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Job polarization, job tasks and the role of firms

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HIGHLIGHTS

- I examine how firms influence the current process of job polarization.
- The analysis is based on detailed Swedish matched employer–employee data.
- I find evidence of within-firm job polarization.
- Both within-firm and between-firm components are important for job polarization.
- The degree of routineness of jobs is the most important explanation for the results.

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ABSTRACT

Using detailed Swedish matched employer–employee data, I show evidence of within-firm job polarization. Applying a decomposition framework, I find that both within-firm and between-firm components are important for overall job polarization. Results also indicate that the degree of routineness is the most important explanation for the observed within-firm pattern. Bringing the analysis down to the firm level seems to confirm the important role played by routine-biased technological change.

1. Introduction

There is ongoing debate about the impact of new technology on different labor market outcomes. Fears of increasing inequality and decreasing job security influence the debate. There are also worries that new technology will replace not only manual routine jobs but also more advanced jobs with cognitive content.[1] In a recent paper, Frey and Osborne (2013) estimate the extent to which computerization can replace individual occupations in the US labor market. Their main finding is that around half of total employment in the US is at risk of being automated within one to two decades.

An important issue in the literature that analyzes how computerization and new technology affect relative labor demand is identifying the types of workers for whom computers and new technology are a substitute and those for whom they are a complement. Several studies have showed that investments in different forms of new technology are complements to hiring employees for non-routine jobs and substitutes for hiring workers to perform routine jobs, indicating that demand for different types of labor is heterogeneous.[2] These results are related to a recent, much debated phenomenon, referred to as job polarization, i.e. the simultaneous growth of high-skill, high-wage jobs and

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[1] For instance, Brynjolfsson and McAfee (2014) argue that advanced robots will soon be able to replace a broad range of job tasks. See, also, Autor (2015) for a recent overview on automation and employment.

[2] See, e.g., Autor et al. (2003, 2006), Goos and Manning (2007), Acemoglu and Autor (2011), Autor and Dorn (2009, 2013) and Graetz and Michaels (2015).

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low-skill, low-wage jobs at the expense of middle-skill jobs.[3] Prominent explanations for this phenomenon are routine-biased technological change and the offshorability and automation of jobs.

Thus far, the substantial job polarization literature has not taken into account firms in this process. Thus, the influence of firms in the observed job polarization patterns is more or less absent in the empirical literature.[4] The focus has instead been on employment in different occupations, with no consideration given to how firms shape the labor demand process. I aim to bridge this knowledge gap by using detailed matched firm–worker data for Sweden spanning the period 1996–2013 to investigate the role played by firms in the recent trend toward a more polarized labor market. Is the polarization pattern also traceable within firms over time so that we also have within-firm job polarization?

Understanding how job polarization is related to firms is of interest given the role of firms in the wage setting process and how they shape overall wage inequality and relative labor demand. A large body of literature has found that the firm and establishment effects are important components in decompositions of overall wage inequality (see, e.g., Barth et al., 2016 and the references therein). Given how firm heterogeneity influence wages and wage inequality, this paper investigates if a similar firm effect is also present in job polarization. It is also important to examine if firms as employers contribute to job polarization and changes in relative labor demand. This is not possible to observe if one only takes into account nation-wide job polarization. Data limitations have usually prevented previous studies from being able to study this issue. Matched employer–employee data make it possible to dig deeper into this issue. Finally, from a policy perspective, knowing the origins of job polarization, including how firms shape this process, is of importance.

A second purpose of this paper is to analyze the contribution of different explanations for job polarization while at the same time focusing on the role played by firms as employers.[5] It has been proposed that automation or computerization might have a role to play, but the empirical evidence is scarce. By adding computerization to the analysis, my aim is to disentangle the relative impact of the proposed explanations for job polarization, as described above.

2. Data and descriptive statistics

The analysis is based on register-based matched employer–employee data from Statistics Sweden covering the period 1996–2013.[6] The firm data contain detailed information on all Swedish firms. The worker data cover detailed information on a large representative sample of the labor force.[7] Occupations are based on the *Swedish Standard Classification of Occupations* (*SSYK96*), which in turn is based on the *International Standard Classification of Occupations (ISCO-88)*. All data sets are matched by unique identification codes. To make the sample of firms consistent across the time period, the analysis is restricted to firms with at least 10 employees in the private sector.

