

## 7<sup>th</sup> IRIMA Workshop

Industrial Research and Innovation Monitoring and Analysis

### Innovation and Job Creation

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*Background Paper*

Lesley Potters

The objective of the IRIMA project is to generate science based evidence to support policy making in areas related to the European Commission's priority on Jobs, Growth and Investment. The Europe 2020 strategy puts research and innovation at the core of policies contributing to job creation and sustainable economic growth. This project is related to the broader aim of the related Horizon 2020 Work Programme, which refers to the need to build more inclusive, innovative and reflective societies. This includes the need to find new sources of jobs and growth, addressing among other things the insufficient levels of private R&D investments which continue to fall short of the set target.

More specifically, the IRIMA project concentrates on the analysis of company data from the sample of world top R&D innovators, complementing it with additional data sources when necessary. The company dataset on world top R&D investors constructed over the past 12 years by the IRIMA project has proven to be an extremely valuable data source allowing the study of relevant topics.

The part of the work plan related to this workshop focuses on the role of corporate R&D and innovation activities and its impact on employment growth. The analyses performed in this field are typically translated into sound policy messages and are published as academic papers and technical reports. As main input for these analyses, firm-level data from the EU R&D Scoreboard and Annual Survey on Business R&D Investment are combined with the Community Innovation Survey, patent statistics and other commercial databases.

The main aims of this workshop:

- To get a better understanding of the relation between innovation and job creation on firm and sector level
- To provide insight in growth patterns of young firms and policies to facilitate growth and minimize the impact of barriers to growth
- To formulate policy messages on how to shape tomorrow's policies in the light of the Europe 2020 strategy with respect to innovation and job creation.

**The objective of this background paper is to set the scene for the contributions expected from the workshop participants.**

## **Session 1: Empirical findings on the impact of innovation on job creation**

The workshop will start with a presentation by Marco Vivarelli on the work of his team at the UCSC (Milan) on the impact of R&D and innovation and job creation, both in terms of levels and skill composition, across industries and firms in the European Union.

Current concerns on the impact of technological change on employment are at the top of the political agenda, with a special focus on the manufacturing sectors and low and medium skilled workers, although with an increasing attention for higher skilled workers. The attention of this subject is even more pronounced in the light of the jobless recovery that the EU sees since the 2008 crisis.

Within the IRIMA project at IPTS, there has been previous work on this relationship using the unique EU R&D Scoreboard data and other micro-level datasets. Ciriaci et al (2013), by using Spanish CIS data, find that being innovative as a firm not only has a positive impact on its employment growth but also on the growth persistence as compared to non-innovative firms. However, this relation is not linear. Bocliagino (2014) shows, by analysing EU R&D Scoreboard data, that firms will typically encounter a scale effect: a firm cannot reproduce in scale the innovative process with constant return so that any new innovation will have a higher employment effect for a constant final demand. In turn, Kancs and Siliverstovs (2015), also using R&D Scoreboard data, show that innovation can both create and destruct jobs, depending on the R&D intensity. Innovation "followers" – firms with medium-high innovation intensity – show the most positive relationship between innovation and job creation, while both innovation leaders and modest innovators show a negative impact.

The (macro-) economic literature does not provide a single answer about the impact of innovation on employment, since this impact depends on e.g. institutional factors, price and income elasticities, demand and profit expectations, the nature of the technological change and other contextual factors. It remains unclear what the effects of innovation is on macro-level employment: product innovations might lead to a surge in sales and production, and hence employment, but process innovations might lead to loss of jobs elsewhere in the economy – with possible (but unknown) second round effects.

Therefore, the focus is currently on empirical studies, mainly using sector and even firm-level data. Most of recent studies provide evidence of a positive relationship between technological change and jobs. The positive impact on employment is especially pronounced in high-tech sectors and for innovative companies – either measured in R&D intensity or as having introduced a product innovation. On the other hand, some studies find a negative impact of process innovation on employment, especially in low-tech manufacturing sectors (see e.g. Harrison et al., 2014).

