

R&D INTENSIVE CORPORATIONS AND THE JOB MARKET: THE DANISH CASE

This document shows the role of large R&D intensity companies on the Danish labour market and their effect on job polarisation

In this Issue

- To boost job creation, the labour market role of big multinationals cannot be overlooked
- Large R&D investing companies operating in Denmark act as agents of skill upgrading, rather than destroying mid-skill jobs through job polarisation
- However, workers employed by these companies tend to move within such *elite* (i.e. remaining in the 'Champion's League') rather than moving to other non-multinational indigenous firms
- Scoreboard companies, domestic and foreign, pay higher wages for a given occupation compared to other firms; they also show a higher wage growth

1. The role of R&D intensive multinational corporations on the job market

Job creation is among the 10 priorities of the current European Commission and will be a key focus of the forthcoming InvestEU Programme for 2021-2027.¹ Whatever strategy for job boosting will be implemented it should consider the role of big multinational companies in modern economies, specifically on the job market. Their impact on a country's economic structure (from the job to the product market) is sizable, both in developed and developing countries.

This document discusses briefly the effect of an important kind of multinational companies – large R&D investors – on the job market of their host country, specifically on its tendency to experience job polarisation.

Job polarisation – the disappearance of mid skill jobs in favour of either high or low skill jobs – is a phenomenon that has characterised modern economies in the past decades and has attracted the attention of policy makers (Eurofound, 2014). Job restructuring² has wide-ranging policy implications and triggers complex compensation mechanisms, which makes difficult to evaluate its overall impact on the innovation system, the labour market and the income distribution. Moreover, the role played in this process by different kind of actors (local firms, multinationals, public authorities, etc.) is still under debate.

In this brief we take the case of Denmark to analyse the role big R&D investing companies' play in job polarisation, focusing on a recent JRC report (Holm *et al.*, 2017) studying skills, innovation and reorganization of labour.

2. Top R&D investor companies in Denmark

Since 2004, the EU R&D investment Scoreboard (from here on "Scoreboard") provides a yearly overview of the top corporate R&D investors worldwide. In the [2014 edition](#), 25 of these companies were headquartered in Denmark (see figure 1). These Danish Scoreboard companies are large in terms of R&D investment, sales, and employment. In the Scoreboard, the information reported for each company is consolidated at the headquarter level according to their accounts; while most of these companies are multinationals (operate in different countries). This raises the question about how much Scoreboard companies' impact on the Danish economy, both those headquartered in Denmark (but with subsidiaries in other countries) and those with subsidiaries in Denmark (but headquartered in other countries).

Figure 1 – Location of Danish SB firms



Source: Danish business registry.

¹ http://europa.eu/rapid/press-release_IP-18-4008_en.htm

² For a review of the digital revolution's impact on the labour market see Eurofound, 2018

By matching subsidiary data with Danish registry data, it is possible to quantify how much of the economic activity in Denmark is due to Scoreboard companies operating in Denmark (both headquartered domestic Scoreboard, plus their subsidiaries in the country, and the foreign Scoreboard companies present through their subsidiaries).

The employees of Scoreboard subsidiaries - foreign and domestic combined - in Denmark are about 80,000 full time equivalent jobs, meaning that they make up roughly 12% of the total private sector employment.

By aggregating the R&D expenditures of the Scoreboard subsidiaries as reported in the Danish business registry and comparing the result with the total R&D expenditures of the Scoreboard companies (Guevara et al., 2015), it is possible to calculate the share of total R&D from top worldwide investors located in Denmark.

