

Forty Years of Change in Labour Supply and Demand by Skill Level – Technical Progress, Labour Costs and Social Change

Dominique Goux* and Éric Maurin**

Abstract – In France, the proportion of unskilled non-manual jobs is higher today than forty years ago, especially in personal service sectors. However, these unskilled jobs are only growing in occupations where employers enjoy significant reductions in social contributions and only in periods when these reductions are implemented. Throughout the same period, the diffusion of new technologies systematically appears to be favourable to higher- and intermediate-level occupations. Technological change contributes less to a polarisation between higher-level and lower-level jobs than to the emergence of a society where intermediate-level jobs take an increasingly central place. However, the joint rise in higher and intermediate level jobs is not strong enough to absorb the influx of high-school and college graduates. An increasing number of graduates are forced to compete with less educated workers in lower-level job positions. The result is both an increase in the occupational downgrading of graduates and the persistence of very high unemployment rates for non-graduates.

JEL Classification: J21, J24, J31

Keywords: technological change, labour cost, occupational structure, polarisation, unemployment

Reminder:

The opinions and analyses in this article are those of the author(s) and do not necessarily reflect their institution's or Insee's views.

* Insee (dominique.goux@insee.fr)

** PSE, EHESS (eric.maurin@ens.fr)

Translated from the original version: "Quarante ans d'évolution de l'offre et de la demande de travail par qualification – Progrès technique, coût du travail et transformation sociale"

Citation: Goux, D. & Maurin, É. (2019). Forty Years of Change in Labour Supply and Demand by Skill Level – Technical Progress, Labour Costs and Social Change. *Economie et Statistique / Economics and Statistics*, 510-511-512, 131–147. <https://doi.org/10.24187/ecostat.2019.510t.1991>

Over the last decades, the social landscape in France has completely transformed. As many studies have already highlighted, manual occupations and lower-level non-manual occupations have collapsed, while higher-level non-manual occupations (managers and professionals) have risen dramatically¹ (Marchand, 2010; Goux & Maurin, 2012). Within the lower-level groups, significant reconfigurations are taking place: some of the occupations not among the lowest paid are losing ground, while some of the lowest paid are growing, particularly in personal service sectors (Ast, 2015).

Together, these changes seem to be consistent with the hypothesis that technological change is now contributing to polarising employment and society and to leaving employees with only two options, poorly paid personal service jobs on the one hand and higher-level, non-manual employment on the other, with the middle stratum of the workforce condemned to disappear (Autor *et al.*, 2003; Goos & Manning, 2007; Goos *et al.*, 2009).

At the heart of this hypothesis is the idea that the jobs most exposed to technological change are not necessarily the lowest-skilled jobs, but those that require employees to perform “routine tasks”, i.e. tasks involving following procedures that are easy to specify and schedule in advance, irrespective of how complex or abstract they may be. Many intermediate-level occupations are said to be full of these “routine tasks” (such as accounting), whereas numerous jobs among the lowest skilled require employees to carry out tasks that are simple, but which cannot be specified or scheduled in advance (in the personal care sector in particular). This disconnection between the skills required to perform a job and the tasks involved is said to be the key to understand modern technological developments, those that favour higher- and lower-level jobs, but are unfavourable towards intermediate-level jobs.

Although difficult to test empirically, yet dominant in the literature, this hypothesis of technological polarisation serves a dual political purpose: on the one hand, by giving technological change a key role, it lends a certain inevitability to the changes in the occupational structure, irrespective of the institutions in place and the political choices made; on the other hand, by identifying intermediate-level jobs as those that are most threatened by technological changes, this hypothesis has the scaremongering nature of the ideas heralding a future without middle classes, a future where nothing remains but a face-off between the upper and lower strata of society.

Before we can endorse these hypotheses, several questions still need to be answered, including that of the role played by policies reducing labour costs for the lowest-paid jobs. When addressing the question of the mechanisms likely to explain changes in the occupational structure, one crucial question arises, namely that of the change in the relative costs of the different types of jobs for employers. Put simply, the relative decline in one specific type of job (for example, skilled manual jobs) can only be interpreted as reflecting adverse technological changes to the extent that the cost of that type of jobs for employers has not increased when compared with other types, in particular those likely to replace it. If the relative cost increases, the diagnosis becomes unclear as the decline could result from adverse changes in either technology or relative costs.

Numerous studies have already highlighted the fact that the relative wages of higher-level occupations (managers or professionals) have experienced a falling trend in France over recent decades (Insee, 2018a; Babet, 2017; Charnoz *et al.*, 2013; Verdugo, 2014). Figure I-A shows the change in wages of the main occupation groups between 1990 and 2018 (see Box for a presentation of the data used). It confirms that the wages of higher-level occupations are dropping while those of lower-level non-manual workers and manual workers are experiencing the most significant increases, contributing to a significant narrowing of the wage hierarchy.

While the drop in relative wages of higher-level occupations could be interpreted as a drop in the relative cost of those jobs to employers, Figure I-A could be said to offer a simple explanation for the rise in these occupations within companies: they have become less costly with the influx of new graduates onto the labour market, which has encouraged employers to gradually replace other forms of employment with managerial and professional positions. Likewise, while the increase in the relative wages of the lower-level occupations could be interpreted as an increase in their relative cost for employers, Figure I-A could be said to be consistent with one of the key elements of the technological polarisation

1. Building on the French classification of occupations, we will distinguish higher-level occupations (managers, professionals), intermediate-level occupations (technicians, foremen, associate professionals), lower-level non manual occupations (sales employees, lower-level clerical employees, childminders, etc.) and manual occupations. In the French classification, the first group (higher-level occupations) corresponds to the category Cadres, the second to the Professions Intermédiaires, the third to the Employés and the last one to the Ouvriers. Among these last two groups, we will distinguish skilled and unskilled occupations (Ouvriers qualifiés et Ouvriers non qualifiés as well as Employés qualifiés et Employés non qualifiés).

Box – Data and Calculation of Labour Costs

This study is based on the French Labour Force surveys (LFS) conducted from 1982 to 2018. Between 1982 and 2002, the surveys were generally carried out in March, whereas since 2003, information has been collected continuously throughout the year.

For each respondent, in addition to the usual sociodemographic characteristics (gender, age, education), the LFS also provide detailed information on the activity status (employed, unemployed, not economically active), the employment status for those who work (employee/self-employed, private-sector/public sector, i.e. state and local authorities), the occupation, employer's industry, monthly wage received and working hours (full or part-time, part-time percentage).

In the 37 surveys conducted, the occupation is coded in the French classification of occupations (PCS, standing for *Professions et catégories socioprofessionnelles*). This classification was revised in 2003 but this only affected the most detailed level of the classification (four-digit level) without changing the more aggregated levels (two-digit level). The surveys therefore make it possible to describe the change in the French occupational structure using the two-digit classification over a 37 years period. However, we must highlight that the changes in the coding procedures associated with the change in classification of occupations in 2003 (and the transition from one survey generally carried out in March to a continuous survey conducted throughout the year, also in 2003) make it difficult to interpret the changes per socio-professional category between 2002 and 2003. Therefore, the graphical analyses do not show the change between 2002 and 2003.

We have distinguished between managers and professionals (item 3 of the one-digit PCS, named "higher-level occupations"), technicians, foremen, associate professionals (item 4 of the one-digit PCS, named "intermediate-level occupations"), skilled manual workers (items 62, 63, 64 and 65 of the 2-digit PCS), unskilled manual workers (items 67, 68 and 69 of the two-digit PCS) and lower-level non-manual employees (item 5 of the one-digit PCS). Within the category of lower-level non-manual employees, we distinguish unskilled non-manual occupations, which include sales workers, hotel and restaurant workers, childminders, home help workers (items 55 and 56 of the two-digit PCS). We have also differentiated between personal service employees (item 56, which includes hotel and restaurant workers, childminders, home help workers) and other unskilled non-manual employees (item 55, including sales workers). Finally, within personal service employees, we have also distinguished between childminders, home help, domestic workers and cleaning staff employed by private individuals (PCS 2003 = 563a, 563b and 563c or PCS 1982 = 5631 and 5632) and other personal service employees (the other PCSs within the two-digit category 56).

