

## Introduction to De ECONOMIST Special Issue on “Ageing Workforces”

Vincent Vandenberghe

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One of the challenges faced by ageing Western societies is that of maintaining a workforce large enough to supply the goods and services needed by the entire population. In the coming decades, these societies will experience a fall in the share of the working-age population due to one of the most salient demographic trends of recent decades. In many European countries, the number of people aged 60–64, many of whom are about to retire, already exceeds the number of people aged 15–19, who will soon enter the labour market. Ageing on the anticipated scale will put welfare systems under unprecedented pressure. It will also affect economic growth. According to the OECD, on the basis of unchanged participation patterns and productivity growth, the growth of GDP per capita in the OECD area would decline to around 1.7% per year over the next three decades, as compared with about 2.4% per year between 1970 and 2000. These negative consequences of ageing could possibly be offset by increased immigration, higher fertility or faster productivity growth (although the positive economic effects of higher fertility would take two decades to materialize).

While these developments would help to counterbalance the negative effects of ageing populations, most labour economists think they need to go hand-in-hand with attempts to better mobilize available labour. And one of the most significant sources of additional labour supply is older people aged 50+ who are currently inactive. In the coming years, in order to compensate the fall in the share of the working-age population and to alleviate the rising cost of publicly funded old-age pension schemes, public authorities will keep trying to expand the (currently sometimes very low) employment rate, particularly among individuals aged 55–64.<sup>1</sup>

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<sup>1</sup> In many EU 15 countries (Belgium, France, Luxemburg, Austria, Spain, Italy and Greece), in 2009, their employment rate was still well below the 50 percent threshold (Eurostat: <http://epp.eurostat.ec.europa.eu>)

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V. Vandenberghe (✉)  
Université catholique de Louvain, Louvain-la-Neuve, Belgium  
e-mail: [vincent.vandenberghe@uclouvain.be](mailto:vincent.vandenberghe@uclouvain.be)

This special issue of *De Economist* contains six empirical papers, most of which were presented at the Ageing Workforce conference held in Louvain-la-Neuve on September 6, 2010. They all deal with the age-productivity-pay nexus, and explore the range of advantages and challenges that may derive from an increased share of older people inside firms, and some of its corollaries i.e. higher age heterogeneity among employees. Ageing workforces raise crucial issues that have received too little attention so far. Many economists have looked at the consequences of ageing populations in terms of higher dependency rates and rising welfare costs (Gruber and Wise 2004). Another strain of the economic literature on ageing examines the retirement behaviour of older individuals (Mitchell and Fields 1984) and its determinants, for example how the generosity of early-pension and other welfare-state regimes entices people to withdraw from the labour force (Saint-Paul 2009), or how poor health status precipitates retirement (Kalwij and Vermeulen 2008). That literature primarily covers the supply side of the old-age labour market. However, the consequences of an ageing and more diverse workforce, from the point of view of firms, forming the demand side of the labour market, have received much less attention. This special issue aims at filling that void.

## 1 The Specific Questions Addressed

The empirical papers assembled in this special issue simultaneously consider the age-productivity and age-pay<sup>2</sup> relationships. By contrast, all the studies published so far, except Hellerstein and Neumark (1999), Hellerstein et al. (1999) and Aubert and Crépon (2003), have concentrated only on the productivity side—suggesting that they are primarily concerned with the effect of ageing on firms' productivity or growth, at a more aggregate level. The papers collected here focus more on labour market issues. For instance, they investigate the causes of the weakness of the old-age labour markets in the European context, in particular the relative unwillingness of firms to re/employ older individuals. Assessing the latter implies analysing the sensitivity of the productivity-pay ratio to the age structure of firms. Evidence of a negative impact of older workers on that ratio (as seems to be the case in Belgium, as shown by Vandenberghe or Cataldi, Kampelmann and Rycx) can be interpreted as harmful to their employability, either because firms facing downturns have a strong incentive to concentrate layoffs on the less profitable segments of their workforce, or because firms refuse, when recruiting an unemployed old person, to match the wage levels paid by the historical employer. On the contrary, the absence of such evidence (which seems to be the case in the Netherlands, as explained by van Ours and Stoeldraijer and in Portugal, as shown by Cardoso, Guimaraes and Verajao) conveys the important message that firms face no disincentive to employing a rising number of old individuals who are present on the labour market. Also, *ceteris paribus*, job transitions for older workers should not be more problematic than for young or prime-age workers.

