



# Are personnel measures effective in increasing productivity of old workers? <sup>☆</sup>

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## HIGHLIGHTS

- ▶ Representative analysis on specific human resource measures for old employees (SMOE).
- ▶ Compares age-productivity profiles of establishments with and without SMOE.
- ▶ Estimates age-productivity profiles using Diff-GMM.
- ▶ Uses large scale linked employer employee panel data.
- ▶ Effects of age specific equipment, age specific jobs and mixed-age teams.
- ▶ No effects of working time reductions and training for old employees.

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## ABSTRACT

In this study, we investigate the relation between five specific human resource measures for old employees (SMOE) and the relative productivity of old employees. Despite the fact that the share of old employees increases in most developed countries and many establishments apply specific measures for old employees, this is the first large scale study on this topic. We find that the relative productivity contributions of old workers are significantly higher in establishments that provide either specific equipment of work places or age-specific jobs for old workers. In establishments that apply mixed-age working teams the relative productivity contributions of old and of young employees are significantly higher than in establishments without this measure. Working time reductions and specific training for old employees are not associated with higher relative productivity of these employees. Our results suggest that the application of SMOE can contribute to the explanation for two recent findings, the only modest decline of the relative productivity contributions of old workers and the high variance for estimates of age-productivity profiles.

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## 1. Introduction

As a result of the rapid ageing of the workforce in almost all developed countries, concerns are being raised as to whether establishment

productivity and economic competitiveness are likely to suffer. If an increasing share of older employees is likely to reduce establishment productivity, ageing workforces could lead to a decline in welfare. Consequently, the literature on the relationship between age, productivity and wages is currently growing fast (see, for example, the special edition on “Ageing Workforces” in the journal *De Economist* 159 (2) from 2011).

Medical studies typically highlight a strong decline in individual skills and abilities for old employees (Skirbekk, 2008; van Ours, 2009). However, several recent contributions suggest that increased numbers of old employees in an establishment do not necessarily translate into a decrease in establishment productivity on average (Aubert and Crépon, 2006; Malmberg et al., 2008; Börsch-Supan and Weiss, 2011). Moreover, some studies point to large variances in age-productivity profiles between establishments (Lallemand and Rycx, 2009; Göbel and Zwick, 2009).

In this paper, we explore the relationship between different specific human resource measures for old employees (SMOE) and the

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**Table 1**  
Adoption of specific measures for old employees (SMOE).

SMOE	Share
At least one SMOE	27.8%
Specific equipment of workplaces	1.8%
Reduced working time	14.5%
Age-specific jobs	3.9%
Mixed-age working teams	11.1%
Training for old employees	10.4%

Note: Share of establishments that employ old employees with SMOE in 2002. The share is computed using the cross-sectional weight for 2002 provided by the IAB-establishment survey.

age-productivity profile of enterprises. The human resource measures are targeted at old employees<sup>1</sup> and are implemented by establishments, as part of their human resource strategies, in order to enhance relative productivity of old employees. The application of SMOE in firms is an important economic phenomenon that so far has not received much attention in the economic literature. In fact, almost 28% of the German establishments that employ old workers have implemented at least one measure that specifically targets old employees (Table 1).

If SMOE are successful at enhancing the relative productivity of old employees, they can provide a joint explanation for the recent empirical findings on the relationship between age and firm productivity. SMOE, then, can help enterprises to avoid a reduction in productivity contributions of old workers and to augment the variance in age-productivity profiles between establishments. Moreover, SMOE could help reconcile the seemingly contradictory results on the decline in individual peak performance found in medical studies, and the comparatively modest decline in average relative productivity contributions of old workers found in recent studies (Van Ours and Stoeldraijer, 2011).

Until recently, the availability of data on the application of SMOE was scarce. In the meantime, data on SMOE have been collected and they are now integrated into the extensive linked employer–employee data of the IAB (LIAB), which is publicly available and widely used in economic research.

