

The Effect of Changes in Labor Demand and Entrepreneurship on Income Inequality under Innovations

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ABSTRACT

The highly skilled-biased technological changes brought by innovation have changed the employment market greatly. This paper presents the impact of changes in labor demand and entrepreneurship on income inequality under innovation in the form of literature overviews and finds out that innovation is positively correlated with the income inequality from two points of view, labor demand and entrepreneurship. Firstly, innovations can change the demand for high skilled and low skilled labor and thereby change the skill premia and wage structure, which would influence the income inequality. Secondly, the rising entrepreneurship allows entrepreneurs to accumulate more wealth due to higher financial returns from innovations as well as higher incentive to save more money. Different from traditional papers which analyze the relationship between innovation and income inequality from one single aspect, this review paper intends to show both the effect of labor demand and entrepreneurship on the income inequality from the perspective of innovations through summarizing the related existing theoretical and empirical research studies. The study also points out the research gaps in the current studies and future research directions about the effect of innovations on the income inequality.

Keywords: *innovation, labor demand, entrepreneurship, income inequality*

1. INTRODUCTION

According to the idea by Schumpeter, entrepreneurs can be regarded as innovators as they have the capability of combing existing resources to create new ones [1]. Rising entrepreneurship under innovations has brought enormous technological improvements, and these innovations has led to enormous changes in the public's daily life. Particularly, skilled-biased technological changes would be a major one. This highly skilled biased feature of innovation is highly correlated with the fluctuations in the employment fields, causing changes in people's profession types, labor demand and supply, educational and skill requirements, and workers' salaries etc. Among numerous changes resulting from rising entrepreneurship under innovations, the changes happening in the demand for high skilled labor and a number of self-employed businesses are mostly significant. The alternations produce huge differences in the worker's profession and thereby their skill premia; these changes thereby result in huge gaps in workers' wage and financial returns from the innovation, consequently causing wider income disparity between

people in the society. This review paper specifically focuses on these two major changes caused by the rising entrepreneurship under innovations, that is, changes in labor demand and entrepreneurship.

2. MAIN BODY

2.1. Theoretical Perspectives Research

2.1.1. Changes in demand for different skilled labor under innovations

One of the significant changes brought by innovations would be the changes in labor demand for different skilled labors. The two specific effects that that the highly skilled biased feature of innovation creates ton the labor market summarized by Acemoglu and Restrepo are the assumptions that most related studies fall on [2]. Firstly, the displacement effect refers to the changes taking place where innovation enables capital and automation to replace part of the labor in the process of the production [2]. In this way, the increases in

automation innovations, including computerization and industrial robots, are directly related to the decline in low-skilled labor [3] and will always lead to decline in the share of low-skilled labor in value added to the production and economy [2].

Additionally, the highly skilled-biased traits of innovations produce another second effect to the labor market, named reinstatement effect, which is the effect in which innovations redefine tasks and work into a broader and wider range and consequently require more numbers of labors [2]. This is because that higher innovation and automations possess an aggregate scale effects, which can alter the economy's capability and reduce the cost of production, thereby pushing the overall economy productivity outward [3]. Thus, with a larger range and promoted productive capability of the economic market, higher demand for labor and labor share is created. However, due to the requirement for high skill in the process of developing innovations and changes in task content brought by the innovations and entrepreneurship, this higher demand for labor majorly focused on the high skilled ones.

The above two effects from innovations influence labor market and thus skill premia greatly and consequently produce more income inequality. Based on the theoretical analysis conducted by major economists, the widening effect placed on income inequality majorly comes from two factors: the first factor is the increased wages due to improved firm quality under innovation; the second influential factor comes from the changes in the demand for high skilled labor in the innovation market.

To begin with, the nature of innovations themselves firstly influence the salaries offered within the firms [4]. Innovations are highly and positively correlated with the skill premia in the company because of the overall increased quality of the labor force and company brand attributed to the innovations [4]. With a stronger background and solid financial return from the innovations, companies then have the capability to offer higher wages. In addition, specifically within the innovative firms, in order to stimulate workers to develop more innovations and thereby increase profitability, a higher wage or larger of the profit that obtained from the financial returns of the innovations is shared to the employees [4].