The impact of innovation varies with the workers' skill levels. Until the 90s, shifts in the production technology, especially in manufacturing and production activities, generally favoured skilled over unskilled labour by increasing its relative productivity and, therefore, its relative demand. Current technological change, however, rather involves the substitution of specific *tasks* (mainly routine, but the complexity of the tasks is increasing rapidly) which leads to an increasing polarization of jobs and wages, involving all the economic sectors, even the services sector.

The experts in this session are asked to provide the latest evidence on the complex relationship between technological change, labour productivity, employment growth while taking into account sectoral differences and the outlooks for the different skill levels. Guellec will present a compilation of recent and ongoing work at the OECD on the impact of new technologies on jobs and skills and will include both quantitative evidence and prospective reflection. Jaumandreu will make a presentation on his ongoing work (together with Doraszelski) on the labor-augmenting bias of productivity growth due to technological change, where workers with a given set of skills become more productive over time.

## **Session 2: EU's post-entry growth problem**

The post-entry growth of young and innovative firms forms part of the research on the employment creation abilities of innovation. Previous research has highlighted how European new firms have a sluggish post-entry growth performance compared to their US counterparts. Little is known about post-entry growth, however, because standard datasets have difficulties in observing firms in the years immediately after entry.

The use of the data as collected by the main IRIMA publication – the EU R&D Scoreboard – is limited for the analysis of young small firms and their post-entry growth, since there is a selection bias towards the largest investors in business R&D only. Although Scoreboard data covers some SMEs, the coverage is rather low and other data sources are necessary to complement, such as ORBIS firm-level data or datasets from national statistical offices.

In general, innovative firms are more likely to experience high employment growth episodes compared to non-innovative firms (see e.g. Freel, 2000; Geroski and Machin, 1992). Non-innovative firms, in turn, seem to have more difficulties in maintaining the creation of new jobs after a period of employment growth: Ciriaci et al. (2013) find a negative autocorrelation of employment growth, pointing to a rather unstable growth pattern over time.

Turning to young firms, they show that, by using (Spanish) Community Innovation Survey data, young and innovative firms appear to decline slower during periods of economic downturn, but do not necessarily grow faster. Possible reasons for this mixed evidence are the specific regulations and environmental factors, financial constraints (see Aghion et al, 2007) but also firm characteristics such as ownership (see Mata and Portugal, 2002) and innovative activities that affect growth paths of particularly young firms as compared to more established firms.

The aim of this session is to deal in-depth with empirical evidence from different (and new) data sources on these firms and investigate the different growth paths and possible barriers they encounter in the post-entry phase. Furthermore, the role of regulatory and institutional frameworks on firm's performances amongst EU Member States will be discussed to see whether there are different responses of employment to innovation. Questions that the experts deal with are:

- What factors determine the growth paths of young firms?
- Is a lack of post-entry growth a typical EU problem?
- Do we know more about the regulatory and environmental factors that hamper growth for these firms?

- How can new databases help in better understanding this phenomenon?

### **Roundtable**

The round table aims at opening a policy-oriented debate between policy makers and experts on the most important actions to be implemented in the context of the policy agenda for job creation. The discussions of the roundtable is expected to contribute to a better understanding of where improved policies can contribute to improving framework conditions for translating innovation into job creation and facilitating growth for young firms.

Possible questions are:

- How can R&D contribute to job creation?
- Do different types of innovation have different impacts on job creation?
  - Radical vs incremental innovation
  - Product vs process innovation
- How will innovation affect the EUs strong services sector?
  - How will this compare to other regions?
- Will the impact of technological change be limited to lower and medium skilled workers or will it extend to higher skilled workers as well?
- How will technology change the labour market?
- How should tomorrow's policy be shaped in order to be ready for the unknown outcomes of technological change?
- What can be the role of policymakers in this shift in paradigm?

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