



Ageing, changes, and quality of working life

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TEPP - Institute for Labor Studies and Public Policies
TEPP - Travail, Emploi et Politiques Publiques - FR CNRS 3435

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We acknowledge the financial support of the French National Research Agency (ANR) for this research that is part of the COI-COSA project.

September 2012

Abstract

The aim of this chapter is to examine whether company level changes affect differentially the quality of working life according to employees' age. We use data from a French linked employer-employee survey. The quality of working life is captured through three dimensions: the feeling of fair work recognition, the opportunity to learn new things at work and the feeling of work overload. We find that the impact of changes in the use of ICTs and management tools on the quality of work life of older workers have a less negative impact than expected. Our indicator of fair work recognition is the only one that is found sensitive to changes, with a lower frequency in changing firms compared with inert ones. This difference is not explained by differences in observable characteristics of older workers employed in the two types of firm. It is rather due to a differing contribution of employment relations and work organisation characteristics in shaping the balance between effort and reward in both contexts.

Keywords: Organisational change, ICTs, older workers, quality of working life, fair work recognition, linked employer-employee survey, COI survey.

JEL codes: J81, J28, J14, L23, O33

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The issue we would like to deal with stems from a contradiction which could arise from three phenomena. These phenomena, if confirmed, are hardly compatible, and might become less and less so in the future: i) changes in technologies and work organisation modes tend to accelerate; ii) the working population in industrialised countries is shifting to older ages; iii) but these frequent changes are known as “age-selective”: they supposedly reinforce ageing workers’ deficiencies, alter the benefits of their experience and therefore the quality of their working life.

We shall not dwell here on the first observation: the search for flexibility in corporate structures and the growing frequency of technical or organisational changes. This issue is widely developed in other chapters all along this book.

The second one is well grounded also. The overall ageing of the workforce in industrialised countries is general and ongoing, even though its magnitude and timing may vary from one country to another (OECD, 1998). It is mainly due to the evolution of birth-rate in the second half of the twentieth century: the high birth-rates following the Second World War dropped after 60s. The forties, fifties and sixties age groups are the largest in number. This factor accounts in itself for an ageing of the demographic structure in the labour force. Furthermore, the oldest in these groups have reached or are about to reach retirement age. Given their number, and the increase in life expectancy, this raises a pension funding problem. In many countries, due to this need for funding, public policy aims at promoting active ageing by lengthening professional life and raising the employment rate of “senior workers”.

For both these reasons, the third statement (changes in technologies and organisation are “age-selective”) is worth a more in depth study. Therefore, the aim of this chapter is to examine whether the changes implemented by firms affect differentially the quality of working life according to employees’ age. The quality of working life is captured here through three dimensions: the feeling of fair work recognition, the opportunity to learn new things at work and the feeling of work overload.

1. Ageing and changes: main concerns

To begin with, we may recall that the problems encountered by ageing workers in these situations constitute one of their negative characteristics in the eyes of many employers. Employers’ assessments of older workers vary according to economic conditions and the tensions on the employment market, but surveys in different countries and at different times have identified recurring views that are widely accepted though nonetheless difficult to justify: the fears of employers first of all concern the supposedly negative attitude of older workers to change, and the difficulty they experience in learning new skills. Reduced physical capacity is also mentioned, but less often. In the context of changing technologies and organisations, these negative opinions are a major handicap for older people.

This has been documented in various periods and countries. A pioneer study in that field has been conducted in the US by Rosen and Jerdee (1977). They proposed to 6 000 subscribers of the *Harvard Business Review*, a series of virtual human resources managing exercises, with two versions of the questionnaire, the only change being the age of the employee concerned. It appeared that when the employee was supposedly old, fewer managers considered she was able to change her behaviour, or found it reasonable to send her

to a training course. In the UK during the 90s, according to Walker and Taylor (1992), 43% of employers thought that the elderly had “difficulties to learn”, and 40% thought that they could not “adapt themselves to new technologies”. More or less the same percentages have been found more recently in a survey carried out by the French Ministry of Employment (Defresne, Marioni, & Thévenot, 2010): 42% of employers answered that employees aged 50 or more were disadvantaged as for their “capacity to adapt to new technologies”, comparatively to younger ones (the criticisms are however counterbalanced by qualities they are recognised to possess: experience and know-how, professional dedication).

These problems are echoed – which perhaps exacerbates them - in the reluctance of elderly employees themselves, or at least part of them to adapt to a changing workplace. Difficulties linked to the characteristics of the new technology or organisation, and some specific anxiety in apprenticeship situations, intermingle and reinforce each other, leading to a deterioration in the quality of their working lives, as it has been shown for example in a field research, conducted among employees of an important town in Finland (Hukki & Seppala, 1992).

Knowledge about functional developments with ageing cannot on its own explain the problems faced by older workers when the nature of their job actually changes, or in learning situations. Work psychology provides some explanation for their reluctance, suggesting fears for their jobs, worries about damaging equipment, apprehension when faced with learning situations and competing with younger employees (Marquié, Thon, & Baracat, 1994). Furthermore, the literature in ergonomics shows the advantages older employees could derive from familiarising themselves with the task, and with the consistency between its various components, in order to avoid excessive stress on basic mental processes (Delgoulet & Marquié, 2002).

All these studies emphasise therefore the characteristics of the new technology itself, the conditions of the changes or training, and the way in which these changes and learning situations are prepared and conducted. When “apprenticeship conditions” are sound, change even appears as a resource for the elderly. It helps them avoiding some wear and tear in physically demanding jobs, produces cognitive stimulation (Marquié, Rico Duarte, Bessières, Dalm, Gentila, & Ruidavets, 2010), reinforces their feeling of self-efficacy (Reed, Doty, & May, 2005) and favours the wish to work longer.