Then second major changes in skill premia and income inequality mentioned in the related economists' works are resulted from the changes in the demand for different skilled labor according to the labor demand and supply model. As what has been pointed out in the assumption part, automation innovation would replace low-skilled labors during production, such as in the manufacturing industry. On the other hand, developing innovations requires more high-skilled labors, such as software developers, application designer, and computer programmers etc. These changes in the demand in

positions for different types of labor produce a higher demand for high skilled labor while cause a lower demand for the low skilled ones. According to the labor demand and supply model, the increase in demand for high skilled labors while their supply remain stable would result in a higher wage offered to the high skilled labor. The highly skilled-biased feature of innovation alters the employment market with a new labor structure and consequently allows different skilled workers to earn income with wider gaps compared with before.

Based what we have mentioned, increasing innovations would increase high-skilled wages due to a higher demand in the quantity number of high skilled labor. In comparison, the low skilled wages remain ambiguous depending on the combinations size of reinstatement effect and displacement effect, but it is clear that it is impossible for the wages high skilled and low-skilled labor to grow at the same rate in the long term under the condition that innovations grow constantly [3]. Additionally, the fraction of low skilled would generally decline in the total labor share due to the replacement from automation innovations. Despite the innovations' inability to fully take over low skilled in some working sector and thus keeping the demand for them [5], the employment demanding situation for low skilled labor overall tends to be negative under the increasing innovations while the effect appears to be fairly positive for the high skilled workers. These opposite situations consequently enlarge the existing wage differences between labors and widen the income inequality between them.

2.1.2. Entrepreneurship under innovations

The appearing innovations has incentivized the prevalence of self-employed workers and rising of self-employed business and entrepreneurship [6]. Innovations expand the global market with technology and entrepreneurship, providing innovators with environment, resources, and networking to convert their creativity into business [7]. The overall atmosphere fill with encouragement and incentives for people to start their own innovative ideas into practical business in the innovative economic market. Although rising entrepreneurship under innovation improves the overall market and society into a higher level through combing exiting resources to an existing product or process [7], it at the same time influences the differences in people's wealth and income based on whether they enter entrepreneurship and consequently affect the income inequality. Based on the views pointed out by the western researchers, there are overall two essential reasons behind: increasing incentives to accumulate more wealth due to the working characteristic of entrepreneurship as well as the endogeneity of wealth.

To begin with, entrepreneurship as the occupation creates a number of the incentives for the owners to save

more wealth. From a macro level, the entrepreneurship under innovation would increase aggregate income of the overall society [6] due to great economics profits acquired. However, this increase in overall income falls unequally to the individuals in the society. One mechanism behind is the theory of borrowing constraints that entrepreneurs face. Borrowing can be regarded as an essential way to obtain sufficient financial investment to start and sustain the business and entrepreneurship activity; the amount of investment and capital is directly related with the size and development of the business [8]. The amounts that can be borrowed are determined based on the observable characteristics and belonging assets of the entrepreneurs in the credit market [8]. In order to obtain sufficient funding for the business, the borrowing constraints thus serve as the incentive for entrepreneurs to accumulate wealth [6] to obtain higher acknowledgments and trusts in the credit market. Additionally, entrepreneurs have a higher implicit rate of return [8] due to the nature of the occupation compared with the workers. Comparatively, their workers' wage remains stable regardless of the increase in profits. This single change in income that falls on entrepreneurs allows them to earn more and acquire higher incentives to save more while sustains the salary of the working groups with small varying extent, which widens the income inequality between entrepreneurs and employers.

More importantly, it is widely recognized that wealth creation is strongly endogenous [9]. In this way, people who have high skills and ability, and tertiary educational degree are more likely to save more due to their ability to make more money and choose high profession as occupation and thus more likely to start entrepreneurship in the first place. Many researchers have found that top income households have a higher tendency to choose entrepreneurship as their occupation [10]. Entrepreneurs generally concentrate larger part of wealth in the society due to the borrowing constraint argument mentioned earlier. Although there is no solid connection between entry rate of self-employed business and the wealth of households except of the top rich households [8、 11], the large amounts of wealth which they possess indeed allow the members in the top income households to possess higher social mobility [12、 13]. This means that being as the top income households and working as entrepreneurship would enable the household to enter higher class [13] and have more chances to establish strong social networking, more likely to enter higher education and confront with greater opportunities for their career development. The solid financial situation and higher social mobility in another way provide with incentive and foundation for these households to enter or expand their entrepreneurship.