Since 1982, the LFS also collects information on employees' monthly wage. But detailed information on wages is only available from 1990 onwards (until 1989, the survey only provided wage brackets – with 19 brackets – an information which is not accurate enough for our study). Note also that since 2003, this information is only available for one third of the sample (the "incoming 1/6th" sample and the "outgoing 1/6th" sample). Therefore, from

2003 onwards, wages (and labour costs) are estimated on the basis of one third of the sample.

Employment and wages are estimated in full-time equivalent, using the information available on the employment time-status (full-time or part-time) and for part-time employees, the part-time percentage.

Calculation of Labour Cost

For each employee, we estimate the labour cost using the available information on the monthly wage, working hours (full-time or percentage of full-time), social contributions (and caps for the corresponding year), and distinguishing between *cadres* (broadly the category working in "higher-level occupations"), and *non-cadres* (broadly all the others) – this distinction going with significant differences in social contributions, particularly for pensions. We also deducted the general measures of social contribution reduction measures applicable for the corresponding year (see Ouriac & Nouveau, 2012, for an inventory of these measures).

In the case of home help, childminders, domestic workers and cleaning staff employed by private households, we have also estimated a net cost of the tax reductions and additional social contribution reductions granted to their employers (whether directly or via a company). With regard to childminders, we assumed that the private individuals had been exempt of (employee and employer) social contributions since 1991 (AFEAMA, an assistance scheme for families employing approved childminders) and ignored any other financial assistance (such as the AFEAMA supplement, which depends on the number and age of the children looked after and also, from 2001 onwards, the employer's income) (Daniel, 2003). In the case of the other jobs in this category (home help, domestic workers, etc.), we have assumed that a given employee had only one private employer (or user) who benefitted from the maximum tax reduction (or tax credit) associated with employing a domestic worker given the caps in force (Article 199 sexdecies of the French General Tax Code). We ignored any other financial supports (for example, such as the AGED, a specific support for childcare aimed only at childcare jobs carried out in the employer's home, which are difficult to identify in the survey).

The LFS allows for the indirect identification of childminders within the occupations grouped into the "childminders, babysitters, domestic workers" PCS (PCS 5631, then 563a and 563b in PCS 2003) since 1994. We used the criteria proposed by Algava & Ruault (2003), namely people working as "childminders, babysitters, domestic workers" who work at their own home and who are neither self-employed nor employed by the state or local authorities.

To assess the quality of our estimations, we compared them with the series of labour costs calculated by Insee using administrative data (the DADS) and social legislation (Insee, 2013). Reassuringly, our estimations and those of Insee give a very similar image of the change in the different deciles of the labour costs distribution. For example, the first decile increased between 1990 and 2010 by +48% according to our estimations and +50% according to Insee. Likewise, the last decile increased by +70% according to our estimations and +68% according to Insee. The ratio of the last decile to the first increased by +13% according to Insee and +15% according to our estimations.

hypothesis: the proportion of some lower-level occupations in total employment is growing even though their costs are rising, a development that is difficult to explain without the hypothesis that technological change is more favourable (or less unfavourable) towards these jobs than towards many intermediate or higher-level occupations. The problem here, however, is that wages only represent a part of the costs to the employer. These costs also depend on social contributions, which have become much more favourable to lower-level jobs since the start of the 1990s.²

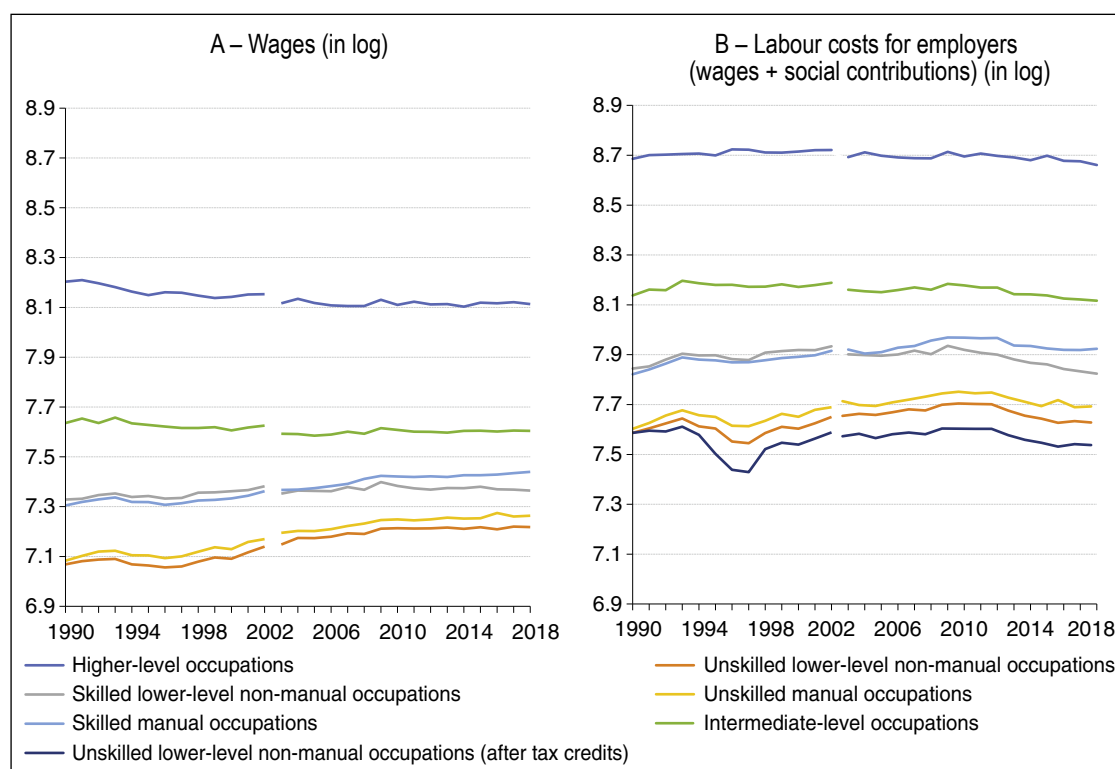
To illustrate the importance of distinguishing between wages and labour costs, Figure I-B does not chart the change in wages of the main occupation groups but the change in corresponding costs for employers, once social contributions are taken into account. Figure I-B shows that the narrowing of wages has largely been offset by social contribution reduction policies aimed at the lowest-paid jobs.³ While the difference in wages between higher- and lower-level

occupations has dropped by more than 20% over the period examined, the difference in labour costs (wages + social contributions) has remained almost unchanged. If we take into consideration tax reductions and credits, from which employers in the personal services sectors benefit, we even find an increase in cost differences between higher- and lower-level occupations over the period examined.

Throughout this article, one of our main objectives will be to deepen this diagnosis by examining as accurately as possible the joint change in labour costs and relative employment of the main

2. The data are from the Labour Force survey, which has only been providing detailed data on wages since 1990 (see Box).
 3. Using administrative data (the Déclarations Annuelles de Données Sociales or DADS, from employers annual declarations) for the private sector over the period 1976-2010, Bozio et al. (2016) reach similar conclusions, namely a narrowing of the interdecile wage gaps more than offset by the social contribution reduction policies aimed at low earners. This diagnosis marries up with a former research carried out by Goux & Maurin (2000) between 1970-1993 using the surveys on training and vocational education Formation et Qualification Professionnelle (FQP).

Figure I
 Change in wages and labour costs per socio-professional category, 1990-2018



Notes: The change between the years 2002 and 2003 is difficult to interpret due to a discontinuity in the coding of the PCSs.
 Reading Note: In 1990, the difference in log wage between higher-level occupations and unskilled lower-level non-manual occupations was 1.12 (where 1.12=8.20-7.08). In 2018, it was 0.90 (where 0.90=8.11-7.21), meaning a reduction of more than 20%. In 1990, the difference in the log of labour cost (wage+social contributions) between higher-level occupations and unskilled lower-level non-manual occupations was 1.09 (where 1.09=8.68-7.59). In 2018, it was 1.03 if we do not include tax credits and 1.12 if we do include them.
 Coverage: Private sector employees.
 Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1990-2018.

occupation groups, so as to better understand the nature of the dynamics transforming society.