Keeping in mind these aspects of age/change relationship, we intend here to analyse the differences (or similarities) between young and elderly employees, in their exposure to technological and organisational changes, and in the links between this exposure and the quality of their working life. These analyses will be achieved by using the French linked employer/employee survey about organisational changes and computerisation (COI survey). We shall build our hypotheses and interpret the results by referring to research in ergonomics and work psychology, as mentioned above. After having presented the data and the measurement frame (§2), our main questions will deal with the actual existence of age-related selection effects linked to changes in companies (§3), and their general relations with well-being at different ages (§4), then with various factors which might reinforce or soften these relations (§5). To conclude (§6) we shall insist on some ways of action, at corporate level, which these results suggest.

2. Data and measurement frame

The COI survey is a linked employer employee survey on organisational change and computerisation. The employer section of the survey seeks to identify changes in

organisations and examine how they mobilise a wide range of management tools such as just-in-time or quality certification, or Information and Communication Technologies (ICTs) such as enterprise resource planning (ERP) or e-commerce. Indeed, when a manager implements a new tool based on a management concept, he or she has the intention to modify the way the company operates and the implementation itself is a measure of organisational change. The COI survey captures changes that occurred between 2003 and 2006 in a representative sample of private sector French companies with 20 employees and more. From this part of the survey, we compute two composite indexes of change, measuring respectively the cumulative implementation of management tools (out of a list of 13 tools) and of computer tools (out of a list of 15 tools). Descriptive statistics on employer use of ICT and managerial tools in 2003 and 2006 are given in the table in appendix 1 (see also, Bigi, Greenan, Lanfranchi and Hamon-Cholet, 2012). We discretise the two composite indexes to distinguish firms with no or only marginal change in each dimension from firms with ICT or managerial changes respectively. Finally, we build a typology of employers' changes in five categories: inertia, ICT and/or managerial changes, ICT changes only, managerial changes only, ICT and managerial changes. We work with a total sample of 6342 firms.

The employee section of the COI survey has a threefold objective: capture employee's perspective on organisational change, collect data on both the job and the employee and measure employees' experiences and outcomes within the firm. The employer and employee samples are the result of a two stage sampling frame. A list of employers has first been randomly selected and postal questionnaire were sent in 2006. Responding firms have then been identified in a linked employer/employee register from which small random samples of employees (between two and fifteen) have been selected. Then telephone or face to face interviews with employees took place. In this research, we are going to analyse the work experience of employees that were still affiliated with the same firm at the time of their

interview, which took place around one year after they were selected (and the firm was interviewed). They are thus representative of rather stable employees, with at least one year of seniority in our sample of firms. In our analysis, we use weighted statistics and take into account the complex sampling frame in order to ensure the representativity of our results.

3. Age related selection linked to changes?

A couple of decades ago, surveys on technology and work organisation in France showed that ICT use decreased significantly with age, including when taking into account the influence of other variables such as gender, nationality, occupation or educational attainment (Moatty, 1993). This observation, also valid for the use of industrial robots (Marquié & Baracat, 1998), raised two questions, related to one another: Did it reflect a generation effect, because the employees with average age at that time, had not been academically trained in these technologies? Were these disparities specific to technological innovations, or were they also observed for other types of company transformations: changes in product range, in strategy, in organisation?

Since then, many other results have confirmed this general trend. Thus, the five-year survey of the Dublin Foundation found that between 1995 and 2000 the proportion of European workers - in the EU15, at that time - who declared that they “never” used computers at work, had certainly declined between the two dates, but continued to show definite differences by age group (Molinié, 2003). These differences were noted again in the 2005 survey (Parent-Thirion, Fernandez Macias, Hurley, & Vermeylen, 2007; Villosio, 2008), and these authors also highlight other disparities between ages groups for different types of “new” work practices, with a downward trend from the age of 40 to 45 years: Internet use, for example, but also job rotation, access to training, or learning opportunities at work.

The first step of our analysis must therefore be to examine how our own data confirm this differentiated distribution of the workforce by age, with regard to forms of “change”. Considering the usual age thresholds in the literature on aging and the labour market we distinguish two age groups of sufficient size to go deeper into the analysis: up to 45 and older than 45 years of age. The second group of employees is the less numerous in our sample, with 4363 observations whereas the first group adds up to 9738 observations. Table 1 gives the distribution of firms and employees according to the type of change implemented by the employer between 2003 and 2006, as well as the share of older employees for each category of firm in this distribution.

Table 1: Distribution of types of changes at the employer level over the samples of firms and employees

Type of change at the employer level	% firms (among the whole sample)	% employees (among the whole sample)	% employees over 45 (among employees in this type of firm)	Number of firms employees in samples
No or only marginal changes	73	61	34	4071 8669
ICT changes only	15	20	30	1202 2798
Managerial changes only	7	11	36	493 1390
ICT and managerial changes	5	8	33	576 1244

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE

Coverage: Private sector French firms with 20 employees or more, employees with at least one year of seniority, weighted statistics.

Firms with no or only marginal changes are the more numerous in our sample. We will describe them as *inert*. They represent 73% of firms and their workforce gathers together 61% of employees. Compared with the mid 90s covered in the previous edition of the COI survey,

the turn of the century seems to be characterised in the French competitive sector by a distinct deceleration of the dynamics of change, leading to a higher incidence of inertia (Greenan & Walkowiak, 2010). We observe that the most frequent type of employer change involves only new ICTs: 15% of firms are in this category and their workforce represents 20% of employees. They are on average larger in size than inert firms. Firms that implemented managerial changes only and both managerial and ICT changes are respectively 7% and 5%. When we compare the share of older employees in the four types of firm, we note slight differences. In fact, we observe only two statistically significant differences: between firms with ICT changes only and firms with managerial changes only on the one hand (at the 5% level); between the former and firms with no or only marginal changes (at the 10% level) on the other. Except for firms with ICT changes only, these differences are too small on the whole to reflect a significant age selection process related to the employer changes that we measure.