Dostie and Cataldi, Kampelmann and Rycx pursue a more theoretical agenda, which is to identify the model that best describes the functioning of Western labour markets:

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<sup>2</sup> Labour costs.

(i) perfect competition synonymous with perfect alignment of productivity and pay, or  
(ii) imperfect competition with firms engaging in implicit labour contracts à la Lazear, and disconnecting pay and productivity (to cope with incentive problems).

Ilmakunnas and Ilmakunnas also examine a likely consequence of ageing: rising age and skill/education heterogeneity inside firms. Their paper explores how various measures of the workforce’s age and skill heterogeneity, alongside mean age, affect firm-level productivity and also individual wages.

## 2 Data and Methodology

In this special issue, productivity is examined at the level where it matters most: that of firms. A study of the relationship between age, productivity and pay requires data at the level of the firm, because productivity is in essence a firm-level phenomenon. Individual workers’ productivity is hardly ever observed. By contrast, many datasets contain good-quality information about what firms are able to produce (e.g. firm sales, value added). Similarly, the alignment of productivity and pay at the individual level is hard to assess. By contrast, it can be evaluated with firm-level aggregates and used to assess the attractiveness of older workers to employers, or the propensity of firms to defer payment for incentive reasons. Workers’ characteristics (e.g. their age, gender or educational attainment) can be aggregated at the firm level and introduced into firm-level equations in order to explore how they influence productivity and pay. Papers published in this issue are based on employee-employer matched, firm-level panel data sets. The authors estimate production (and pay) functions with heterogeneous labour input à la [Hellerstein and Neumark \(1999\)](#), where different types (e.g. young/prime-age/old, male/female, uneducated/educated) diverge in terms of productivity (pay).

This said, establishing how age itself affects labour productivity remains a challenge; not only because productivity is sector—or firm-specific, but also because (short-term) productivity changes can be spuriously correlated with the age structure of firms. Positive or negative productivity shocks (e.g. winning or losing a major contract) are expected to lead to the hiring and firing of workers, with younger workers being over-represented in both flows. Therefore, the share of older workers is likely to be negatively correlated with productivity shocks, thereby leading to biased OLS and fixed-effects parameter estimates.

Most contributors to this special issue assume that the identification of the causal link between productivity/pay and the age composition of the workforce requires dealing with (i) time-invariant, firm-specific characteristics that are unobservable, but that simultaneously drive the firm’s average productivity and age, and (ii) the short-term simultaneity or endogeneity bias (i.e. the aforementioned spurious correlation between productivity shocks<sup>3</sup> and share of older workers). The panel structure of their data allows them to use fixed-effects methods (mean-centring or first differences) to cope with non-randomly distributed time-invariant unobservables. To account for the presence of an endogeneity bias, many papers estimate the relevant parameters using IV-GMM methods. This is a strategy

<sup>3</sup> Anticipated by firms, but unobserved by the econometrician.

regularly used in the production function literature with labour heterogeneity (Aubert and Crépon 2003, 2007). The key idea is to instrument potentially endogenous first-differenced age shares by lagged values of these shares.

An alternative to IV-GMM, used by Dostie, Vandenberghe and Ilmakunnas and Ilmakunnas, is to adopt the more structural approach initiated by Olley and Pakes (1996) and further developed by Levinsohn and Petrin (2003). The essence of the Levinsohn and Petrin strategy is to use some function of a firm's demand for intermediate inputs (raw materials, electricity,...) in order to infer a value for the short-term productivity shocks causing the endogeneity bias. Firms can swiftly (and also at a relatively low cost) respond to productivity developments by adapting the volume of the intermediate inputs they buy on the market. Whenever information on intermediate inputs is available in a data set, these can be used to proxy short-term productivity deviations.