We will pay particular attention to factors likely to explain the dynamics contributing to the transformation of the lower-level categories of the workforce, whether this relates to the increase in some of the least paid jobs (such as personal service jobs) or the drop in some of the more paid jobs (such as skilled manual jobs or corporate administrative jobs). To preview our main conclusions, we do not find the data to be consistent with the hypothesis that technological change is behind these forms of employment polarisation. In fact, although some jobs among the least skilled have been gaining ground, this has occurred essentially in occupations and during periods where these jobs have been supported by significant public subsidies, considerably lowering their relative costs to employers. Once these specific cases are set aside, technological change seems almost systematically biased in favour of the more skilled occupations. In the last part of the paper, we will also show that the speed with which labour demand is changing in favour of higher- and intermediate-level occupations is still slower than the speed with which the level of education among the population is growing. In a context where labour costs have remained

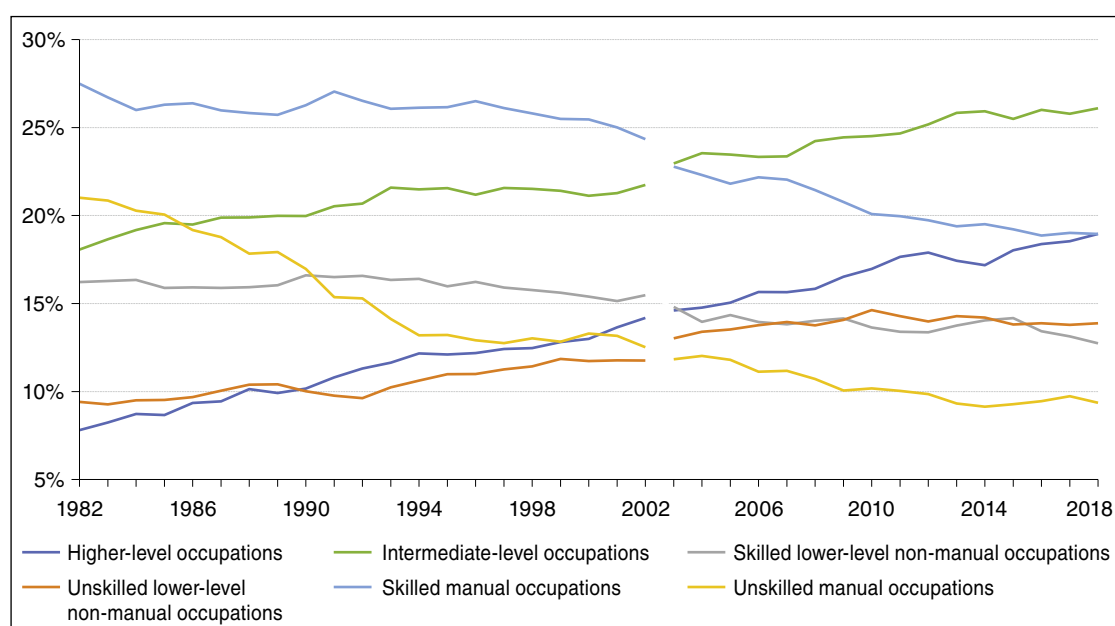
very stable, this rising gap between the supply and demand of skills explains both the increased downgrading of graduates and the persistence of high unemployment among non-graduates.

The Rise of Unskilled Non-Manual Jobs: A Political Choice

Unskilled non-manual occupations represent the lowest paid group of occupations.⁴ One of the features of this group, however, is that it has experienced an increase in its share over the last few decades. Among the lower-level categories of the workforce, this is in fact the only sub-category that has a larger share of employment now than at the start of the 1980s, in contrast with manual workers (whether skilled or not) and with other types of (more skilled) lower-level non-manual workers (such as corporate administrative employees), all of which are shrinking (Figure II).

4. Unskilled non-manual occupations include sales employees, hotel and restaurant workers, childminders, home help workers (2-digit items 55 and 56 of the French classification). For more information on the successive suggested definitions of "unskilled non manual" workers (les employés non qualifiés), see Bisault et al. (1994), Burnod & Chenu (2001) or Chardon (2002).

Figure II
Change in the occupational structure, 1982-2018*



* Discontinuity in time series, see Box.

Reading Note: The share of employees holding skilled manual occupations in the private sector was 27.5% in 1982.

Coverage: Private sector employees.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

This progression of unskilled non-manual employees reflects the general shift in labour demand from manufacturing industries towards service sectors, as these employees hold jobs situated almost exclusively within service sectors. If we focus on these sectors, the proportion of unskilled non-manual employees has, in fact, declined since 1982, although this has been far slower than that of other lower-level non-manual employees or manual workers (Table). A deeper examination reveals that this resilience of unskilled non-manual employees is essentially due to personal service workers (including mostly hotel and restaurant workers, childminders, home help workers), whose share has remained steady in service sectors and has risen considerably in the overall employment, particularly in the period prior to 2002.⁵

Even if this phenomenon is relatively limited, it is important to try and understand the drivers behind this resilience of the personal services occupations. Indeed, taking account of this phenomenon is the main reason behind the hypothesis that technological change is contributing to the polarisation of the occupational structure, namely to the joint rise in the share of higher-level occupations and the share of some lower-level occupations.⁶

However, an alternate hypothesis posits that personal service employment has been the main beneficiary of labour cost reduction policies implemented in France since the early 1990s,

in particular in the childcare or home help sectors.⁷ Parents who employ childminders have been benefitting from a total exemption from social contributions, complemented by a partial payment of the childminder's wage and a tax reduction, since the early 1990s. Since 1993, individual employers of home help have also benefitted from significant tax reductions, which were converted into tax credits in 2007. The implementation of the service employment voucher scheme (the *chèque emploi service*) in 1994 also considerably simplified hiring procedures for private employers.

To clarify the roles played by these policies, we have split the category of personal service employees into two subcategories: one grouping together childcare and home help⁸ and the other

5. Throughout this article, we try to account for the break in the series that took place between 2002 and 2003, when the classification of occupations used in surveys was revised. This is the reason why the Table, for example, shows the changes before and after the 2002-2003 break separately.

6. Using administrative panel data (the DADS panel, which covers the employed population, excluding those employed by private employers), Berger & Pora (2017) found no trace of polarisation of the French occupational structure between 1988 and 2014. They found that the lower rank occupation in the 1988 pay hierarchy, the less its share in employment increased between 1988 and 2014. This result is consistent with the idea that the only dynamic that is potentially consistent with the technological polarisation hypothesis is that of personal service employees.

7. These different schemes led to several assessments that generally highlight a significant impact on the rate of use of the schemes or on personal service employment, even though it is generally difficult to isolate the specific role of each scheme, as there are significant overlaps (see, in particular, Flipo & Olier, 1998; Carbonnier, 2009; Marbot, 2011; Marbot & Roy, 2014). See also the meta-analysis provided by Carbonnier (2015).

8. Including domestic workers and cleaning staff employed in private households.

Table
Change in the occupational structure, by industry

	Manufacturing and construction			Tertiary sector		
	Share in 1982 (%)	Change 1982-2002 (in pts)	Change 2003-2018 (in pts)	Share in 1982 (%)	Change 1982-2002 (in pts)	Change 2003-2018 (in pts)
Higher-level occupations	6.3	+4.8	+3.8	9.8	+6.4	+4.1
Intermediate-level occupations	16.8	+4.3	+5.0	20.1	+2.4	+2.5
Unskilled non-manual occupations	1.1	+0.3	+0.4	18.5	-1.0	-0.8
of which:						
Sales workers	0.9	+0.4	+0.3	8.5	-1.0	-0.5
Personal service	0.2	-0.1	+0.1	10.0	-0.0	-0.3
Other low-level non-manual occupations	8.4	-1.4	-1.7	24.8	-4.6	-3.7
Skilled manual occupations	37.9	+4.1	-4.1	17.5	-2.2	-1.0
Unskilled manual occupations	29.5	-12.1	-3.4	9.2	-1.0	-1.2

Reading note: Between 1982 and 2002, the share of higher-level occupations (managers and professionals) in private-sector tertiary employment increased by 6.4 points.

Coverage: Private sector, excluding agriculture.

Source: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982, 2002, 2003, 2018.

grouping other personal service employees, in particular hotel and restaurant workers.⁹ In so far as the first subgroup constitutes the main beneficiary of policies supporting personal services implemented from the early 1990s to the end of the 2000s, making a comparison of the change in these two subgroups across the last four decades can give an idea of the role played by these policies.