As a matter of fact, the time period we cover with this survey has been seldom explored with quantitative data. Most of the results available in the literature, including some of the ones we quoted above, rest on survey data that was collected in the mid 90s. The beginning of the millennium is a different time period in many respects: first, the computer literacy issue is less acute as most of the older generation in employment has been accustomed to working in a computerised work environment, second ICT changes that occurred at the turn of the century have more to do with software than with hardware, third managerial changes are more related to transversal issues in organisations like optimising overall processes or improving relations with customers and suppliers than focused on a given area like production. These results could mitigate the age selection process observed in the period of rapid changes of the mid 90s, and in particular the rapid ICT changes linked to the diffusion of the Internet.

4. Changes and quality of working life, according to age

Episodes of change in a workplace may be experienced differently by older workers and younger (Marquié & Baracat, 1998). These differences derive both from earlier career paths and from future prospects. On the one hand, indeed, initial training is more recent for younger workers. It could enable them to acquire knowledge about emerging technology. Knowledge of older workers, in contrast, is more likely to be considered obsolete, or even to be really difficult to mobilise, when work methods are heavily modified. This disadvantage is particularly marked when their professional trajectory was relatively poor in opportunities to grow and learn.

On the other hand older and younger workers are not at the same point in their career, and therefore do not have the same outlook. For young people a change can be a turning point for a route to come. The elderly have a greater probability of reaching an end position, or at least limited opportunities for advancement. Worse, they have more reason to fear that a change is a prelude to restructuring, with potential implications for their jobs and skills. It may happen, probably more often for older workers, that a new situation "calls into question the psychological, cognitive and relational balances, previously acquired, sometimes dearly" (Paumès Cau-Bareille & Marquié, 1998). The transformation of work may, for these workers, generate a subjective impact in terms of degradation of self-image, with the fear of having to "start from scratch", at a moment in their working life when they are not ready for it. Based on these elements, we can expect that membership in a changing workplace can contribute rather positively to the quality of work life for young workers, and rather negatively for older workers.

We are going to consider three different employee outcomes in our analysis of the quality of working life, which cover complementary dimensions of work experience: the feeling of fair work recognition, the opportunity to learn new things at work and the feeling of work overload.

The precise formulations for the questions and item response from which these three binary variables derive are given in appendix 2. These questions are asked towards the end of the questionnaire after the employee has described her job and the main characteristics of work organisation. The first question to appear is the one about opportunities to learn new things at work, in a section of questions about skills development. The question on work overload comes in the last section of the questionnaire where the employee is asked to give a general review of his work experience. The question on fair work recognition is the last question which aims at synthesising the balance between effort and reward with a reference to fairness of treatment: does the employee feel that his contribution is justly valued by the employer?

71% of the employees covered by the survey indicate that their job gives them “opportunities to learn new things”, 27% have to cope with work overload “every day” or “at least once a week” and 44% have a feeling of fair work recognition (Table 2). When we break down these statistics between the two age groups we consider, we note that the older employees report less learning opportunities at work, less frequent feeling of work overload and more recognition for their contribution than younger ones.

Table 2: Quality of working life and age

%	Feeling of fair work recognition	Opportunities to learn new things at work	Feeling of work overload	Number of: employees firms
All sample	43.6	71.0	27.3	14101 6342
46-59 years old	45.3	70.7	25.2	4363 3051
20-45 years old	43.1	72.8	28.6	9738 5392
Age gap	0.022*	-0.021*	-0.034**	-

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE

Coverage: Private sector French firms with 20 employees or more, employees with at least one year of seniority, weighted statistics.

Note: **, * means significant at the 5% and 10% levels respectively. The age gap is the difference in each of the three components of well being between employees aged 46 to 59 and employees aged 20 to 45.

The objective of our research is to explore the sensitivity of these results concerning quality of working life to the context of change within companies, using our typology in five categories of change. Table 3 explores our hypothesis by computing the average quality of working life indicators for our two age groups in changing firms of each type compared to inertia which is our benchmark case.

Table 3: Quality of working life and employer level changes according to age: descriptive statistics

	Feeling of fair work recognition		Opportunities to learn new things at work		Feeling of work overload	
	46-59 year old	20-45 year old	46-59 year old	20-45 year old	46-59 year old	20-45 year old
No or only marginal changes	47.38	43.95	71.27	72.37	24.19	29.61
<i>ICT and/or managerial Change</i>	41.82	41.59	69.81	73.48	26.96	27.29
Change gap	-0.0556*	-0.0236	-0.0146	0.0111	0.0277	-0.0232
No or only marginal changes	47.38	43.95	71.27	72.37	24.19	29.61
<i>ICT change only</i>	37.14	37.49	67.81	72.48	25.94	29.48
Change gap	-0.1024*	-0.0646	-0.0346	0.0011	0.0175	-0.0013
No or only marginal changes	47.38	43.95	71.27	72.37	24.19	29.61
<i>Managerial change only</i>	50.12	48.98	74.12	73.67	28.23	24.80
Change gap	0.0274	0.0503*	0.0285	0.0130	0.0404	-0.0481*
No or only marginal changes	47.38	43.95	71.27	72.37	24.19	29.61
<i>ICT and managerial change</i>	40.47	42.52	68.08	75.75	27.42	24.94
Change gap	-0.0691*	-0.0143	-0.0319	0.0338	0.0323	-0.0467**
Number of employees	4363	9738	4363	9738	4363	9738

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE

Coverage: Private sector French firms with 20 employees or more, employees with at least one year of seniority, weighted statistics

Note: **, * means significant at the 5% and 10% levels respectively. The change gap is the difference in each of the three components of well being for an age group between firms that implemented some changes and firms that remained inert or nearly so between 2003 and 2006.