As a measure of the routineness of occupations, I use the Routine Task Intensity (RTI) index, which is used in many papers on routine-biased technological change (see, e.g., Autor et al., 2003 and Goos et al., 2014 for more information). The offshorability of occupations is based on the same measure that is used in Goos et al. (2014), which in turn is based on Blinder and Krueger (2013). Both the RTI index and the measure of offshorability are available at the 2-digit ISCO-88 level.[8]

The risk of automation of jobs is based on work by Frey and Osborne (2013). They implement a novel methodology to estimate the probability of the computerization of detailed occupations. The calculated probabilities in Frey and Osborne are based on *O*NET*, which is an online service provided by the US Department of Labor. *O*NET* includes very detailed and in-depth information on nearly 1000 occupations. In Frey and Osborne, occupations are classified according to the US Labor Department's *Standard Occupational Classification* (*SOC*). The estimated probabilities based on SOC have been translated into ISCO-88 to obtain figures for the occupations used in this paper.[9]

3. Results

Job polarization implies that we should expect an increasing employment share for occupations in the higher and lower parts of the wage distribution and that the employment share should decrease in the middle of the wage distribution. Fig. 1a presents basic results for the entire Swedish business sector. To be comparable to earlier studies, the same occupational classification as in Goos et al. (2009, 2014) is applied. The figure shows fairly clear patterns of job polarization in Sweden with improved employment opportunities in high-wage and low-wage occupations, while it is also apparent that a number of occupations in the middle part of the wage distribution have experienced falling employment shares during the period.

Goos et al. (2014) decompose the overall change in employment shares into within-industry and between-industry components. In addition to industry reallocation, I extend their analysis by addressing firms and the corresponding within-firm and between-firm components of job polarization. Results are presented in Figs. 1b and 1c. Starting with the industry components, we see that both industry components are typically positive for high-wage and low-wage occupations and that they are mostly negative for the group of middling occupations. I have also divided occupations into three wage groups as in Goos et al. (2009, 2014).[10] For these broad groups, results show that both industry components are positive for the high-wage and low-wage groups, and for the middle-wage group, they are both negative. These results indicate that overall job polarization stems from both within- and between-industry reallocation.

[3] See, e.g., Goos et al. (2014) for an overview, Asplund et al. (2011) for a cross-country analysis on the Nordic countries and Adermon and Gustavsson (2015) for a study on Sweden. See, also, Olsson and Tåg (forthcoming) for a study on job polarization and the private equity market.

[4] Another paper that examines firms and job polarization is Kerr et al. (2016) using Finish data. Their results from ongoing work indicate that job polarization is taking place within existing firms, as well as originating from firm entry and exit.

[5] Obviously, the impact of new technology and globalization can have similar effects on firms and workers and hence on job polarization patterns. For instance, many routine job tasks are offshorable and have a potentially high risk of being automated. In addition, computerization has made it possible to offshore certain job tasks that were primarily performed by middle-skilled workers. Thus, it is difficult to separate contributions.

[6] See, e.g., Davidson et al. (2014) and Hakkala et al. (2014) for two recent articles based on the same data.

[7] The worker data originate from the Swedish annual salary survey (*Lönestrukturstatistiken*). See www.scb.se for more details on the data.

[8] The highest RTI index is found for office clerks and the lowest for managers of small enterprises. The measure of offshorability of occupations is highest for machine operators and assemblers and lowest for drivers and mobile-plant operators.

[9] Details on this translation can be found in Heyman et al. (2016). The highest risks for automation are found for salespeople and demonstrators and agricultural, fishery and related laborers. The lowest risks are found for legislators and senior officials and life science and health professionals.

[10] Computing the percentage point change in employment share for each of these groups, we find an increase in the high-wage group equal to 6.7%, a decrease in the middle-wage group equal to 17.8% and an increase in the low-wage group equal to 11.1% during the period 1996–2013.