In terms of employment, Figure III-A depicts the change in the share in employment of home help and childminders on the one hand and that of other personal service employees on the other. In addition, Figure III-B shows the change in the ratio between these two proportions. In the 1980s, the proportion of these two groups of employees fluctuated, but no clear trend emerged. From the end of the 1980s/start of the 1990s onwards, which was also when the specific policies favouring childminders and home help were first implemented, everything changed: home help and childcare jobs soared, while other categories of personal service employment continued to stagnate. Between the end of the 1980s and the

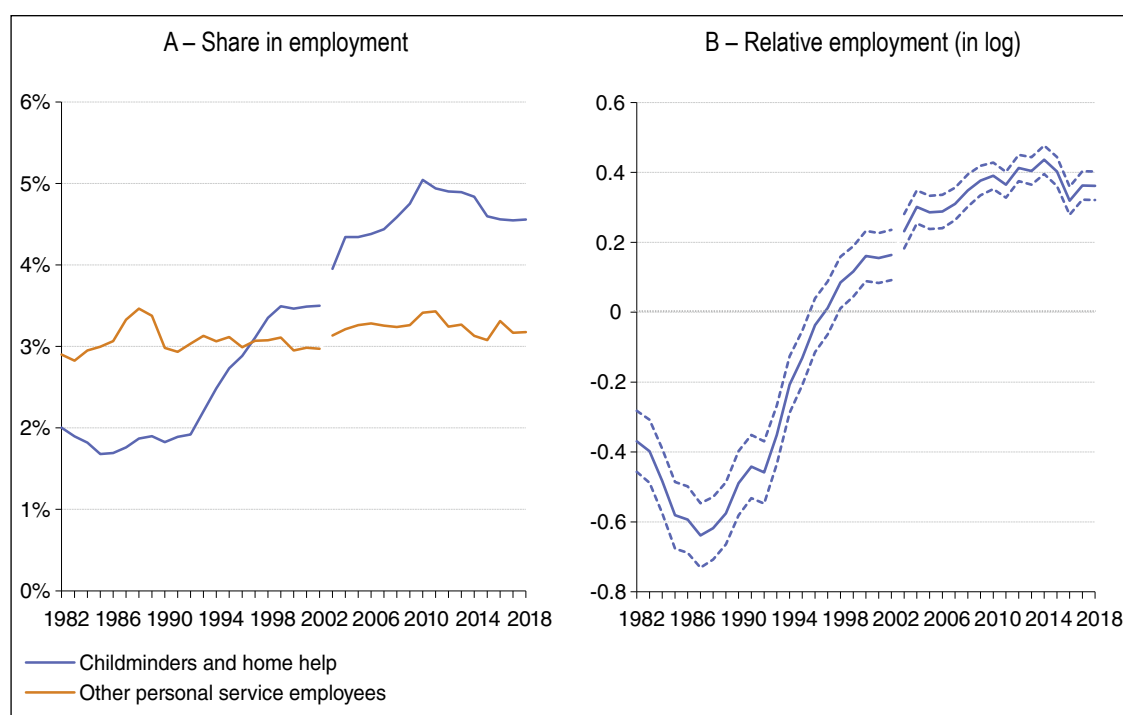
end of the 2000s, relative employment of home help and childminders doubled. Since the end of the 2000s, which coincided with the stabilisation of tax incentives, the growth experienced by these two groups of employees has plateaued, with home help and childcare employment even falling back. In 2018, relative employment of home help and childminders was still at the same level as in 2008.

Ultimately, not all forms of personal service employment have grown over the last 35 years, but primarily those targeted by public aid and only during the period in which that public aid increased.

To give a more accurate idea of the scale of this aid, Figure IV maps the change in relative labour costs (i.e. wages and social contributions) of the two subgroups after taking into account the

9. Childminders and home help covers items 563a, 563b and 563c of the PCS 2003 [occupations and socio-professional categories] (corresponding to items 5631 and 5632 of the PCS 1982). The other personal service employees are the other occupations in the two-digit item 56 of the PCS 2003 (or PCS 1982) classification.

Figure III
Employment of childminders and home help/other personal service employees, 1982-2018*



* Discontinuity in time series, see Box.

Reading note: The share of childminders and home help among employees in the private sector increased from 2% in 1982 to 4.6% in 2018. Over the same period, the share of other personal service employees increased from 2.9% to 3.2%. The log of the ratio between the share of childminders and home help and the share of other personal service employees increased from around -0.49 in 1990 to +0.16 in 2002.

Coverage: Personal service employees, private sector.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

general measures for reducing social contributions as well as the specific tax measures taken in favour of home help and childminders.¹⁰

When we look at the relative labour cost of these occupations after application of the general measures only, we see that it follows a very slight upward trend throughout the period. But when we also take into account the specific measures taken in favour of home help and childminders, the curve shows a sharp drop in their relative cost over the period from 1990 to 2007, the very period during which relative employment soared. This period saw that cost drop from -9% in 1990 to almost -35% in 2007, before stabilising between 2008 and 2018.

Ultimately, it can be tempting to interpret the increase in the share of personal service employees in overall employment as a consequence of their lesser exposure to modern technological change. However, if this hypothesis were true, this would scarcely explain why this increase was almost exclusively focused on those occupations targeted by public aid and over the period during which that public aid increased. A more credible

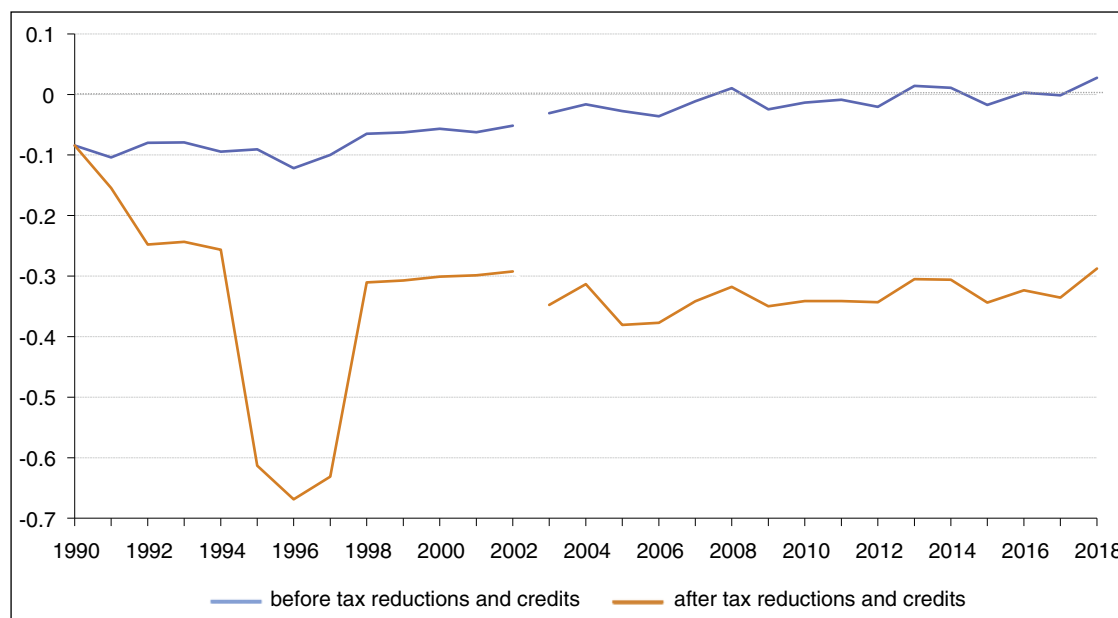
hypothesis seems to be that the share of personal service employees is very directly linked to this aid, which favours, among other things, the transition of home help and childcare jobs into the formal economy, without which they would have remained informal.¹¹ The emergence of a society in which the wealthiest fraction of the population is able to pay for the services of the most poorly paid is not an inevitable consequence of modern technological advances, but is, in many ways, a political choice.¹²

10. With the tax reductions granted to each private individual having been capped, the overall cost of home help for employers is even lower if there are several employers sharing the services of the employee (as that increases the chances of each one being below the threshold). In our calculations, we have, however, assumed that each job corresponded to a single employer, i.e. a conservative assumption in terms of the costs for employers represented by these jobs. Had we been able to consider the exact number of employers for each employee, the fall in costs would have been even greater.

11. According to Algava & Ruault (2003), the French Labour Force survey is fairly reliable to evaluate "formal" employment in the childminder sector, as shown by various administrative or tax sources. However, according to Marbot (2008), the actual increase in personal services (i.e. as estimated from data on actual household spending) represents less than half of that "formal" change. Together, these two studies suggest that the data from the Labour Force survey (or from sources such as the DADS) quite grossly overestimate the actual increase in personal services.

