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Is smart growth employment friendly?

Francesco BOGLIACINO[1]

Introduction

During the economic downturn caused by the financial crisis, seven million people have been made unemployed. In fact, according to Eurostat, between the first quarter of 2008 and the second quarter of 2010 the number of unemployed rose from 16 to 23 million over the 27 Member States; two million higher than the peak hit during the previous recession (second quarter of 2002), and cancelling out the results of almost a decade of reforms. Of course, the impact has varied between one Member State and another.

Growth needs to restart to reabsorb those displaced workers. Short term statistics provide little reassurance that the situation will improve on its own; in fact, the weak signals of recovery have made little impact on the labour market. However, there are doubts that the strategy followed in the last decade could be feasible.

The driving forces of employment growth in the last decade were represented by the lesser developed countries catching up and the process of (dual) liberalisation of contractual arrangements, namely the flexibilisation of the labour market arrangement for specific segments. Both processes had a level effect and not a growth one: catching up works for the period necessary to reach the target, and flexibilisation at the margin allows the existing pool of workers kept off by the high labour cost (determined by the system of guarantees) to be absorbed. As discussed in Box 1, the other side of the coin was a poor dynamics of productivity and wages. Once the two processes come to an end, Europe should face the open issue of continuing to promote employment growth, and to do so in the face of increasing competitive pressures from the new emerging countries.

The policy challenge in this framework is to address the need for productivity and employment growth together, putting Europe onto a sustainable path. Europe 2020 (European Commission, 2010a)

has assumed this challenge and proposes R&D driven Innovation as a key determinant of a smart growth paradigm centred on the knowledge-based economy. While R&D shares the positive effect on productivity with other innovative activities,[2] its peculiarity is its particular labour-friendliness.

R&D[3] can represent a main driver for an alternative response to both the economic crisis and the increasing competitive pressures. Instead of concentrating on pure efficiency gains under existing structural conditions, there is a possible strategy to create new competitive advantages in new sectors where increases in productivity can be shared by companies and employees.

There is an increasing need to better address the implications of R&D-driven innovation for the quantity and quality of jobs, namely the channels through which innovation affects employment and the institutional mechanisms to improve, secure and accelerate the process. This scientific analysis will make it possible to support policy makers in identifying targets and designing specific, tailor-made measures in the related policy initiatives.

Innovation and Employment: a complex nexus

The employment effect of R&D is part of the more general theme of the effect of innovation on jobs.

Box 1 – Employment, wages and productivity in the last decade.

In figures, the Euro Area (16 countries) maintained an average growth rate of employment for the period 2000-2007 of 1.5%. This was drastically reduced to 1.0% if the two years following the recession are included. The performance for the EU 15 is slightly worse: 1.3% and 0.9%, respectively. If we consider the EU 27, the figures drop to 1.1% and 0.8%, respectively.

A simple, back-of-the-envelope calculation shows that those countries growing more (namely, the new Member States) were creating fewer jobs, suggesting that in fact employment growth was supported by creating flexibility at the margin in the largest countries.

The other side of the coin is a poor dynamics of productivity: The Euro Area had an average growth rate of 0.4% (2000-2007) which reduces to 0.01% if we consider the all 2000-2009 period. The EU 15 performed slightly better, 0.5%/0.1%, while the EU 27 had 1% and 0.4%, driven by the new accession countries. Wages suffer as a consequence the poor productivity performance: The Euro Area has a -0.1%-0.001%, the EU 15 has 0.2%-0.2% and the EU 27 closes with 0.5%-0.4%.

The discussion is as old as the history of economic thought. Classical economists deal with the effect of labour substitution by capital adoption. In a nutshell, technological change is adopted because it reduces unit costs, represented in large part by labour. Thus the direct effect of this efficiency gain is to reduce employment. However, the classical economists and their successors investigated a large array of mechanisms through which full employment was restored: mainly due to the adjustment of wages, increasing market dimensions (when competitive pressures push prices downwards) and the reallocation of those workers through new investments in new or old sectors (see Vivarelli, 2007).

Given the uneven nature of innovation, many of those mechanisms occur in historical time at different speed and facing different frictions: wages may be rigid downwards due to institutional frictions or insider power; market expansion may be constrained by rigidity of demand or market power, allowing companies to maintain higher prices; and finally reallocation may be difficult due to the lack of mobility of workers (or lack of specific competences), or lack of entrepreneurship. The operation of the compensating mechanisms may be time-consuming and costly, although effective in theory.