The “change gap” gives the difference in quality of working life for these two organisational contexts. It appears in bold in the table when it is significant at least at a 10%

level. First, we observe no significant differences in “opportunities to learn new things at work” between changing and inert firms, whatever the type of change, and for younger workers as well as older ones. But differences related to the organisational context do appear in the two other dimensions of the quality of working life. For older workers, it is the feeling of fair work recognition that is sensitive to employer changes, whereas for younger workers, it is the feeling of work overload. However, the outcomes of change take opposite directions for the two groups of workers, in terms of quality of working life: older workers feel lower fair work recognition whereas younger ones feel less work overload. Interestingly, older workers are sensitive to ICT changes only, whereas younger ones react to changes that incorporate managerial ingredients. In other words, ICT changes tend to deteriorate the balance between effort and reward for older workers whereas managerial changes help younger workers to better cope with their duties. The strongest correlation is observed for older workers in organisational contexts where only ICT have changed: there is a significant difference of 10 percentage points in feeling of fair work recognition for older workers between this type of change and inertia. We also note that younger workers have a more frequent feeling of fair work recognition when their employer implements managerial changes only.

These descriptive results match the findings of the more qualitative research that we mentioned earlier on. Are they robust to structural controls? We estimated two sets of logit regressions where the dependent variables are the quality of working life indicators and where the regressors are the employer level of changes and a set of structural controls at the employer and employee levels: company size at the employer, personal characteristics, employment characteristics and work organisation characteristics at the employee level. Apart from the fact that the correlation between organisational change and quality of working life may stem from a different distribution of these characteristics among firms that have changed and firms that have remained inert, some of these variables may also mediate the relation

between organisational change and quality of working life. In the first set of regressions, we use an indicator of overall change and in a second set, our typology of changes. We see from Table 4 that the main results concerning feeling of fair work recognition for older workers and feeling of work overload for younger ones remain valid once controls have been taken into account.

Table 4: Quality of working life and employer level changes according to age: marginal effects from a logit regression model

	Feeling of fair work recognition		Opportunities to learn new things at work		Feeling of work overload	
	46-59 year old	20-45 year old	46-59 year old	20-45 year old	46-59 year old	20-45 year old
No or only marginal changes	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>ICT and/or managerial Changes</i>	-0.049* (0.029)	-0.028 (0.030)	-0.018 (0.021)	-0.012 (0.014)	0.027 (0.023)	-0.029# (0.020)
No or only marginal changes	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>ICT changes only</i>	-0.079* (0.044)	-0.062 (0.047)	-0.011 (0.026)	-0.009 (0.016)	0.027 (0.022)	-0.012 (0.028)
<i>Managerial changes only</i>	0.005 (0.034)	0.023 (0.029)	-0.014 (0.036)	-0.032 (0.025)	0.036 (0.055)	-0.045* (0.026)
<i>ICT and managerial changes</i>	-0.057# (0.039)	-0.032 (0.026)	-0.039 (0.030)	0.003 (0.023)	0.016 (0.030)	-0.050** (0.020)
Number of employees	4363	9738	4363	9738	4363	9738

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE

Coverage: Private sector French firms with 20 employees or more, employees with at least one year of seniority, weighted statistics

Note: **, *, # means significant at the 5% and 10% and 15% levels respectively. Two sets of regressions are given in the table, a first one with a dummy indicating the existence of any type of change at the employer level and a second one where we distinguish between our three types of change. The two regressions include the set of controls given in appendix 2: company size, employee personal characteristics, employment characteristics and work organisation characteristics.

Since our purpose here is to focus on older workers, we are now going to look closer into our main result for this age group, by identifying what factors contribute to explaining the fair work recognition gap among them, between inert and changing firms.

5. Explaining differences in feeling of fair work recognition for older workers facing changes

In the relationship between age and changes in work, as in all age/work relationships, the effects are in general "conditional": they depend on several characteristics of the work experiences which may increase or decrease the age-related impairments. They can help or hinder the construction of experience based resources as well as their mobilisation by older workers.

We shall now see how these characteristics or attributes can intervene by inquiring the reasons for which the feeling of fair work recognition is lower for older workers when their firms implement changes, and more particularly ICT changes. Our analyses will be based on the decomposition method suggested by Yun (2004, 2005), which extends the Oaxaca-Blinder technique, well-known in wage discrimination research, to the case of a binary outcome. This method allows us to estimate both an aggregate decomposition of the observed fair work recognition and a detailed one (see appendix 3).

**Table 5: The aggregate decomposition of the observed fair work recognition gap for
older workers facing changes**

	ICT and/or managerial Changes vs no or only marginal changes		ICT changes vs no or only marginal changes		ICT and managerial changes vs no or only marginal changes	
	Gap	%	Gap	%	Gap	%
Total	-0.0556*	100.0	-0.1024*	100.0	-0.0691*	100.0
Aggregate characteristics effect	-0.0088	15.8	-0.0199	19.4	-0.0241	34.9
Aggregate coefficients effect	-0.0468*	84.2	-0.0825*	80.6	-0.0450	65.1

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE.

Coverage: Private sector French firms with 20 employees or more, employees with at least one year of seniority, weighted statistics. *Note:* Significant at ***1%, **5% and *10% levels.

Table 5 presents the results of the aggregate decomposition for changes, ICT changes only and ICT and managerial changes. The fair work recognition gap for managerial changes only is

not decomposed here, because it is not statistically significant (see Table 3). The results of the aggregate decomposition are based on logit estimates using the sample of older workers in inert firms.

The model allows assigning the change gap to differences in the distribution of characteristics among older workers between organisations that have undergone changes (changing firms) and organisations that have not materially changed (inert firms) on the one hand, and to differences in the impact of certain characteristics or attributes between the two samples of firms on the other hand. The first source is labelled the characteristics effect, the second one, the coefficients effect.