12. For a discussion of the drivers behind and the scope of this choice, see for example Carbonnier & Morel (2018).

Figure IV
Relative labour cost of childminders and home help/other personal service employees (in log), before and after tax reductions and credits, 1990-2018*



* Discontinuity in time series, see Box.

Notes: Between 1995 and 1997, the cap on domestic service expenditure eligible for a tax reduction was temporarily increased more than three-fold, which explains the temporary, yet significant drop in the relative labour cost of childminders and home help observed, after tax reductions and credits, between 1995 and 1997.

Reading note: Between 1990 and 2002, after application of tax reductions, the log of the ratio between the cost of employing childminders and home help and the costs of other personal service employees dropped from -0.08 to -0.29, a reduction of more than 20%.

Coverage: Personal service employees, private sector.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1990-2018.

Technological Change and the Demand for Skilled Manual Labour

Manual worker jobs are far from homogeneous. For example, in terms of socialisation and working conditions, it is very important to distinguish between manual workers in large capital-intensive companies and manual workers in small labour-intensive companies, including drivers, freight handlers or manual logistics workers.¹³ Within each of these broad categories of manual workers, it is also crucial to distinguish between unskilled and skilled workers, considering that manual workers often begin their careers as unskilled before becoming skilled workers with experience, through internal promotion, resulting in a wage gain of around 20%.

Over the course of the last 35 years, the reduction in manual worker jobs has primarily affected unskilled manual workers, especially in capital-intensive manufacturing industry. Since the mid-1990s, the fall in unskilled manual jobs has slowed down while that of skilled manual jobs has sped up (cf. Figure II and Table). These switch-ups are anything but trivial, given that they are now fuelling the technological polarisation hypothesis, according to which the new generations of technology are contributing to the destruction of more skilled jobs in favour of some of the least skilled ones.

Here again, before endorsing this hypothesis, it is worthwhile performing an analysis of the way in which employment and relative costs of skilled and unskilled manual workers have changed. In order to reach the conclusion that technological change is intrinsically detrimental to skilled manual workers, the share of skilled manual workers would have to drop when compared with that of unskilled manual workers without an increase in the relative costs of the former.

To explore this question, Figure V-A firstly maps the change (in the log) of relative costs of skilled and unskilled manual worker jobs for the period between 1990 and 2018. The Figure shows that the relative cost of skilled and unskilled manual jobs remained very stable over this period: the reductions in social contributions targeted at the lowest paid jobs contributed to maintaining the cost of skilled manual workers at between 20% and 25% higher than the cost of unskilled manual workers. We can also add that, over the same period, changes in employment adjustment costs were no longer particularly favourable towards skilled manual workers, as the share

of short-term labour contracts (easier to create and remove) increased more slowly for skilled manual workers than for unskilled manual workers (especially over the period between 1990 and 2002; see for example COE, 2014).

Throughout this period, which saw the relative labour costs change in a way that was unfavourable to skilled manual workers, the change in the ratio between their numbers and those of unskilled manual workers gives a very direct image of the impact of demand factors and, in particular, technological factors, which affected the demand for manual worker skills within companies. However, Figure V-B shows that, after having increased significantly during the 1980s and early 1990s, this ratio stabilised, with the share of skilled manual workers in overall employment remaining around 70% higher than that of unskilled manual workers over the last twenty years. In other words, the change in the proportion of skilled workers among manual workers is fully consistent with the hypothesis of a technological change that was unfavourable towards unskilled workers until the mid-1990s, but it is not consistent with that of a change that was unfavourable towards skilled workers after that date.

For unskilled manual workers, skilled manual worker positions often represent a chance of internal promotion within their company, involving new supervision and control tasks. However, nothing seems to indicate that technological change has recently caused the substitution of unskilled manual workers for skilled manual workers within firms, which would have occurred if the digitalisation of production processes had made skilled manual workers more productive in carrying out their specific supervision and control tasks.

Eventually, we can highlight that two types of technological developments can affect the share of skilled workers among manual workers: technological changes affecting the distribution of the demand for skilled labour within each industry on the one hand (automation of production in the automobile industry, for example) and, on the other hand, technological changes affecting the distribution of the demand for labour across more or less skill-intensive industries. To separate, at least roughly, the two types of mechanisms, it is possible to break down the change in the share of skilled workers among manual workers

13. The French classification of occupations makes a distinction between "ouvriers de type industriel" and "ouvriers de type artisanal".

into two components: (i) the weighted average change in this share within the various industries (the “intra” component) and (ii) the change in the share due to the shift of manual employment between industries (the “inter” component).¹⁴ When we carry out this breakdown exercise, we see that the stability of the share of skilled workers among manual workers since the start of the 1990s is the result of two opposing trends that balance each other out, namely an increase in the skill level of manual worker within industries offset by a shift in manual worker employment towards less skill-intensive industries. Over the course of the preceding period (1982 to 1993), the sharp increase in the skill level of manual workers was entirely explained by intra-industry shifts and the significant increase in manual worker skills within industry. Ultimately, if the proportion of skilled workers among manual workers stopped increasing by the 1990s, it is only because jobs began shifting towards industries that were less demanding in terms of manual worker skills.

In addition to their effects on skill levels, inter-industry shifts also generated a major reconfiguration of manual worker employment: these jobs are decreasingly carried out in large capital-intensive companies and increasingly within small labour-intensive context.¹⁵ In forty years, the share of skilled workers in large capital-intensive

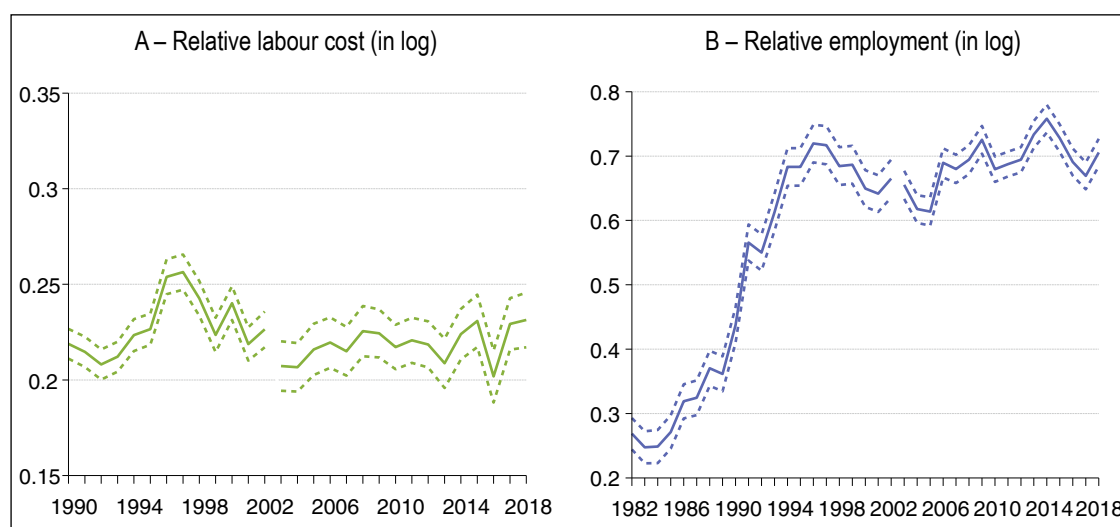
companies has dropped almost four times more quickly than that of skilled workers in small labour-intensive companies (-37% vs -11%), while the share of unskilled workers in large capital-intensive companies has dropped 1.5 times quicker than that of unskilled workers in small labour-intensive companies (-54% vs -36%). These basic changes in working contexts are transforming the way in which manual workers are susceptible to union or political mobilisation¹⁶.

14. Denoting p_{Qt} the share of skilled employment in manual employment at t , p_{st} the share of industry s in manual employment at t and p_{Qst} the share of skilled employment in the manual employment of industry s at t , we can write: $p_{Qt+1} - p_{Qt} = \sum_s (p_{Qst+1} - p_{Qst}) p_{st} + \sum_s (p_{st+1} - p_{st}) p_{Qst+1}$, with the component $\sum_s (p_{Qst+1} - p_{Qst}) p_{st}$ capturing intra-industry changes while component $\sum_s (p_{st+1} - p_{st}) p_{Qst+1}$ measures the inter-industry changes. One of the difficulties of this exercise is that the French classification of industries has changed over time. To overcome this difficulty, we have used the NAP 1973 classification grouped into 38 positions for the period 1982 to 1993, the NAF 1993 grouped into 36 positions for the period 1994 to 2008 and the NAF version 2 2008 grouped into 38 positions for the period 2008 to 2018 i.e. the number of sectors has remained between 36 and 38 over the course of the study period.

