Job polarization at the firm level - evidence from Finland

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Abstract (extended)

There exists an extensive literature that provides the theoretical and empirical grounds for the standard view that skill-biased technological change (SBTC), especially related to computer-based production technologies, is the driving force behind increasing wage differentials, education premiums and skill upgrading observed in many industrialized countries since 1970's/1980's (see Acemoglu and Autor (2010) for a recent review). Autor, Levy and Murnane (ALM) (2003), however, raised the question *"… what it is that computers do – or what it is that people do with computers – that causes educated workers to be relatively more in demand."* The answer provided by ALM is the so-called routinization hypothesis. Adoption of computers in the workplace changes the tasks performed by workers at their jobs. Computers in particular substitute for workers that perform routine tasks, but complement workers in carrying out non-routine tasks. ALM present a theoretical model which predicts that industries and occupations that are initially intensive in routine tasks, will invest more in computer capital as its price declines, and therefore reduce routine task inputs and increase non-routine task inputs. This then increases the relative demand for educated workers, because they have comparative advantage in non-routine tasks and computer usage. On the other hand, demand for intermediate wage (skill level) occupations, which often are routine task intensive, declines as they are substituted by computers. This adjustment may lead to job polarization, where employment concentrates at the low and high skill (wage) occupations, whereas the jobs at the middle of the skill distribution are diminished. Acemoglu and Autor (AA) (2010) present a formal task-based model that makes this specific prediction. They provide some empirical evidence for their model with regressions that predict changes in wages for different skill groups (defined by sex, education and experience) by variables that indicate the relative advantage of these skill groups in performing non-routine, routine or service tasks (i.e. the shares of each skill group in non-routine, routine, and service occupations prior to computer era). ALM (2003) also presented empirical evidence for their model by industry-level regressions explaining the changes in the non-routine and routine task input measures (from Dictionary of Occupation Titles, DOT, database) with the industry level computerization. They found that non-routine labour input rises more, and routine labour input declines more, in industries that invest more in computer capital. This is consistent with their model.

In this paper we study the routinization hypothesis and the implied job polarization in the Finnish private sector using the new Harmonized Wage Structure Statistics (HWSS) data of Statistics Finland. It combines the annual wage structure statistics data into a harmonized panel data, where all important wage measures and classifications, like industry and occupation are consistent across all the years. The new harmonized data is presently available for the private sector and it covers the years 1995-2008. The annual wage structure statistics are based on the firm and individual level wage surveys of employer federations, which cover their member firms, augmented with samples of non-member firms and sectors not covered by employer data by Statistics Finland. Using sampling weights these data are

representative of the whole private sector, except for the smallest firms, which are exempted from the wage surveys of employer associations or Statistics Finland. We augment these HWSS data with firm-level variables for technology intensity from R&D and ICT Surveys of Statistics Finland. Furthermore, we match to the wage data task input measures at 2-digit occupation level from Goos, Manning and Salomons (2010). Using this data we first of all document the trends in tasks inputs used in Finnish private sector firms, and the possible employment and wage polarization development in the Finnish private sector labour market. The novelty of our paper is, however, in performing the ALM (2003) and AA (2010) regression analyses at the firm level, instead of aggregate economy or industry level. In this way, we are able to study evidence for routinization and job polarization at the micro level, where the actual labour demand decisions are done, and thereby also minimizing any effects from compositional changes in product demand (inter-firm shifts in production and employment) on the structure of employment or wages that may cause spurious relationships in other studies. Furthermore, we are able to examine the technology-based explanations for routinization and polarization at the firm level using firm level R&D and ICT variables as explanatory variables in the firm-level regressions.

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