

## **Spillover effects of innovation policies on workplace accidents in Europe**

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### **Abstract**

Innovation policies aim to enhance growth, productivity and competitiveness. However, the 21st century economic “grand challenges” must include environmental issues like climate change, demographic, health and well-being concerns linked to the difficulties of generating sustainable and inclusive growth. The development of digital technologies, such as artificial intelligence (AI), advanced robotics, widespread connectivity, the internet of things and big data, wearables, mobile devices and online platforms, can change the nature and location of work and how work is organised and managed and can create new challenges for OSH and its management (Cockburn, 2021). Therefore, industry 4.0 is inevitably shaping the industrial configuration and penetrating all sectors of economies, and the rate at which this transition are taking place is faster than before. Since, automation and digitalization are inevitably changing the nature of work, and consequently OSH management since the risks of occupational accidents depend on the various specific work activities performed, within the business cycle theoretical framework, our work aims to investigate, at a macro level of analysis, if innovation policies, acting on the technological innovation’s components that re-shape the workplace, can display also a positive spillover effect on the OA rate in a country.

The frequency of workplace accidents has been extensively studied in the literature for which, traditionally, it is possible to identify four main groups of factors affecting injuries (see Fabiano et al., 2004): i) individual factors related to workers characteristics (age, gender) and experience, ii) job-related factors, organization of work and environmental conditions, iii) technology used, and iv) economic factors, such as general economic conditions, unemployment rate, labour and social insurance legislation, business cycles. Cornelissen et al. (2017) have provided one of the most comprehensive overviews on the determinants of occupational safety, identifying and clustering several possible determinants of occupational injuries in high-risk industries (i.e., construction, petrol-chemistry, warehouses, and manufacturing). The resulting seven clusters constitute a suitable framework to identify the possible determinants of workplaces accidents since Cornelissen et al. (2017) considered both theoretical and empirical studies and included determinants which have received so far little attention in previous models (e.g., external factors).

Based on this strand of literature, this paper presents an empirical investigation on the determinants of workplace accidents and focuses on the extent to which public expenditure on

R&D&I affects the workplace accidents trend in Europe, while controlling for production-system characteristics (employment sectoral risk, size of firms, temporary contracts), business cycle and socio-economic factors (GDP, level of investments, unemployment, education) and other territorial features (quality of the institutions, crime index).

We use Eurostat data, and our panel is composed of 27 European countries over the period 2005-2019. Implementing different functional forms and estimation methodologies (pooled OLS, panel fixed and random effects models, system-GMM and semiparametric fixed effects model), we find robust evidence that the overall levels of public support schemes for innovation, while controlling for the productive-system characteristics, the business cycle and other territorial variables are effective in explaining the evolution over time of the occupational accident rates.

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