15. In the following, we measure the share of (skilled or unskilled) manual workers in large capital-intensive contexts by aggregating (skilled or unskilled) occupations that fall in the “ouvriers de type industriel” broad category of the French classification. Conversely, we measure the share of manual workers in small labor-intensive contexts by aggregating (skilled or unskilled) occupations that fall in the “ouvriers de type artisanal” broad category of the French classification.

16. For more on this reconfiguration of manual employment that began at the start of the 1980s, see for example Maurin (2002). See also the survey conducted by Beaud & Pialoux (1999) at Peugeot’s Sochaux factories, which describes the rift between the generations of manual workers created by the sudden disappearance of the unionised and politically organised “working class” and the access of the new generations of manual workers to longer secondary education.

Figure V
Skilled/unskilled manual workers, 1982-2018*



* Discontinuity in time series, see Box.
Reading note: Between 1990 and 2018, the log of the ratio between the cost of employing skilled manual workers and the cost of employing unskilled manual workers fluctuated between 0.21 and 0.26. In 1990, the log of the ratio between the share of skilled manual worker jobs and the share of unskilled manual worker jobs rose to 0.46.
Coverage: Manual workers employed in the private sector.
Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

The Rise in Intermediate-Level Occupations

While the proportion of skilled workers among manual workers has remained stable over the last thirty years, the proportion of manual workers in employment has dropped sharply, as that of lower-level non-manual employees, especially if we exclude personal service employees, the specific momentum of which depends, as we have seen, on political choices.

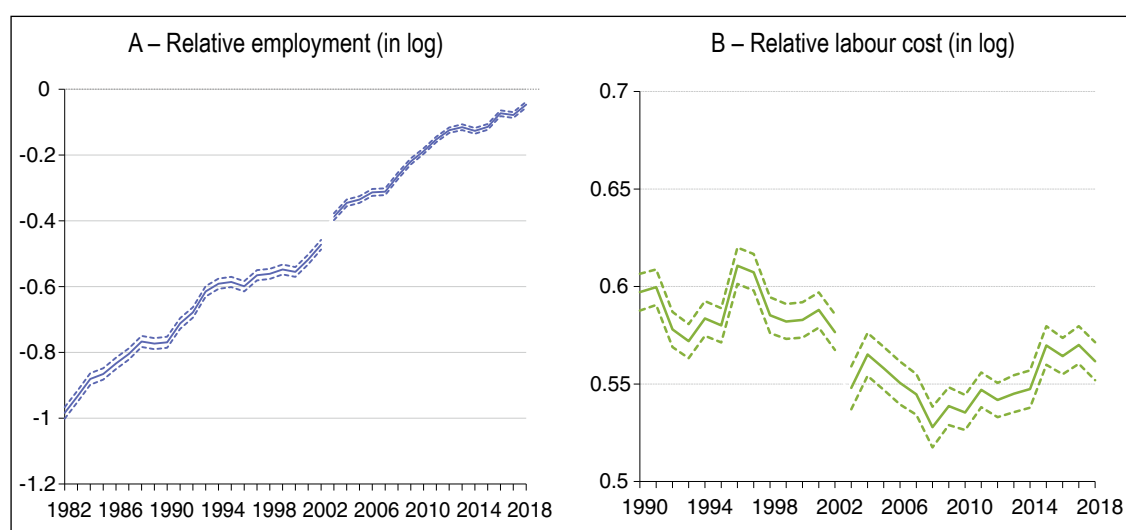
To better quantify this shift towards intermediate- and higher-level occupations, Figure VI-A maps the change in the ratio between the number of employees in these occupations and the number of manual workers and the number of employees in lower-level occupations, between 1982 and 2018. This Figure confirms that this ratio has been increasing continuously for 35 years, from around 1/5 at the start of the 1980s to almost 1/2 today. In contrast, over the period between 1990 and 2018 (during which wages were observed in the Labour Force surveys), the relative costs of these two groups remained very stable, as shown by Figure VI-B. Taken together, these two figures suggest that the main cause of the major shift that is transforming society lies in the change in labour demand, which has seemingly been changing almost continuously in

favour of intermediate- and higher-level jobs, to the detriment of manual workers and lower-level non-manual employees.

One idea often advocated today is that technological change is contributing not only to the destruction of lower-level jobs, but also to that of intermediate-level jobs (see for example OECD, 2019). Firms are now allegedly sacrificing their intermediate-level jobs increasingly in favour of higher-level jobs exclusively, i.e. managers or engineers. However, this is not exactly what Figure VII suggest. They show that higher-level positions increased significantly more rapidly than intermediate-level ones only until the early 2000s (Figure VII-A). Since then, the difference has closed up substantially, with intermediate-level positions now increasing almost as quickly as higher-level positions, while the relative costs of these two groups remain very stable (VII-B). In other words, the digitalisation of firms and the spread of new generations of communication technologies since the start of the 2000s do not seem to be having a detrimental effect on intermediate-level occupations (especially technicians). Instead, they even seem to favour these middle-class positions more than the previous generations of technology.

Catastrophist discourses about the decline of middle classes often uses an extensive definition

Figure VI
High- and intermediate-level occupations/lower-level occupations, 1982-2018*



* Discontinuity in time series, see Box.

Reading note: The log of the ratio between the share of high- and intermediate-level occupations and the share of lower-level occupations increased from around -0.98 in 1982 to -0.47 in 2018. In 1990, the log of the ratio between the cost of higher- and intermediate-level occupations and the cost of lower-level occupations was 0.6.

Coverage: Private sector employees (excluding personal service employees).

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

of them, aggregating social groups that are as disparate as associate professionals and skilled manual workers (or lower-level corporate administrative workers). Such an extensive definition leads to a mix-up of categories that have nothing in common in terms of their exposure to technological change (as we have seen) and nothing in common in terms of autonomy at the workplace or exposure to economic insecurity.¹⁷ This approach ultimately leads us to foresee the end of middle classes when what is actually happening is a reconfiguration of the lower strata of the society. Taken in the original sense, i.e. as social classes of transition between lower strata (including farmers, manual workers and lower-level non-manual employees) and the upper strata (managers, engineers, company directors), the middle classes have never been so dynamic.¹⁸

Change in Labour Supply vs Change in Labour Demand

Ultimately, the major effect of technological change has remained more or less the same for close to forty years, namely a transformation in labour demand in favour of jobs requiring higher skills, to the detriment of less skilled jobs, such as those of manual workers and lower-level non-manual employees. To what extent is this shift contributing to unemployment among those

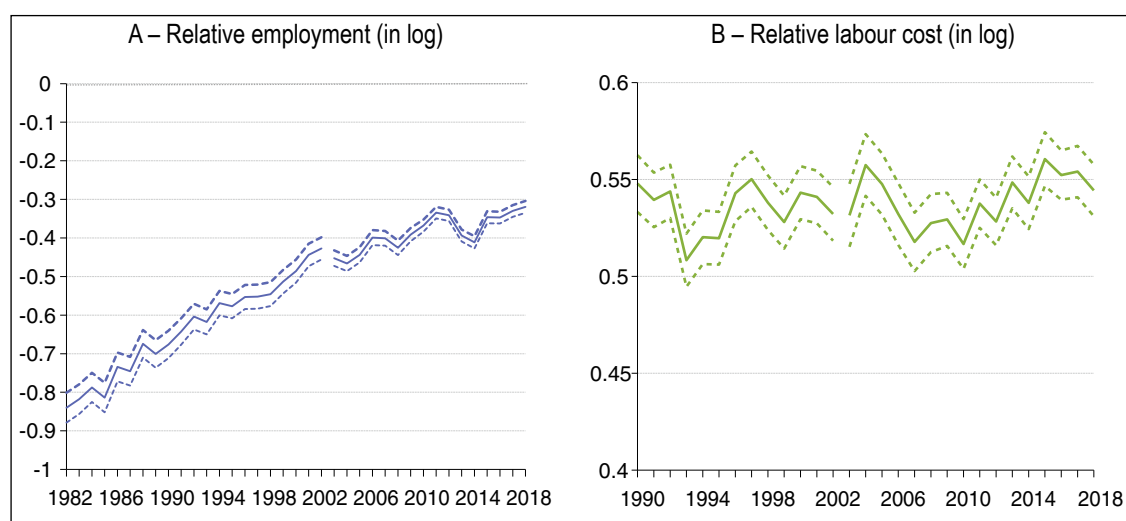
with the lowest levels of education and to their persistent difficulties in accessing work? And to what extent is this shift protecting those with the highest levels of education from the risks of occupational downgrading?