The complexity of the link is revealed by its dependency on the functioning of many variables related to demand, supply and institutions. Empirical identification of this relationship is difficult because of the many variables to be taken into account. The choice of the unit of analysis is also important to avoid confusion between employment growth due to "stealing" of market share from firms pushed away from the market and genuine increases in employment. Unsurprisingly, the evidence is not conclusive (see Pianta, 2005; Chennels and Van Reenen, 2002), as it is not possible to extract a consensus on a specific figure from existing literature for the impact of technological change (see Vivarelli, 2007).

Taxonomic descriptions of innovation are helpful to try to disentangle this nexus. The most recent consensus is more focused on the rather traditional Schumpeterian distinction between product and process innovation.[4] The latter resulting from the long run process of labour-saving technological change, while the former is given by the discovery of new opportunities, opening up of new sectors or market niches, or transformation of mature industries. There is evidence that this distinction fits the data satisfactorily at the industry level (Bogliacino and Pianta, 2010).

R&D and Employment: the new evidence

Following the aforementioned theoretical insights, the role of R&D has been the object of a series of recent contributions from the JRC-IPTS. The main research questions are the identification and quantification of a causal channel and the definition of environmental factors (demand, supply and institutions) that shape the relationship. We have used a variety of data that satisfies three criteria: (a) a homogeneous and theoretically coherent measurement of the innovative variable, namely the Frascati Manual (OECD 2002) for R&D and the Oslo Manual (OECD 2005) for innovation; (b) a European Dimension; (c) the micro or industry level, to give a satisfactory account of the underlying heterogeneity.

The labour-friendly nature of R&D comes from two main sources:

- The product innovation channel: R&D is associated with product innovation and radical technological change; the latter promote diversification of the economy and structural change towards new patterns of specialization and new competitive advantages. This process generates new opportunities in the economy;
- The complementarity channel: R&D generates new knowledge and increases the demand for human resources to exploit it.

This effect on the labour demand by the firm is then translated into higher employment through two channels. On the one hand, R&D investment speeds up reabsorption of the unemployed, either because the arrival of new high salaried jobs reduces search lags, or simply because of the speeding up of the compensation system defined above. On the other hand, more people are encouraged to work because of better job opportunities.[5]

New empirical evidence has been provided on the relationship in three different papers. The first has data at industry level from fifteen European countries, covering 25 manufacturing and service sectors for the years 1996-2005 (Bogliacino and Vivarelli, 2010). The use of industry level data allows controlling for business stealing. Moreover, the availability of the time dimension implies the possibility of using robust techniques to identify causal relationships.[6] In the estimates, the labour friendly nature of R&D emerges robustly: the long run elasticity is around 0.15.[7]

The second work is at firm level (Bogliacino, 2010) using data from the European section of the EU Industrial R&D Investment Scoreboard covering 2000-2008 (see European Commission, 2009 for a description). In this paper, a flexible formulation is used, where R&D investment is related

to innovation, and the demand for labour is determined according to the expectation that research will be successful. In particular, we allow the employment effect to vary with the amount invested, and to interact with the size of the company. In our estimate, the impact is positive and is positively related with research intensity. For the average company, the estimated elasticity is between 8 and 15%, depending on the R&D intensity, which is fairly consistent with the industry level estimate.[8]

Finally, Bogliacino and Garcia Torres (2010) use innovation surveys, representative at the national level and covering 23 EU countries for the period 1998-2000, nineteen countries for the period 2002-2004 and eighteen countries for the period 2004-2006. Three effects of R&D on employment are isolated: (a) a direct effect due to a change in the combination of productive input; (b) an indirect one, depending on the probability of successfully innovating the product, and the evolution of the demand for it; (c) a spillover effect[9] due to the exploitation of the knowledge produces elsewhere. While the first and the second are positive, the third one may be positive or negative depending on the interaction of positive knowledge accumulation effect and business stealing.

Concluding Remarks and Policy Implications

As mentioned above, there are many framework conditions that affect the impact of R&D on employment. As a result, a calibrated policy mix should address many aspects of the economy, as explained in the various Europe 2020 initiatives. A few factors should be highlighted to maximise the employment impact of supporting R&D policies.

- Innovation has an unbalancing effect, especially when associated with structural change, for example, when it is R&D driven and adjustment to the new conditions requires a reallocation of resources from old to new companies and sectors. In other words, there is a need for coordination between skills and jobs (as also suggested in New Skills for New Jobs; European Commission, 2008). This requires unemployment insurance schemes that do not eliminate the necessary flexibility (e.g., the flexicurity policy), but also policies that promote requalification of the workforce. The mismatch between the existing capabilities of workers and those required by companies – especially for young workers - is indeed considerable in OECD countries, but particularly relevant in some European countries.[10]

- Innovation is temporarily associated with market power,[11] which is inefficient from an allocative point of view (namely for the consumer who pay higher prices). As a result, the lack of sufficient R&D should be weighed against the opposite interest of not increasing the harmful concentration too much. This call for two specific sets of policies: one addressing the increase in R&D spending and the other favouring entry. For example, on the one hand, creation of a market for ideas, promoting both mobility (European Commission, 2010c) and financing instruments (European Commission, 2010b), or easier access to them; on the other hand, further strengthening the common market and removal of internal barriers.
- Further policy coordination at the European level, such as the elimination of the fragmentation in the patent system or the creation of an integrated venture capital market, may be supportive of entry. These initiatives will reduce innovation costs for small and medium-sized enterprises and create new jobs by allowing more firms to enter the market, or existing SMEs to increase their size and become more competitive. In the Innovation Union flagship (European Commission, 2010b), some of those factors have already been mentioned.

