisations based on workers' involvement and commitment seem to have become less prone to improve productivity in recent years. Their entangled impact on labour productivity may account for a 2 to 5 percentage points decline over the recent period. We may also expect the losses in apparent productivity working through these two mechanisms to be transitory.

Two recent "reforms" of the labour market increased low-productive jobs, partially in substitution for more-productive employment. The most important was the introduction of a new status for the self-employed, the *auto-entrepreneur* (unincorporated “freelance entrepreneur”), and the second was the development of very-short salaried employment. The two measures may account for roughly 2 percentage points in decreased aggregated productivity; i.e., one fourth of cumulative productivity losses. This lost productivity is likely to be permanent if the incentives and regulations favouring these low-productive jobs are not removed.

Based on this diagnosis, economic recovery in France is likely to lead to a revival in productivity. Correlatively, an economic upturn would most likely be followed by a delayed decline in unemployment. However, the continuing substitution of "typical" jobs by low-productive employment may well prevent the realisation of this scenario.

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Appendix A: Definitions and descriptive statistics

This appendix gives definitions of non-straightforward variables and basic statistics for the main variables used in the section 4.

Variables from REPONSE (manager questionnaire)

Employee shareholding takes the value one if employees

- in 2004/2005 are the main or the second main category of shareholders (Q. 0.8a); or own a part of the capital of the firm (Q 6.17a)

- in 2010/2011 are the main category of shareholders (Q. 0.9b); or own a part of the capital of the firm (Q 6.16)

Organized voice equals the mean of regular workplace meetings (Q. 3.3.2 in 2004/2005; 3.2.2 in 2010/2011) and of *voice group* on working conditions and workplace organization (*groupe d'expression directe* Q. 3.3.3 in 2005; 3.2.3 in 2011)

Quality management is the mean of the dummies for total quality management (Q. 5.13a in 2004/2005; 5.9f in 2010/2011) and for quality circles (Q. 3.3.1 in 2004/2005; 3.2.1 in 2010/2011).

Variables from DADS

Occupations are classified according to the INSEE-PCS 2003 both for both waves. *High-skilled* occupations are artisans and firm directors, managers and professionals in the establishment. *Medium-skilled* are "intermediary" occupations i.e. technicians and associated professionals. *Low-skilled* occupations include clerical support workers, services and sales workers and blue-collar workers.

Table A1. Descriptive statistics for selected variables, columns (1) tables 6 and 7

	2005	(N=1469)	**2011**	(N=1857)
	Mean	Std. Dev.	Mean	Std. Dev.
Ln(productivity per employee)	10,92	0,64	10,99	0,58
Ln(gross asset per employee)	11,65	1,18	11,97	1,12
Share of 55-	0,08	0,07	0,10	0,08
Share of high-skilled occup.	0,16	0,20	0,16	0,21
Organized voice	0,56	0,31	0,57	0,31
Employee shareholding	0,31	0,46	0,31	0,46
Quality management	0,62	0,39	0,59	0,40
Autonomous work group	0,48	0,50	0,57	0,49
job rotation	0,48	0,50	0,44	0,50

Table A2. Correlations for selected variables, columns (1) tables 6 and 7

2005 N = 1469	Ln(productivity per employee)	Ln(gross asset per employee)	pct of 55-	pct of high-skilled	organized voice	employee shareholding	quality management	autonomous work group	job rotation
Ln(productivity per employee)	1,00								
Ln(gross asset per employee)	0,70	1,00							
pct of 55-	0,04	0,09	1,00						
pct of high-skilled	0,38	0,34	-0,04	1,00					
organized voice	0,14	0,11	-0,04	0,03	1,00				
employee shareholding	0,18	0,16	0,04	0,18	0,12	1,00			
quality management	0,11	0,13	0,00	0,04	0,32	0,03	1,00		
autonomous work group	0,01	0,04	0,03	-0,07	0,09	0,04	0,17	1,00	
job rotation	-0,06	-0,03	0,01	-0,14	0,01	-0,04	0,12	0,19	1,00

2011 N = 1857	Ln(productivity per employee)	Ln(gross asset per employee)	pct of 55-	pct of high-skilled	organized voice	employee shareholding	quality management	autonomous work group	job rotation
Ln(productivity per employee)	1,00								
Ln(gross asset per employee)	0,69	1,00							
pct of 55-	0,02	0,08	1,00						
pct of high-skilled	0,44	0,35	-0,01	1,00					
organized voice	0,05	0,08	-0,11	0,02	1,00				
employee shareholding	0,11	0,18	0,01	0,17	0,10	1,00			
quality management	0,06	0,13	0,00	-0,03	0,29	0,06	1,00		
autonomous work group	-0,04	0,02	0,01	-0,05	0,09	0,02	0,14	1,00	
job rotation	-0,08	-0,01	-0,04	-0,18	0,03	-0,03	0,12	0,14	1,00

Appendix B: Labour hoarding

Table B1: Evolution of production and employment during the past 3 years in private establishments with 20 or more workers. In %.

