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Job polarization in aging economies ☆

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HIGHLIGHTS

- Goods and services are complementary for seniors and substitute for young people.
- New technologies replace labor input in routine tasks.
- Labor input reallocates towards the service sector in aging societies.

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ABSTRACT

The progressive diffusion of ICT explains the raise in the number of highly paid jobs but has difficulties in justifying that of low-paid jobs. Classifying occupations according to their median wage in 1993, we analyze their employment growth until 2010, which is highest both in the top and in the bottom of the distribution, and lowest in the middle. Low-paid personnel services arise as the main factor responsible for the increase in the proportion of employment at the bottom of the wage distribution. We argue that population aging can explain the increased demand for personal services and thus the rise of employment in low-paid positions. Our argument goes as follows: goods and personal services are complementary for seniors. The decrease in the relative price of goods, induced by the progressive replacement of labor input in routine tasks by machines, is then associated with an increased demand for personal services if the proportion of seniors is increasing. We thus complement the existing literature on employment polarization by showing that demographic trends also play first order role.

1. Introduction

This paper investigates the impact of aging on recent labor market dynamics. Autor and Dorn (2013) show that employment changes in the US since the mid-1990s are U-shaped, with relative employment decreases in the middle of the wage distribution and relative gains at the tails. At the bottom of the distribution, they find that employment gains are accounted for by growth in low-skilled service occupations; these jobs often involve assisting or caring for others (e.g. food service, security guards, janitors, child care workers, hairdressers). Autor and Dorn (2013) relate this job polarization to the combination of non-neutral technological progress and consumer preferences that favor variety over specialization. Non-neutral technological progress reduces the cost of routine tasks since labor input is replaced by cheaper machines, but it has only a minor impact on the cost of work associated with service occupations. This results in a decrease in the relative price of goods with respect to services. If goods and services are complements the demand for service occupation outputs will increase, resulting in an increase in both employment and wages in service occupations. Autor and Dorn (2013) are silent about the potential reasons behind this complementarity in consumers' preferences. They also fail to explain the absence of labor market polarization before the mid-1990s even though American technological diffusion started in the 1980s. We believe that population aging explains both of these

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phenomena. Because goods and personal services are complements for seniors, population aging—in conjunction with technological progress—increases demand for these services. Further, labor market polarization appeared when population aging started to become an issue for most western economies.

We propose a simple theoretical framework following Baumol (1967) to test our hypothesis. Our model provides an equation to estimate the elasticity of substitution between goods and personal services by age group. It further allows us to analyze the combined impact of population aging and technological progress on demand for labor input in the personal service sector.

Our contribution is twofold. First, we estimate age-specific elasticities of substitution between goods and personal services. If the elasticity of substitution is constant, then aging is sufficient to produce job polarization at the bottom of the wage distribution and allows for increased complementarity (with an upper bound). These elasticities suggest that goods and personal services are indeed complements for older households while being substitutes for young ones.

Second, in the context of technological change between 1993 and 2010, we estimate the contribution of population aging to the increased concentration of jobs at the bottom of the wage distribution. We provide evidence of the gradual polarization[1] of the labor market and find that demand for service occupation outputs drives employment growth at the lower tail of the distribution while driving up wages for this type of job.

To our knowledge, this is the first paper that presents evidence of job polarization in French data with a stress on employment growth in the service occupation sector. Dealing with the relationship between polarization and the wage distribution is left for future research. Our objective here is to analyze the combined contribution of aging and technological change to the job polarization process, in terms of employment changes.

The paper is organized as follows. Section 2 is a literature review. Section 3 sketches the theoretical framework. Section 4 empirically validates our assumption concerning the divergent elasticity of substitution between goods and personal services for seniors and young workers. Section 5 provides evidence of job polarization in the French labor market. It shows that employment demand for service occupations has increased due to the combined effect of technological change and aging. Section 6 concludes.

2. Literature review

The literature is far from unanimous concerning the reasons behind the increased demand for labor input in non-routine manual jobs. Initially, most of the literature simply focused on the progression of wage inequalities. Using US data, Lemieux (2006) and Autor et al. (2008) found that wage inequalities between the ninth and the fifth decile had increased more than wage inequalities between the ninth and the first decile, suggesting a rising demand for jobs at the two extremes of the distribution or, at least, a decreasing demand for jobs in the middle of the distribution.