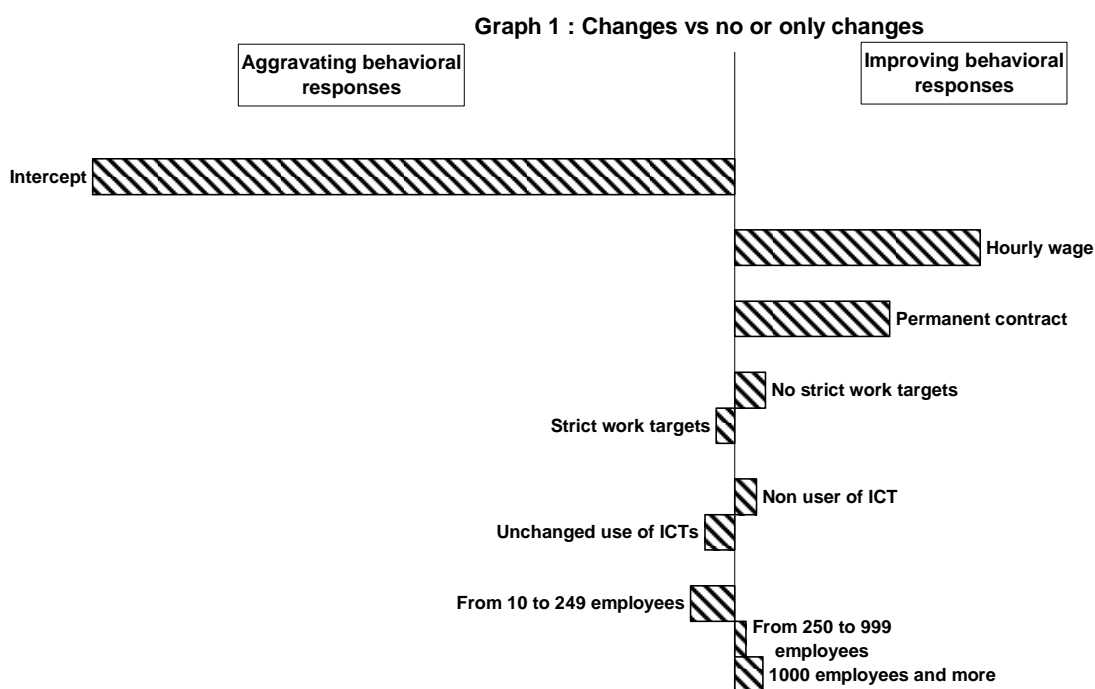
The more salient finding of this decomposition is that the observed fair work recognition gap is largely explained by the coefficients effect. For example, if we consider the first column of table 5, feeling of fair work recognition among older workers in firms that have implemented changes is 5.6 percentage points lower than among older workers in inert firms and 84.2 percent of this gap is due to differences in the impact of certain attributes that mediate the relation between organisational change and the feeling of work recognition. On the contrary, the contribution of the differences in older workers characteristics is very small (15.8 percent) and not statistically significant. We find similar percentages when we consider the observed fair work recognition gap for older workers between firms that have only implemented ICT changes and inert ones (column 2). On the other hand, the aggregate coefficients effect is smaller (but still important) and not significant when we decompose the loss of fair work recognition for older workers facing both ICT and managerial changes (column 3).

In other words, the lower feeling of recognition that we observe among older workers in changing firms compared to older workers in inert firms is not explained by differences in individual and employment characteristics between these two populations. Indeed, the main

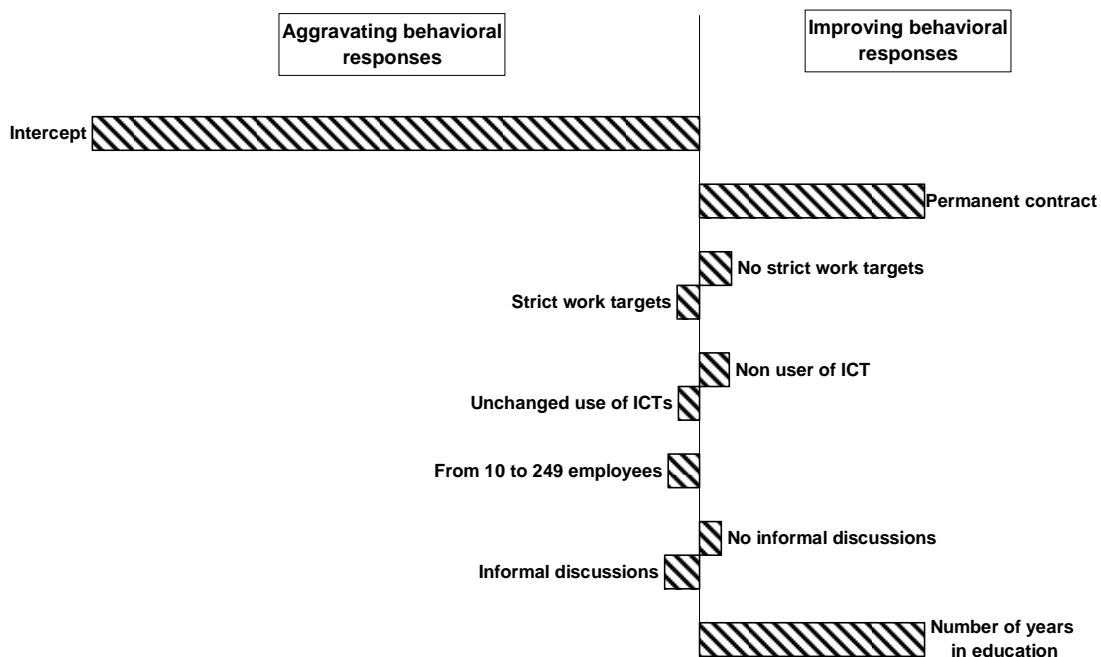
explanation lies in the fact that older workers have different behavioural responses in terms of recognition depending on whether they are confronted with change.

To determine individual and employment characteristics giving rise to the most pronounced differences in behavioural responses, and therefore contribute the most to explain the observed difference of fair work recognition, we perform a detailed breakdown of the unexplained portion of the gap. The results are presented in Figure 1. The left side of each graph represents the individual and employment characteristics leading to behavioural differences that contribute to increase, in an aging workforce, the recognition gap between changing and inert firms (*aggravating behavioural responses*). In contrast, individual and employment characteristics leading to behavioural differences that contribute to narrowing the recognition gap are represented on the right side of each graph (*improving behavioural responses*).