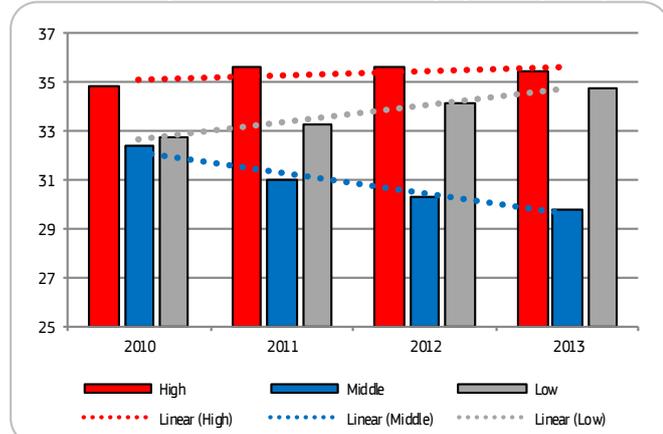
The R&D expenditures in Denmark of subsidiaries of foreign Scoreboard companies amount to the 0.5% of their total R&D expenditures; the corresponding value for domestic Scoreboard companies including subsidiaries is 66%. The majority of R&D investment of Danish top R&D investors is still performed at home; a result in line with evidence from patent analysis showing that, despite some country specificities, Scoreboard companies tend to locate the majority of their R&D investments in their home country (Gkotsis et al., 2018).

3. Job polarisation in Denmark and the role of Scoreboard companies

As many other developed countries, the Danish economy exhibits trends towards deindustrialisation, urbanisation around the larger university cities and job polarisation, with low and high skilled jobs becoming relatively more abundant at the expenses of middle skilled jobs. These trends are closely linked, for example manufacturing activities tend to be located outside cities and providing middle-wage jobs. The deindustrialisation and job polarisation trends for Denmark have been recently documented using employer and employee level registry data by Keller and Utar (2016) and Bernard et al. (2016).

As said, the general trend in the Danish economy is towards job polarisation; figure 2 illustrates this trend.

Figure 2 – Job polarisation (% of total employment by occupation)



Source: Computed using registry data from Statistics Denmark.

A clear shift from middle to low occupations can be observed with only a minor increase in the share of high occupations in the years leading up to 2013. Job polarisation in Denmark does not seem to lead to an increase of high skilled jobs, but it is rather a shift from middle to low skill occupations.

The Scoreboard companies (and their subsidiaries) have a sizable impact on employment and on R&D in the Danish economy. The question is to what extent Scoreboard companies contribute to the structural transformation of the Danish economy, as evident from labour market data.

Using a Seemingly Unrelated Regression model (see the data sources and methodology annex), it is possible to study the effect of the Scoreboard R&D investment, innovation activities, organisational changes and internalisation strategy on job polarisation (i.e. the relative shares of high, middle and low skill jobs). This allows identifying complementarity or substitution effects between each of the aforementioned dimensions and specific types of skills. Finding a complementarity means a positive correlation between the variable at stake and the type of skill (e.g. a complementarity between R&D investment and high skills means that an increase in R&D investment is associated with an increase in the demand for high skill jobs). Finding a substitution effects means the opposite.

The analysis sheds some light on the contribution of Scoreboard companies to the general tendency toward job polarisation. What emerges from the estimations can be summarized as:

- ❖ R&D expenditures of Scoreboard companies are complementary to high skill jobs, have no effect on middle skill jobs, and substitute low skill jobs;
- ❖ Innovation from Scoreboard companies (new products or services, new production methods and marketing approaches) has uncertain effects that further analyses must clarify.
- ❖ Organisational change within Scoreboard companies has complex effects on jobs, mainly depending on the dimension along which the organisational change is observed. In general, organisational change seems to be a source of job upgrading toward higher skill requirements;
- ❖ The internationalisation of domestic Scoreboard companies (measured by imports and exports) also complements high and middle skill while substituting low skill jobs.

All in all, the change in job structure of Scoreboard companies appears to be skill biased and generally pointing to an upgrading rather than polarizing pattern. Indeed, high skill jobs are created mostly at the expense of lower skill jobs. In other words, during the period considered, large R&D investors in Denmark have been an agent of positive skill upgrading (better jobs) rather than of job polarisation.

4. Scoreboard employees: mobility and wages

The skill upgrading effect of the Scoreboard companies on the Danish labour market raises questions about whether the workers employed by Scoreboard companies are somehow "different" from other workers in the private sector.