In the policy design, ex-post evaluation should be explicitly integrated as part of the realisation: proper data sources should be collected during the implementation phase for each adopted measure, according to the specific targets pursued and relevant to be assessed. Europe still lacks a systematic effort for an ex ante design of ex post monitoring and impact evaluation, including the definition of how to collect the proper data necessary for the evaluation.

This effort may be coupled with an ex ante assessment exercise, where regional quantitative economic models are used to provide quantitative estimates of policy impact.

However, regarding the future research agenda, a number of specific issues should be further qualified to better calibrate policies.

Firstly, since technical change has a different impact on different groups of workers (e.g., on skilled and unskilled, as discussed in Acemoglu, 2002 and Chennels and Van Reenen, 2002), it may be likely that differences in innovative activities carried out by companies accentuate differences in the labour market. Secondly, it is necessary to understand what factors (especially the institutional ones) strengthen or soften the impact of R&D.

In this context, JRC-IPTS has planned to further develop the research with both data gathering and analysis at industry and firm level. The expected output of this work package is a characterisation of the structural differences, obtained through a systematic comparison between manufacturing and services and between groups of industries or companies (for a preliminary work in this area, see Bogliacino and Pianta, 2008) and a quantification of the impact at the micro and meso level.

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Endnotes

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2 The role of innovation in the explanation has been recognised by all growth scholars from the very beginning. For a recent review of the contribution of R&D on productivity growth, see Ortega-Argilés et al. (2010).

3 To avoid confusion, we have provided a few definitions. By R&D, we mean the process through which existing technologies (commodities, services and human capital) are used to try to produce a future technology. Since the latter is characterised by knowledge accumulation, it should be distinguished by any kind of recombination of existing knowledge (namely adoption of new techniques or processes), or non-technological improvements of products and process (such as marketing). Finally, by innovation we mean the process through which a new product or process is generated. In other words, R&D is an input and innovation an output, but innovation may also be generated by non-R&D input.

4 There is increasing interest in the effect of organisational innovation. However, given the essence of the latter, namely the efficiency improvement in the management of input, it may be considered as a process innovation.

5 Needless to say, increasing the employment rate (at any given unemployment rate) is also beneficial for fiscal policy reasons, namely increasing the sustainability of the welfare state. The need for higher employment rates is explicitly mentioned in the context of the worrying demographic trends in the European Commission (2008), p.7.

6 Besides econometric technicalities, the main advantage is the possibility of building a measure of R&D stock which controls for the time lag and is less subject to endogeneity problems. For details of the specification and the robustness tests, see the discussion inthe papers.

7 By elasticity we mean a percentage effect on employment determined by an increase of 1% in R&D. To have a comparable value in the literature, one can take the benchmark study, Van Reenen (1997), who estimated the long run elasticity of employment to innovation as 0.10-0.17. Since the estimated elasticity in the papers under discussion was that of employment to R&D, one can break it down into the product of the elasticity of employment to innovation and the elasticity of innovation to R&D. By using an indirect estimate of the R&D-innovation elasticity (from the long review in Denicolò, 2007) of 0.7-1.0, one can define a range of 0.07-0.17, which includes the value of 0.15.

8 It is difficult to translate it in a guess on the number of jobs created. By providing elasticities, this work provides an input for those who may want to run a general equilibrium simulation, in order to get a specific figure. In fact in order to compute the absolute numbers you should make a scenario assumption on how wages, related markets, capital prices, labour supply and taxation evolve.

9 Here the term spillover measures the effect on the population of which the sample considered is representative (or the sector in case of the first work). Of course there may be other type of spillovers to the rest of the economy, but to try to capture them one should move towards general equilibrium modelling, where robustness of the results may be an important issue.

10 OECD (2010) p 361 indicates that the rate of overeducation for 25-29 workers with tertiary education was 23% in 2007, but 44 in Spain and 39 in Ireland.

11 As well as the legal barrier represented by Intellectual Property Rights, there is significant evidence that learning lags (i.e. the time to imitate) and secrecy may operate as effective tools to defend market power.