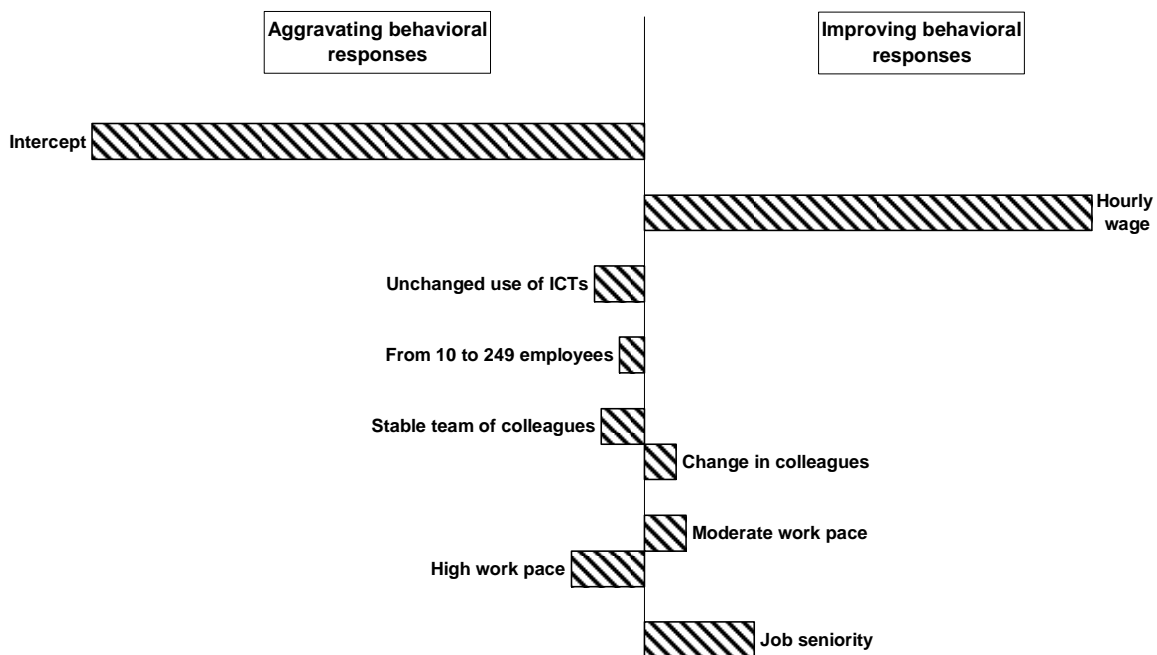
Figure 1: Contribution of differences in behavioural responses to recognition gap for older workers facing changes



Graph 2 : ICT changes only vs no or only marginal changes



Graph 3 : ICT and managerial changes vs no or only marginal changes



Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE.

Coverage: Private sector French firms with 20 employees or more, 46-59 year old employees with at least one year of seniority in changing and inert firms, weighted statistics.

Note: The graph displays the characteristics leading to behavioural differences that contribute the most to the explanation the observed difference of fair work recognition for older workers between changing and inert firms. The length of the bar is proportionate to the strength of the contribution of each characteristic.

In the estimated models, the intercept appears as the main factor explaining the recognition gap for older workers. It can be taken as an assessment of the propensity of older workers to declare being poorly recognised in their work, regardless of their individual and employment characteristics. If so, this result indicates that employer changes, and notably when they incorporate ICT changes, generate for older workers a strong increase of the tendency to feel poorly recognised at work.

Higher pay, and the fact of having a permanent job, more strongly influence - and in a positive sense - the older workers' feeling of fair work recognition within changing than within inert firms, so these two elements contribute to reducing the observed recognition gap. However, there are differences according to the type of changes. Higher pay helps to reduce the loss of recognition only among firms that have experienced both ICT and managerial changes, while the fact of having a permanent job can help reduce this loss just among firms that experienced ICT changes only.

Having to follow strict work targets reduces the feeling of fair work recognition of elders and especially when they belong to changing firms. The following explanation could prevail: the issue for older workers facing a change is to reuse personal work strategies that they have forged along their professional path, adapting them to new circumstances (Gaudart, 2000). This objective is undermined if the change takes place in a context of increasing prescription to streamline, standardise and to draw more strictly labour practices.

We also note that, when firms implement changes and especially changes in ICT tools only, it is better for the feeling of fair work recognition of older workers that they (themselves, personally) do not use any computers, and using old computer equipment in this case is particularly detrimental. This could reflect both the difficulties associated with age in

the appropriation of new ICT tools and the symbolic value of new equipment in the process of work recognition.

The firm size has a positive influence on the feeling of fair work recognition of older workers within changing firms and a negative one within inert ones. Therefore, when firms are changing, it is better for the feeling of recognition of older employees that they evolve within firms whose size is greater than 250 employees rather than in small structures. The negative relationship between firm size and the feeling of fair work recognition for older workers has been described by an empirical research using the European SHARE survey (Lengagne, 2011). The author advocates the fact that smaller organisations have a greater ability to favour a balance between efforts and rewards because of more direct communication between employees and thus a better common knowledge of the share of the work burden. However, improved working and employment conditions in bigger structures could counterbalance this common knowledge effect. Thus, it could be the case that in larger changing firms, the organisation of change management and sometimes the involvement of the human resources department alleviate the work recognition loss for older workers.

Finally, there are specific factors that explain the observed loss of recognition within firms that experienced either ICT changes only or both ICT and managerial changes. Hence it appears that the loss of recognition is lower when the education level of older workers is higher in firms that experienced only ICT changes. This overlaps with earlier results, according to which the level and quality of initial and further training - even before the considered employer change - moderate the negative effects of age on the capacity to appropriate technical changes (Salhouse, 1990; Behaghel & Greenan 2010; Marquié et al., 2010; Paumès Cau-Bareille et al., 2011). On the other hand, and in a counter intuitive manner, this loss of recognition is more important where older employees have opportunities to

discuss with colleagues, perhaps because these exchanges encourage them to share their dissatisfaction.