		2005	2011
Production	Very increasing	11.9	9.6
	Increasing	44.8	33.4
	Stable	28.9	33.5
	Decreasing	12.0	19.5
	Very decreasing	2.4	4.0
Employment	Increasing	43.6	40.7
	Stable	40.0	40.3
	Decreasing	16.4	19.0

Employment\Production		Very increasing	Increasing	Stable	Decreasing	Very decreasing
Increasing	2005	78	58	23	11	7
	2011	85	60	27	16	9
Decreasing	2005	5	8	16	50	75
	2011	4	8	12	46	73

Source: Authors' calculus using REPONSE 2005 and 2011. Data are weighted to be representative of establishments with 20 or more workers in the private non-agricultural sector.

Table B2: Skilled labour hoarding and workplace strategy in 2011

Coefficients (standard errors)	**Nested logit model**		
Nested logit structure			
First level	No workforce reduction	Workforce reduction	
Second level	–	High-skilled labour hoarding	No high-skilled labour hoarding
Workplace strategy			
Innovation as main objective		**2.989** (1.308)**	**-3.424* (1.787)**
Product diversity as main objective		1.478 (1.507)	-0.964 (1.746)
High-involvement indicators			
Employees shareholding	*Reference category*	**-1.640 (1.079)**	**2.402*** (0.874)**
Decentralized voice		0.475 (0.831)	-0.817 (0.813)
High-performance practices			
Quality		1.112 (1.133)	-0.939 (1.247)
Autonomous work team		-0.711 (0.835)	0.696 (0.842)
Job rotation		*1.654** (0.740)*	*-1.151 (0.729)*
Controls and model characteristics			
2-digits industry control	Yes		
Other controls	Share of employees aged > 55, workplace age, percentage of women, workplace size, economic activity		
N	3140		
Industry clustered standard error	Yes		

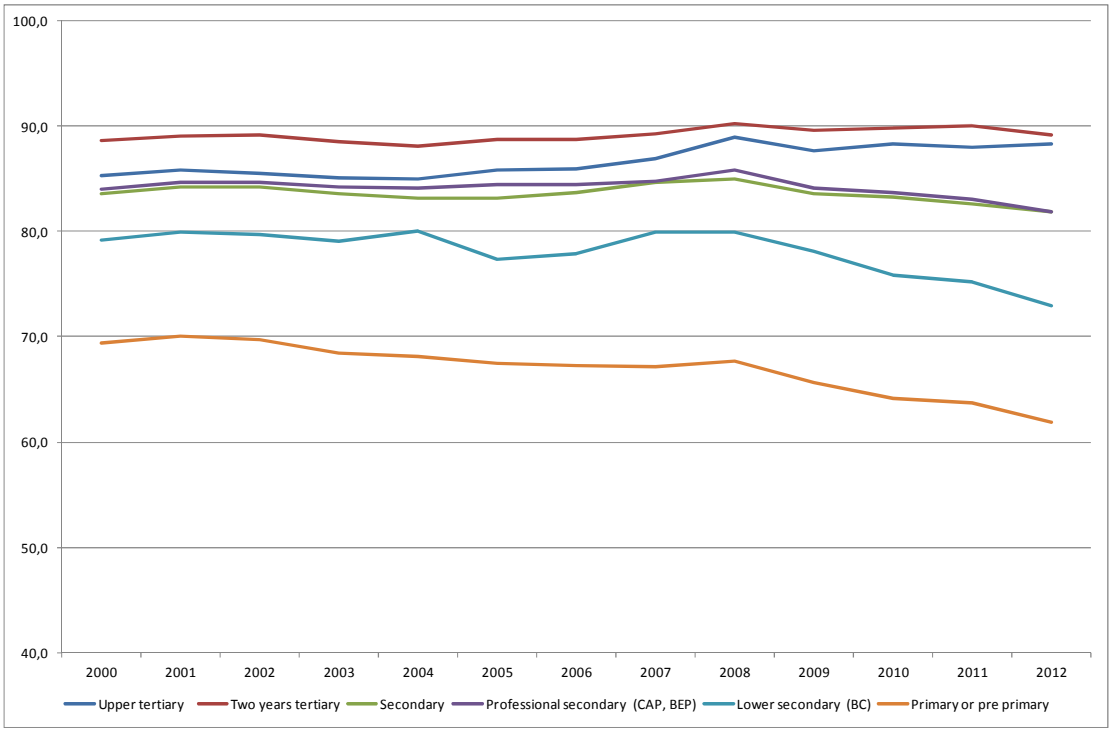
Source: Authors' estimations REPONSE 2010/2011

Note: Workplaces of 20 or more workers in the private non-agricultural sector. Significance levels: * 10 %, ** 5 %, *** 1 %. Lines in bold refer to coefficients significantly different from one another at a 5 % significance level. Lines in italic refer to coefficients significantly different from one another at a 10 % significance level.