### 3 Results

From an econometric point of view, it is worth stressing that all the papers in this special issue produce results validating the idea that there is (i) a spurious correlation between a firm's unobserved productivity characteristics and age (or gender) composition, (ii) short-term changes in the workforce composition of a firm are not independent of short-term productivity shocks. Indeed the comparison between OLS, on the one hand, and fixed-effects, IV-GMM or more structural estimators à la Levinsohn and Petrin, on the other hand, is supportive of the argument that failure to account for unobserved heterogeneity and endogeneity of the workforce composition biases results. This said, the papers still diverge as to their main outcomes. The Belgian studies of Cataldi, Kampelmann and Rycx, and Vandenberghe, exploiting different data sources, conclude that if workers grow older there is an increasing gap between productivity and pay, which suggests that pay increases with age while productivity does not increase, or even declines: something that is conducive to a low employability of older individuals. Cataldi, Kampelmann and Rycx show that the age-related productivity handicap in Belgium does not seem to depend on how ICT-intensive firms are. Vandenberghe concludes that the handicap is larger for older women than for their male peers. He also shows that the vast (and highly feminized) services industry does not seem to offer working conditions that mitigate older women's disadvantage—on the contrary.

The results obtained by Dostie for Canada are mixed. On average, age does not seem to affect the productivity-pay ratio. Only older Canadian workers with at least an undergraduate degree display a lower productivity-pay ratio. Finally, Cardoso, Guimaraes and Verajao (for Portugal) and van Ours and Stoeldraijer (for the Netherlands) find little evidence of a large age-related negative impact on the productivity-pay ratio. These latter results contrast with the Belgian evidence. They also deviate from the results of many slightly older studies reviewed by Skirbekk (2004, 2008), which are not always as elaborate in terms of their identification strategy, but whose most common finding is a hump-shaped relationship between productivity and age, while labour costs are either rising with age or flat beyond a certain threshold.

The outcome of the paper of Ilmakunnas and Ilmakunnas, which focuses on age and education heterogeneity, produces mixed outcomes. Using Finnish data, the authors find that higher age dispersion translates into higher firm-level productivity. This contrasts with previous studies of workforce heterogeneity that conclude either with a negative effect ([Grund and Westergård-Nielsen 2008](#)) or with an absence of effect of age dispersion. By contrast, more in line with existing studies, the Finnish evidence supports the idea that educational diversity is harmful to firms’ performance.

#### 4 Limits and Suggestions for Future Research

I end this introduction by briefly mentioning some limits that should be kept in mind when interpreting the results presented in this special issue. First, some papers lack adequate information about key control variables like capital (van Ours and Stoeldraijer do not measure capital stock directly and resort to cross-industry comparisons in order to assess its role), or human capital, ie. the educational attainment or previous training of the workforce. Vandenberghe includes proxies for educational attainment (share of blue-collar workers or managers). All authors apply within transformations to controls for most of the firms’ unobserved time-invariant heterogeneity (including in terms of stock of human capital). But there could still be problems with unobserved short-term changes in human capital levels that are related to the age/gender structure.

Second, only average firm profiles are calculated, which may imply that the papers tend to overlook the (in)capacity of some firms to cope with an ageing workforce (by implementing or not implementing *ad hoc* measures that compensate for age-related loss of performance).

Third, there is the issue of selective attrition. It could be that the best 50+ workers remain, while the least productive older workers leave the firms and perhaps the labour force. To the extent that this selection bias is an issue, we could view the estimated coefficients for older workers’ productivity as lower boundaries (in absolute value). However, this selectivity effect would also apply to the age-pay profile in a similar way, meaning that the results in terms productivity-pay ratio are *a priori* more robust.

Four, the econometric strategies underpinning the papers in this special issue are still developing. This could soon deliver improvements and eliminate some of the divergence observed across papers. For instance, [Akerberg et al. \(2006\)](#) have developed a new version of the two-step structural estimator initiated by [Olley and Pakes \(1996\)](#) and further developed by [Levinsohn and Petrin \(2003\)](#). An open question is whether “natural experiments” (now commonly used in empirical labour economics in order to identify causal relationships) could help assess the impact of ageing on firm-level productivity. To my knowledge, such a strategy has never been used to disentangle the age-productivity-pay nexus.

Five, the important cross-country differences (Belgium vs. Portugal or the Netherlands) with regard to how age, productivity and pay are related could be due to data specificities or to econometric issues. But one cannot reject the hypothesis that they point to country effects. It could be, for instance, that the way age affects productivity is partially dependant on the set of labour-market institutions present in one country. Some of these institutions may be conducive to greater investment (from

both employers and employees), combating or compensating age-related productivity declines, whereas others may have the opposite effect. The issue remains open for discussion and calls for more research.

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