If we consider firms having experienced both ICT and managerial changes, we see that the loss of fair work recognition is reduced when the work collective changes, where the work is not carried out under pressure and among older workers with high seniority in the post. Conversely, the loss of recognition is aggravated by the fact of working with the same colleagues and under high pressure. These findings are consistent with more general knowledge: when the time pressure at work is high, older workers always experience more difficulties (Volkoff, Buisset, & Mardon, 2010) because they have fewer opportunities to mobilise the resources gained through their experience, even though these resources are valuable to anticipate emergencies. This applies to learning situations, because the training times are then smaller, more difficult to plan, prepare, and preserve, because of lack of sufficient staff for example. But research in occupational psychology have long shown that older people sometimes need a learning time a little longer than the younger people (Czaja, Hammond, Blascovitch, & Swede, 1989).

6. Conclusion

Our results suggest that changes in ICTs and / or managerial techniques have less negative impact than what could be expected on employees' quality of working life, especially among older employees. Indeed, between the three dimensions of quality of work life considered, only the feeling of fair work recognition is negatively correlated with company changes - especially ICT changes - for older workers. Furthermore, the feeling of work overload of younger workers is lower when companies change, especially when they change their managerial tools.

In this chapter, we have also explored the reasons for which the feeling of fair work recognition is lower for older workers when their firms implement changes, and more particularly ICT changes. The main result is that this loss of recognition is explained by the fact that older workers have different behavioural responses in terms of recognition depending on whether they are confronted with changes and not by differences in individual and employment characteristics between older workers in changing firms and older workers in inert firms. However, some individual and employment characteristics counterbalance this loss of recognition: higher pay, the fact of having a permanent job, of belonging to firms which size is greater than 250 employees as well as moderate time pressure in work activity. More specifically, when firms implement changes in ICT tools only, it is better for the feeling of fair work recognition of older workers that they do not use any computers whereas using old computer equipment is particularly detrimental.

As a whole, our results suggest that changes in technologies and organisations at work might be less « age-discriminating » than what preconceived ideas would let one suppose. Older workers are just as frequently present in firms which have managed such changes as in those that have not. And as far as quality of working life is concerned, we find no differences for the older workers between changing and inert firms in terms of learning opportunities at work or feeling of work overload and a moderate gap in the feeling of recognition, in particular in firms having implemented only new ICTs compared with inert firms.

For sure, experience-related work strategies are often based on a certain familiarity with the task: it is most valuable to have accomplished the task itself or similar tasks repeatedly, to know beforehand the effects of specific actions on one's own well-being and one's own efficiency. Therefore, when an older worker encounters a new work environment because of work being reorganised, or of technical change, she has to consider a means of transferring part of her previous strategies and/or developing new ones. That is why senior workers, more

than the younger ones, share the concern to develop a “controlled” approach to the new context, ways of doing things that will allow them to feel comfortable, and not let the job become too tiring. These two concerns (to learn the job, and to learn to feel comfortable with it) partly explain why older workers require longer learning periods than the younger ones, and may feel ill-at-ease (or “ill-recognised”) during this period. This learning time allows the fine tuning of a revisited balance between effort and reward. But it does not mean that they cannot adapt to “new” work environments.

Many studies in the field of work or learning have shown the effectiveness of operating modes based on experience, and the substantial role they play in preserving well-being. However the possibility for workers – especially the older ones - to implement them and, consequently, their chances of success, will depend on the organisation of work that is chosen. Hence the overall changes in working conditions must be taken into account. In particular, work intensification (Green & McIntosh, 2001) puts the importance of experience-related strategies, but at the same time it hinders their implementation.

Therefore, while it is important to take into consideration the potential deterioration of well-being resulting from the various aspects of professional life, another component of the age/ work/well-being relationship is just as essential: career paths can favour or hinder capacities to face changes (Shani et al., 2002). One of the key questions in the coming years will be whether the organisation of work in companies will preserve and value professional experience, by encouraging its development and its implementation, namely when changes are planned.

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**Appendix 1: Diffusion between 2003 and 2006 of ICT and management tools used
in the composite measures of change**

13 managerial tools			15 ICT tools		
% of firms	2003	2006	% of firms	2003	2006
Contractual commitment to provide a product or a service within a fixed deadline	66.1	68.5	Website	61.2	73.3
Long-term relationships with suppliers	51.7	54.7	Local Area Network (LAN)	61.3	66.7
Contractual obligation for certain suppliers to provide the product or service in fixed deadlines	51.5	53.5	Use of software or in-house application for HRM	63.4	65.3
Quality certification (ISO 9001)	36.3	41.4	Intranet	47.9	57.8
Satisfaction surveys of customers	32.9	38.7	Use of software or in-house application for conception and development	47.4	49.8
Autonomous teams or work groups	30.7	33.8	Tools for data analysis	39.5	47.1
Tools for tracing the product or service	28.3	32.9	Electronic data interchange system (EDI)	36.2	45.8
Tools for labelling goods and services	28.3	30.8	Database(s) on HRM	34.5	38.5
Call or contact centres	25.5	28.0	Extranet	25.0	30.2
Just in time production	22.9	24.3	ERP	26.6	29.6
Methods of problem solving (FMEA)	17.3	20.9	Databases for conception and development	26.1	28.8
Customer relationship management	9.7	14.3	Database and application interface tools	21.1	28.6
Environmental (ISO 14001) or ethical certification	9.7	12.9	Filing / automated data search tools	21.4	27.4
			Groupware tools	15.1	21.0
			Process modelling and automation tools	8.8	12.7

Source: Survey on organisational change and computerisation (COI 2006), INSEE, DARES, CEE

Coverage: Private sector French firms with 20 employees or more, weighted statistics

Appendix 2: Variables included in the analysis

Dependent variables, employee level:

Feeling of fair work recognition: When the employee makes a balance of what she brings to the company and the benefits she gets back, she thinks that she is fairly recognised.

Opportunities to learn new things at work: The employee's job allows her to learn new things at work

Feeling of work overload: There are moments at work every day or at least once a week when the employee feels unable to cope or overloaded.