Using a multinomial analysis (see the data sources and methodology Annex) on individual worker data, it is possible to investigate whether Scoreboard workers differ in terms of propensity to move (change job) and of destination type (where to move) for workers of non-Scoreboard companies.

The analysis shows that:

- ❖ Scoreboard workers are less inclined to move than other workers; particularly those employed in foreign Scoreboard subsidiaries;
- ❖ If they move, workers of foreign Scoreboard subsidiaries are more likely to move to other Scoreboard companies (both domestic and foreign), while those of domestic Scoreboard companies tend to move mainly to other domestic Scoreboard companies.

Thus overall, it shows that mobility is rather cliquish, meaning that Scoreboard workers limit their mobility pattern to within the population of Scoreboard companies and their subsidiaries. In other words, there seems to be a segmentation of the labour market: workers tend to move to Scoreboard companies and once there they tend to remain on the circle of multinational firms. This can be in part due to difference in wages. In fact, on average, workers employed by a Scoreboard company (or subsidiary) experience a higher wage increase. In the most conservative specification of the model, wage growth in Scoreboard companies is approximately 2.8 percent higher than in other companies. Moreover, moving to a Scoreboard company means an average wage increase of 12.5 percent or, roughly, a difference of 1.5 months of salary.

5. Insights and future research

The evidence here presented suggest that R&D intensive multinationals act as an agent of general skills upgrading rather than job polarisation.

This creates an opportunity and a challenge for policies. The opportunity is due to the possibility to have a higher demand of "better jobs"; the challenge is the possible mismatch between skills required and skills available in the market. The fact that in big multinationals jobs requiring a high level of skills are becoming more abundant relative to jobs requiring fewer skills calls for tailored labour market policies and changes to the education and training system aiming at reducing this mismatch by upgrading the general skill level of the workforce.

Domestic Scoreboard companies are found to be a primary source of upgrading, in particular in cases where they undergo organisational change. The potentially desirable behaviour of skill-upgrading rather than destroying mid-skill jobs through polarisation is particularly strong among Scoreboard companies and subsidiaries. Another advantage is that there is a wage premium for working in a Scoreboard company. However, once a worker is employed by a Scoreboard company, (s)he tends either to stay in the same company or to move to another Scoreboard company rather than moving (back) to other Danish firms.

The labour market seems somehow segmented with R&D intensive multinationals seeming able to attract the most skilled workers in the economy. Whether this phenomenon somehow limits the knowledge spillovers of R&D intensive multinationals within an economy is an interesting subject deserving further analysis. Finally,

the spatial concentration of Scoreboard companies could have an impact on workforce mobility, which is another possible future line of research.

Disclaimer

The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

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Annex – Data sources and methodology

Data:

The JRC compiles the Scoreboard data and supplied a list of Scoreboard firms along with corporate level financial data for the firms. The corporate structures of the Scoreboard firms were obtained from Bureau Van Dijk, and links each Scoreboard firm with a presence in Denmark to one or more Danish VAT numbers (i.e. companies). This combined information was then uploaded to the research servers at Statistics Denmark, where the VAT numbers were linked to detailed registry data on all people, workplaces and companies in Denmark, and to the FUI (Research, development and innovation – Danish CIS) surveys containing information on innovation behaviour and R&D expenditures.

Seemingly Unrelated Regression model:

Employment at each company is divided into three mutually exclusive and exhausting groups: high, middle and low skill jobs. The regression model is a system of three equations which each explain the share of company employment in one of these groups. While the three equations are not explicitly related, they are indirectly related since when one employment share changes, at least one other share changes in the opposite direction. The SUR model takes this relationship among the three equations into account.

Multinomial analysis:

To study the mobility patterns of employees at Scoreboard companies and subsidiaries each such Scoreboard employee was matched to a non-Scoreboard employee using coarsened exact matching. The resulting processed data were then analysed using multinomial logistic regression. The effects on wages were estimated from the same pre-processed data using linear regression.

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