The answer to these questions depends greatly on the speed at which the proportion of graduates increases in the population of working age. The quicker this increase compared with the number of higher- and intermediate-level positions, the more graduates will be exposed to downgrading to lower-level occupations. And the greater the effective downgrading of employees with the highest levels of education, the greater the risk of unemployment for those

17. Over the last few decades, the unemployment rate among intermediate-level occupations has remained at around 5% while that among skilled lower-level employees (manual or non-manual) has fluctuated throughout economic cycles at levels close to twice as high, around 9% (Insee, 2018b). Within companies, lower-level employees are substantially more exposed to job insecurity than intermediate-level employees, even when we focus on the most skilled lower-level employees. They have less autonomy in their work and are much more likely to have to repeat the same actions and operations on a continuous basis (Beque et al., 2017). The differences in status are also shown in how they are allowed to use new technologies – even the more skilled ones – are much less likely to use connected digital tools (in particular portable tools) than intermediate-level workers (Mauroux, 2018).

18. For more on these issues, see for example Goux & Maurin (2012). For more on the definition of the middle class as a crossroads of mobility between the working classes and upper classes, see Simmel (1896). For more on manual workers and lower-level non-manual employees forming heterogeneous “working classes” undergoing transformation but still increasingly distinct from intermediate-level and higher-level occupations, see Siblot et al. (2015).

Figure VII
Higher-level/intermediate-level occupations, 1982-2018*



* Discontinuity in time series, see Box.

Reading note: In 1982, the log of the ratio between the share of higher-level occupations and the share of intermediate-level occupations was -0.84. Between 1990 and 2018, the log of the ratio between the labour cost of higher-level occupations and the cost of intermediate-level occupations fluctuated between 0.51 and 0.56.

Coverage: Higher-level and intermediate-level occupations, private sector.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

with the lowest levels. In a country where political choices are keeping the relative costs of the different types of labour inputs very stable, the supply and demand of labour is, in fact, adjusted essentially by rationing access to higher- and intermediate-level occupations for the most educated workers and access to any form of employment for the least educated ones.

To clarify these questions, Figure VIII shows the change in the proportion of high-school graduates (*baccalauréat* holders) among the population aged between 25 and 65 and shows that this almost tripled between 1982 and 2018, rising from around 20% to 55% over the period. At the start of the 1980s, there were four times as many high-school dropouts as high-school graduates in France.¹⁹ However, by 2018, that ratio had completely flipped; there are now 20% more high-school graduates as high-school dropouts. Over the same period, the proportion of higher- and intermediate-level positions rose from 30% to around 45%, as Figure VIII shows. In other words, technology is increasingly developing in favour of intermediate- and higher-level employment, but the supply of graduates is increasing even more quickly.²⁰ Without a doubt, the creation of higher- and intermediate-level positions

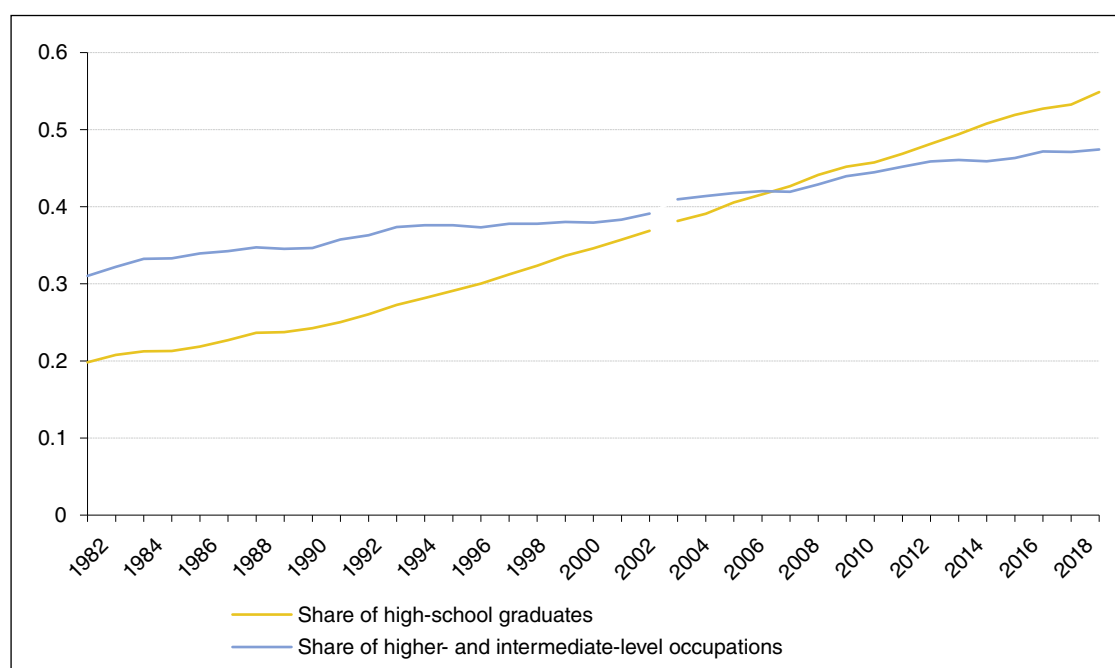
requires a supply of new graduates on the labour market; however, this condition is not sufficient: there is not one additional such positions for each additional graduate arriving on the labour market, especially in the short run. This results in a surplus of graduates and unprecedented risks of graduate downgrading, which are very specific to the periods of education expansion.

This surplus of high-school graduates can have two different consequences depending on the degree of competition between high-school graduates and high-school dropouts. If there is little competition, if high-school graduates tend to take higher- and intermediate-level jobs only, the gap in unemployment across high-school graduates and high-school dropouts could narrow as high-school dropouts will each have access to a growing number of job opportunities (as their

19. The term "high-school graduate" refers to people who have a *baccalauréat* degree and we use the term "high-school dropout" to refer to people who do not have a *baccalauréat* degree. In France, the *baccalauréat* is the secondary school leaving diploma that gives access to higher education.

20. The diagnosis is qualitatively similar if we focus on the rise in the number of college graduates: at the start of the 1980s, there were nine times fewer college graduates than people without a university degree, while in 2018, it is no more than 1.7 times fewer, i.e., a reduction by more than 5 of the ratio.

Figure VIII
Change in the supply high-school graduates and the demand for skilled work, 1982-2018*



* Discontinuity in time series, see Box.

Reading note: The yellow curve shows the change in the proportion of high-school graduates (*Baccalauréat* holders) among 25-65-year-olds while the blue line shows the proportion of employees who hold higher-level or intermediate-level occupations.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

number is dropping relatively more rapidly than the number of low-skilled jobs). Conversely, however, if competition is high, if graduates do not hesitate to apply for lower-level jobs to avoid unemployment, we could see an increase in the downgrading of graduates to lower-level positions, which could induce a rise in employment inequality between high-school graduates and high-school dropouts. Figures IX and X suggest that this latter scenario is the one currently at play, with an increase in both the downgrading of the most educated people and the persisting problems of access to employment for the least educated.