Our data provide cross-section information on the application of SMOE at the establishment level. In order to explore the productivity effects of SMOE, we use the fact that these measures are targeted at the subgroup of old employees. Therefore, SMOE should affect the age-productivity profile in a specific way: in most cases, they should enhance the relative productivity of old workers when they are effective and have only weak effects on the productivity of young workers. In this paper, we investigate the following measures: specific equipment in work places, working time reduction for old employees, age-specific jobs for old employees, mixed-age working teams and training for old employees. Up till now, there have been only few case studies on the effects of SMOE (Streb et al., 2008). To our knowledge, this paper is the first attempt to provide large-scale quantitative results on this subject.

For our analysis, we require estimates of the relationship between the age composition of the workforce and productivity at the establishment level. As the age composition of the workforce is likely to be influenced by the establishment outcome, we have to consider potential endogeneity of the age composition of the workforce in order to obtain unbiased estimates of the age-productivity profiles (Aubert and Crépon, 2006; Göbel and Zwick, 2009). Moreover, we have to take into account that firms are different in many aspects – identification of the age-productivity profiles should therefore be based on within

firm variation over time and include a broad spectrum of other establishment and employee characteristics.

The reasons for the application of human resource measures by a subgroup of otherwise similar establishments are controversial. New “management technologies” are continually being adopted by establishments (Bloom and van Reenen, 2011), and establishments might experiment with different human resource measures. These arguments point to the possibility that the application of SMOE could be, at least to some extent, exogenous. On the other hand, the application of personnel measures could be selective. In this case, we expect firms that apply these measures to be different with respect to their characteristics such as establishment size or sector. In order to check the sensitivity of our results with respect to the observed characteristics, we conduct additional weighted estimations. In this sensitivity check, we use inverse probability weighting for the estimations of establishments without SMOE. This means, roughly speaking, that the inclusion of the probability weights makes the samples of firms with and without measures more similar and therefore more comparable.

Panel attrition might differ between establishments with and without personnel measures. As attrition could be correlated with the age structure of the employees and the productivity of the establishments, this could bias our results. In another robustness check, we therefore control for the panel attrition of the establishments. The results for the different measures fit to our theoretical considerations. Despite the explorative nature of this study, we therefore interpret our findings in the following way: SMOE are associated with a higher relative productivity of old employees. Therefore, it is likely that these measures contribute to relative productivity of old workers not declining on average. Our findings suggest that from the firms’ perspective, SMOE can be an important human resource measure to enhance relative productivity of old employees. From a macroeconomic perspective, our findings suggest that the ageing workforce does not (yet) reduce economic welfare.

The remainder of this paper has the following structure. The next section provides an overview of human resource measures and their hypothetical impact on the relative productivity of old employees. The third section explains our estimation strategy and the fourth section presents the linked employer–employee panel data set used. The fifth section contains empirical results on the relationship between specific measures for old employees and the age-productivity profile. The sixth part concludes.

## 2. Background

Establishments use personnel measures to cope with potentially restricted capabilities of old employees. The most obvious method is to select the most able and best fitting employees and dismiss less productive employees (Howard, 1988; Frosch et al., 2011). However, because of strict labour market protection for old employees, in many countries their selective dismissal is expensive. This suggests that employers frequently cope with old employees, who might have a lower individual peak performance than younger workers or who are, on average, less productive than their younger colleagues. With a rapidly ageing workforce, successful sustainable personnel management is characterised by flat age-productivity profiles. For an establishment, a flat age-productivity profile implies that an increase of the share of old employees does not lead to a reduction in productivity. At the macroeconomic level, flat average age-productivity profiles suggest that, ceteris paribus, a higher share of old workers does not lead to a decrease of overall productivity in a country.

Strategic human resource management measures that directly tackle disadvantages of old employees potentially provide tools to cope with a decline in the capability of old employees in cases where adjustment of their wages or dismissal are not feasible. SMOE are based on the insight that old and young employees have complementary competencies and capabilities (Boockmann and Zwick, 2004; Johnson, 2005; Skirbekk,

<sup>1</sup> Based on the definition used in our data set, “old employees” are defined as those employees who are older than 50 years of age.

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