Reading: Having innovation as main objective is statistically associated with a higher probability of proceeding to high-skilled labour hoarding, controlling for the probability of introducing a global workforce reduction policy.

Appendix C:

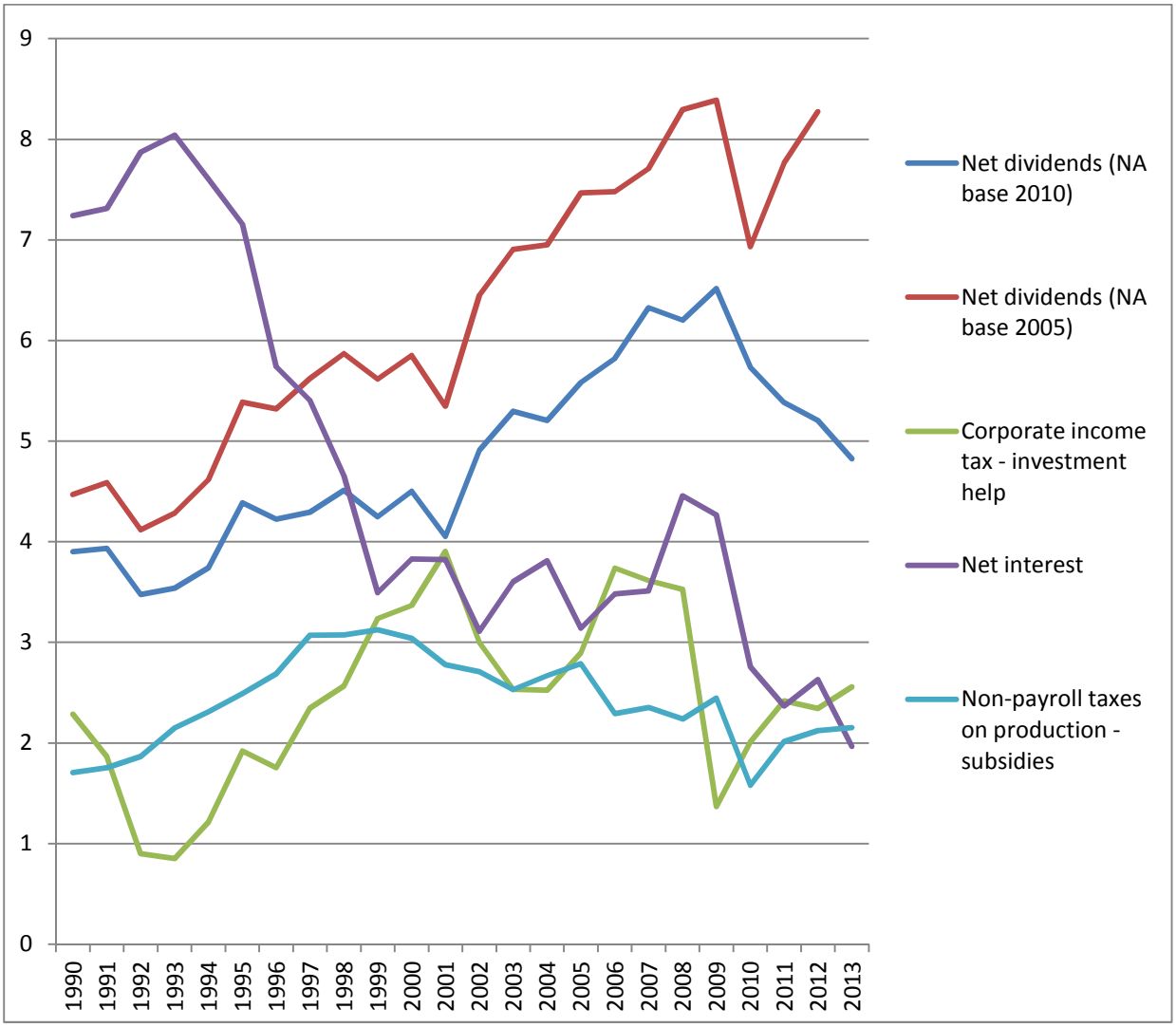
Figure C1-Employment rates by education levels (25-50 years old) 2000-2012



Source: French Labour Force Surveys

Fig. C2: Net distributed income, taxes-subsidies, net interest as % of the gross value added.

Non-financial corporate firms 1990-2013.



Source: authors' calculus using INSEE National Account base 2010 (published May, 2014) and for net dividends base 2005 (published May, 2013). Preliminary data for 2012 and 2013. For net dividends, figures in base 2005 and in base 2010 exhibit large discrepancies which are not currently explained.