Independent variables, employer level:

Employer level changes: Categorical variable deriving from two composite indicators measuring respectively the cumulative implementation of management tools and of computer tools: ICT changes only, managerial changes only, ICT and managerial changes and inertia.

Company size: From 10 to 249, from 250 to 999 and more than 1000 employees.

Independent variables, employee level:

Personal characteristics:

Sex: Male, female.

Number of years in education: Number of years in education starting from primary schools

Employment characteristics:

Fixed term contract: The employee is on a fixed term contract.

Permanent contract: The employee is on a permanent contract.

Log of hourly wage: log of the net monthly wage divided by the usual number of hours.

Job seniority and seniority squared: Computed from the declared year when the employee started to hold her current job.

Work organisation characteristics:

Training: The employee has taken training courses in the company in 2003, 2004 or 2005.

High work pace: The work pace of the employee is set by demands needing immediate response.

Strict work targets: The employee has to achieve set work targets and has no latitude to change them.

Strict quality procedures: The employee has to follow strict quality procedures.

Technical support on the job: Since 2003, the employee's colleagues or her boss showed her or gave her explanations, about the operation of a slightly complex piece of machinery, or the course of a slightly complex procedure or about how to deal with customers.

Operational support: when facing a temporary excess workload or when having trouble doing a complicated task, the employee receives support either internal or external to the company.

Continuous improvement: the employee or his colleagues have made, in the last twelve Months, suggestions to improve operations, procedures or machines and they have been taken into account.

Informal discussion: the employee is able to discuss informally what happens in the company with his colleagues.

Change in colleagues: over the past twelve months, some or most of the employee's colleagues have changed.

Change in used ICTs: over the past twelve Months the employee's computer equipment or software has changed.

Unchanged use of ICTs: the employee uses ICTs, but equipment and software have not changed over the past twelve months

Non user of ICT: the employee does not use ICTs at work

Appendix 3: The decomposition method of Yun (2005)

In this paper, we perform the non linear decomposition method proposed by Yun (2005) in order to decompose the observed fair work recognition gap between older workers in changing firms and their counterparts in inert firms into “explained” and “unexplained” components. This decomposition can be done at aggregate and detailed levels.

Aggregate decomposition

The aggregate decomposition presents the same form as that of the traditional Oaxaca (1973) and Blinder (1973) decomposition in wage discrimination research. In fact, the difference in average probability of feeling fair work recognition \bar{I}_j between older workers in changing firms ($j = C$) and their counterparts in inert firms ($j = NC$) can be expressed as:

$$\bar{I}_C - \bar{I}_{NC} = \left[\overline{\Phi(X_C \hat{\beta}_{NC})} - \overline{\Phi(X_{NC} \hat{\beta}_{NC})} \right] + \left[\overline{\Phi(X_C \hat{\beta}_C)} - \overline{\Phi(X_C \hat{\beta}_{NC})} \right] \quad (1)$$

where X_j is a raw vector of individual, job and employer characteristics for an older worker belonging to a firm of type j ($j = C, NC$). $\hat{\beta}_j$ is the corresponding vector of coefficients estimates. Φ is the standard normal cumulative distribution function and “over bar” represents the value of sample’s average. The first term in square brackets corresponds to the part of the fair work recognition gap due to differences in the observed characteristics of older workers between the two types of firms (the aggregate characteristics effect or the “explained” component). It can be seen as the gap in the feeling of fair work recognition that would be observed if the impact of the observed characteristics were homogeneous depending on whether or not firms have experienced changes. The second term in square brackets represents the part due to differences in coefficients, i.e. differences in the behavioural responses of older workers to the observed characteristics depending on whether or not their

firms have implemented changes (the aggregate coefficients effect or the “unexplained” component). This can be seen as the gap in the feeling of fair work recognition that would be observed if older workers had not differed in their observed characteristics according to the type of firms. The decomposition described in (1) is done at the aggregate level. However, in this study, we are also concerned with decomposing the fair work recognition gap at a detailed level.

Detailed decomposition

To evaluate the individual contribution of each characteristic included in the vector X to the overall gap, we use the following detailed decomposition equation suggested by Yun:

$$\bar{I}_c - \bar{I}_{NC} = \sum_{i=1}^K W_{\Delta X}^i \left[\overline{\Phi(X_c \hat{\beta}_{NC})} - \overline{\Phi(X_{NC} \hat{\beta}_{NC})} \right] + \sum_{i=1}^K W_{\Delta \hat{\beta}}^i \left[\overline{\Phi(X_c \hat{\beta}_c)} - \overline{\Phi(X_c \hat{\beta}_{NC})} \right] \quad (2)$$

$$\text{with } W_{\Delta X}^i = \frac{(\bar{X}_c - \bar{X}_{NC}^i) \hat{\beta}_{NC}^i}{(\bar{X}_c - \bar{X}_{NC}) \hat{\beta}_{NC}}, \quad W_{\Delta \hat{\beta}}^i = \frac{\bar{X}_c (\hat{\beta}_c^i - \hat{\beta}_{NC}^i)}{\bar{X}_c (\hat{\beta}_c - \hat{\beta}_{NC})} \quad \text{and} \quad \sum_{i=1}^K W_{\Delta X}^i = \sum_{i=1}^K W_{\Delta \hat{\beta}}^i = 1$$

The weights $W_{\Delta X}^i$ and $W_{\Delta \hat{\beta}}^i$ are, respectively, the individual relative contributions of characteristic i ($i=1, \dots, K$) to the aggregate characteristics, and coefficient effects.

Yun uses normalised regressions in computing weights in order to tackle the identification problem that occurs when the detailed decomposition of the aggregate coefficients effect is undertaken. In fact, normalised regressions have the advantage of being invariant to the “left-out” reference category in computing the contribution of dummy variables to the detailed coefficients effect. Moreover, the method of Yun overcomes the “path dependence” problem implying that in non linear decomposition the independent contribution of one variable to the overall difference depends on the order in which the other variables are entered into the decomposition.

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