Autor et al. (2006) for the US, Spitz-Oener (2006) for Germany, Maurin and Thesmar (2004) for France, and Goos and Manning (2007) for the UK find that labor input in routine positions (those in the middle of the wage distribution) has been gradually replaced by cheaper and more productive machines. This automation improved the productivity of labor input in abstract tasks (those at the top of the wage distribution) by facilitating access to information. On the other hand, this new technology created a mass of jobless medium-skilled workers. Part of this mass may remain unemployed,[2] whereas another part may be reallocated towards more labor-demanding sectors. Obviously, in spite of the increased demand for qualified labor in abstract positions, there is a skill mismatch since medium-skilled workers do not have the required qualifications to apply for these types of non-routine jobs. They will thus have to switch to manual, non-routine positions (see Goos and Manning (2007)). The productivity for these positions has remained unaffected. These types of position are difficult to automate or outsource since they require interpersonal and environmental adaptability as well as direct physical proximity. But why should the demand for these jobs rise in such a way as to absorb part of the workers that have been replaced by machines? Our paper points to population aging as an answer to this question.

Using British data, Manning (2004) has already observed that the employment of low-skilled workers is increasingly dependent on their physical proximity to high-skilled workers, as low-skilled work is increasingly concentrated in the non-traded sector. According to him, if there are relatively more skilled workers in a city, we could expect the demand for unskilled labor in the non-traded sector to rise. This would lead to fewer unskilled workers in the traded sector and an overall increase in demand for—and wages of—the unskilled. Within a delimited geographical space, a kind of complementarity between unskilled and skilled workers seems to arise. The biased nature of technological progress must have directly promoted skilled labor and indirectly (via the complementary relationship) unskilled labor.

Based on US data, Mazzolari and Ragusa (2013) provide an explanation similar to Manning (2004)'s of the increasing demand for low-paid services. Their idea is that low-skilled workers are employed in non-tradeable, time-intensive services that are substitutes for home production activities. Over the past decades, wage gains at the top of the wage distribution have increased the opportunity cost for high-skilled workers in spending time on domestic activities. Rather than implementing this domestic production themselves, high-skilled workers now prefer to buy these home services. So the increase in demand for low-paid services at the bottom of the wage distribution results from the combination of a substitution effect (the opportunity cost of one hour of home production is now higher for high-skilled workers) and an income effect (because high-skilled workers are wealthier, they can buy more services). In sum, Mazzolari and Ragusa (2013) and Manning (2004) conclude that rising wage inequality between highly paid skilled workers and unskilled workers will induce the formers to demand more low-skilled services so as to free up more of their time for market work.

Based on 16 European countries, Goos et al. (2009) also analyze the importance of income inequality effects. They conclude that the relative growth in low-paid service occupations cannot be explained by the increase in real income and non-homothetic preferences. The higher income elasticities they estimate are actually associated with the top of the wage distribution (more precisely, with the three high-paid industries: (*i*) financial intermediation, (*ii*) real estate, renting and business activity, and (*iii*) transport, storage and communication). Goos et al. (2009) find that the automation hypothesis remains the most important factor behind the observed shift in the employment structure. Little support is found for the hypothesis that changes in product demand are driven by income inequality effects.[3] Further they find a relatively small,

[1] By definition, a polarization process implies an increasing concentration in both extremes of a given distribution. In this paper, we will often refer to polarization at the bottom of the distribution or polarization at the top of the distribution, meaning that the focus of the analysis is on the bottom or the top tail of the wage distribution, even if we are aware that polarization must concern both extremes of the distribution.

[2] Cheron et al. (2011) show that the diffusion of new technologies has fostered a gradual increase in the relative unemployment rate of medium-skilled workers.

[3] Rather than focusing on income inequality effects, Clark (1957) considers a uniform income effect. He argues that the income elasticity of the demand for personal services is greater than one, in which case, a general rise in income will tend to shift employment towards service-intensive occupations. This pure income effect is not considered by more recent papers, which focus rather on the impact that the recent increase in income inequality has had on job polarization.