Figure IX therefore shows the change in the probability of high-school graduates and high-school dropouts holding lower-level occupations. It also describes the change in the difference (of the logs) of these two probabilities (using the difference value from 1982 as the reference) i.e. a measure of the change in the relative exposure of graduates to low-level positions.²¹

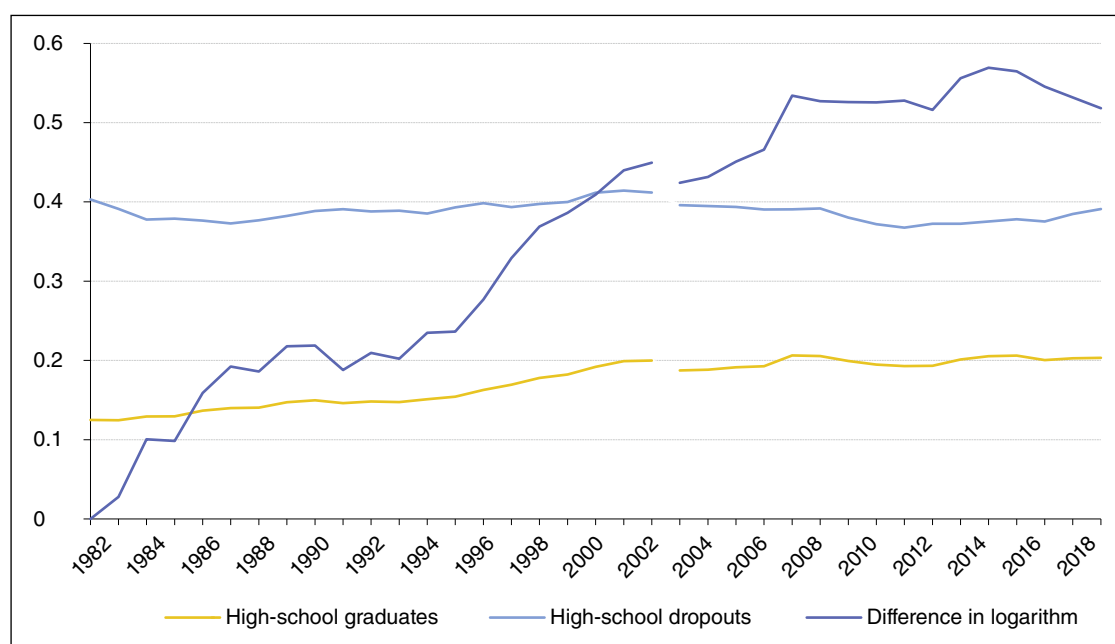
Among high-school dropouts, Figure IX shows that the proportion of employees holding lower-level occupations has remained stable (around 40%) throughout the period. Conversely,

for high-school graduates, the same proportion has almost doubled (from 12% to 20%) over the period, which ultimately translates into a very sharp increase in the relative exposure to lower-level employment positions (twice as high at the end of the period than at the start). As the number of high-school graduates is increasing even more rapidly than the share of higher- and intermediate-level positions within employment, those individuals are increasingly required to perform lower-level jobs.

By depriving high-school dropouts from some of their job opportunities, these downgrading shifts are contributing to maintaining strong employment inequality across the most and the least educated workers. Figure X shows the probability of being unemployed for high-school graduates and high-school dropouts: for the latter, the likelihood of unemployment was much higher at the end of the period than at the start, while the reverse is true for the more educated workers. In addition

21. For a discussion of the different possible ways of measuring occupational downgrading (the French term is *déclassement*) and how this is linked with the economic situation, see Nauze-Fichet & Tomasini (2002). For a discussion of the possible effects of the increase in the risks of downgrading on graduates' occupational choices, see Maurin (2009).

Figure IX
The rise in the occupational downgrading high-school graduates 1982-2018*



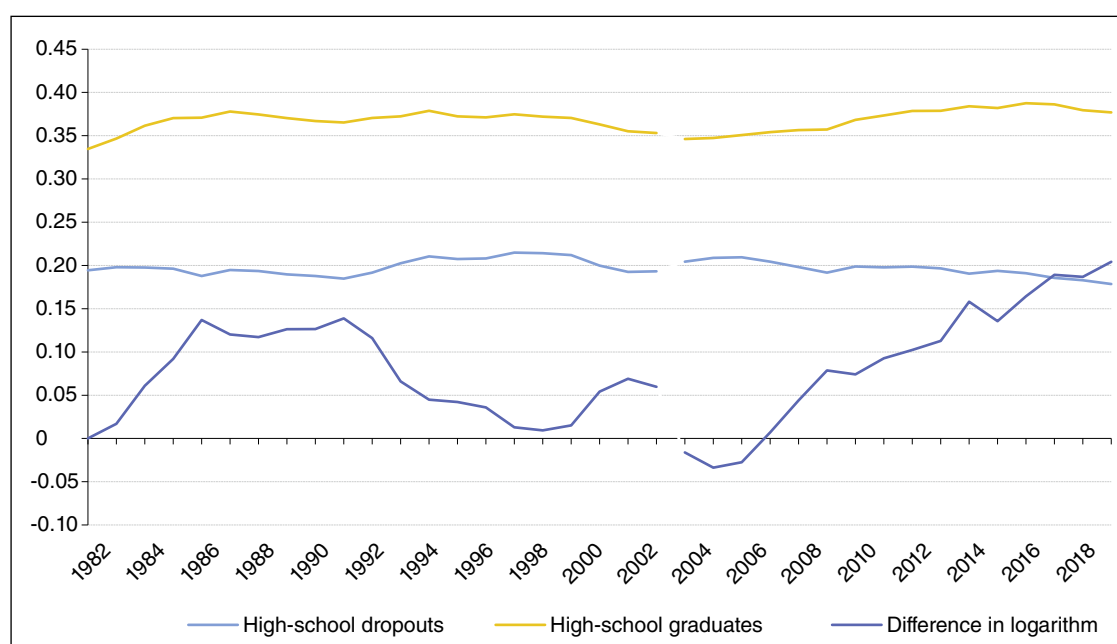
* Discontinuity in time series, see Box.

Reading note: In 2018, 20% of high-school graduates (*Baccalauréat* and over) held manual or low-level non-manual occupations compared with 39% of high-school dropouts. The log of the ratio between these two percentages rose by +0.52 between 2018 and 1982.

Coverage: Individuals aged between 25 and 65.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

Figure X
Persistence of employment inequality between high-school graduates and high-school dropouts, 1982-2018



Reading note: In 2018, 18% of high-school graduates (*Baccalauréat* and over) were not in employment compared with 38% of high-school dropouts. The log of the ratio between these two percentages rose by +0.20 between 2018 and 1982.

Coverage: Individuals aged between 25 and 65.

Sources: Insee, Labour Force Surveys (*enquêtes Emploi*), 1982-2018.

to very large fluctuations across the business cycle, employment inequalities across education groups (as measured by the ratio between their unemployment probabilities) appeared to be much higher in 2018 than at the start of the 1980s (Figure X). This is ultimately the paradox of the education expansion scheme in France: it comes hand-in-hand with a reduction in the apparent returns on education in terms of wages, but an increase in terms of access to employment.

* *
*

At the end of this analysis, it seems difficult to categorise the changes in the French occupational structure as a process of polarisation that will ultimately lead to the disappearance of intermediate-level occupations. In reality, these occupations (who make up the core of the middle classes) have never been as dynamic and now form the main social group in France. What is happening is not a disappearance of the middle classes, but a reconfiguration of the lower-level strata of the occupational structure, whose jobs are decreasingly carried out in large capital-intensive

firms and increasingly within small labour-intensive context. Whilst their employment share drops and becomes a minority, the lower-level strata of the workforce are witnessing a change in the context in which they work, with significant consequences on the conditions of their unionised or political mobilisation.

On a deeper level, in terms of interpretation as opposed to description, it is also difficult to see the change in employment in France as an expression of a polarisation mechanism brought about by technological change. The joint change in the structure of costs and the structure of occupations suggests that technological change is still, in reality, almost systematically favourable to the most skilled jobs, even among manual workers or among lower-level non-manual employees. Although personal service jobs have experienced spectacular progress, this has essentially taken place during periods and in specific sectors where these occupations have benefitted from significant public aid. However, this aid plateaued over the past ten years and the share of these lower-level jobs stopped increasing, even starting to decline.

Finally, in a country where the relative costs of labour inputs have remained very stable and over a period in which the influx of graduates has

been faster than the increase in the demand for skills, we have shown that the adjustment in the supply and demand of labour has resulted in the rationing of access to higher- and intermediate-level occupations for high-school and college graduates and of access to any employment for high-school dropouts. This has led to an increase in the down-grading of graduates to lower-level occupations and persistent, very high levels of unemployment among high-school dropouts.

As a final point, we wish to highlight that it would not have been possible to carry out this long-term analysis of the French occupational structure if we had not had access to measurement tools that are comparable over time, such as the Labour Force surveys and the French classification of occupations (the “PCS” and its various levels of aggregation). In our view, it is crucial that this comparability over time be maintained in the future. □

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