In this way, family background could also be considered as an essential determination for entrepreneurship. Due to the asymmetric information in

the market, the general background of the households with entrepreneurship would serve as an indicator for their reliability [8] and are likely to provide with higher credibility to their borrowing from the banks, suppliers and buyers [8]. The wealth that entrepreneurship household owns thereby largely reduces the asymmetric information problems that innovators may face during the starting up and become more likely to achieve success in their business [8].

Additionally, households with entrepreneurship would be more possibly to enter self-employed business as their career pursuit in the initial place and they are also more likely to accumulate more wealth due to the higher return and saving rate of their work. In another word, those rich households with entrepreneurship encounter a higher likelihood to become even more financial advantaged while the economic incomes still remain constant for the general employees, which worsen the existing income inequality to a further level.

2.2. Empirical Studies

Various studies have shown that innovation has a positive relationship with income inequality [12、 14、 15、 16]. As mentioned earlier, innovations change people's employment and wages and thereby influence people's financial situations through entrepreneurship, which can make top income household to become richer while normal households to become more economically-disadvantaged. Several empirical studies have proved the positive relationship between income inequality with demand for high skilled labor as well as entrepreneurship. The studies can be concluded into the following two categories corresponding to the theoretical framework we mentioned earlier.

2.2.1. Studies on High Skilled labor and Income Inequality under Innovations

To start with, the empirical studies has shown that innovation would result in a decline of the low-skilled labor while an increase for the high-skilled labor in the market. Using high education as the indicator differentiating workers' skills, namely, college attainment as the essential measure, the study has shown that due to the influence of skilled biased technological changes under innovation, the fraction of college graduates in employment share has been consistently rising from 6.1% in 1940s to the 24% in 1990s in the United States; simultaneously, their wages also compose of an increasing share in the total wage bills [2]. Another empirical analysis also confirms the same analysis that as R&D increase in the innovative company, the share of high-skilled labor increase dramatically from 13.7% in the very beginning to 63.8% to the last percentile [17]. This changes in the number for high-skilled labor and

low-skilled labor demanded thereby indirectly influence the income they receive.

Besides of the increase in the demand for high-skilled labor in the employment labor force, research studies have shown that the endogeneity of high skilled labor is another essential reason attributed to the income inequality. Research studies present this point from mainly two perspectives, endogenous benefits from their education and types of firms that high-skilled labor enter. To begin with, high education as the traits for high skilled labor is highly and positively correlated with the wage they received after entering employment. Empirical analysis also confirms that there is a positive correlation between high skilled labor with great score and high education using the data from both European countries and the United States [18]. Particularly, the United States shows the largest wage differences resulted from years of education; having one year more of education would add approximately 8% of increase wage for the workers [18]. This has been also proved by the study that business owners with high education are much more likely to succeed during start-up stage [19].

The second point is that the wages offered by the innovative firms are also much higher compared with non-innovative firms. Statistical data has shown that the average hourly wage is 3 pounds higher in the innovative firms compared with non-innovative firms in the United Kingdom [17]. Besides, study shows that the developing level measuring using the size of R&D in the innovative firms has a both positive and significant correlation with the income that labor received [17]; 1% increase in the R&D level would increase the average by 11.7% [17]. With the emphasis on the share of high-skilled labor in the innovative firm composing of the majority of labor force in the company, the gaps of the income between two high-skilled and low-skilled labor are once more enlarged. From this, we can see that the changes in the labor demand structure and endogenous wage offered under innovation produce larger gaps adding on the existing lags between people's wage and cause a widening effect for the income inequality through differences in skill premia.

2.2.2 Studies on entrepreneurship and Income inequality under Innovations

There are also a variety of empirical studies focusing on the relationship between entrepreneurship and income inequality. Firstly, as the empirical proof for our theoretical framework that households with entrepreneurship concentrate the majority of wealth in the economic market, statistics from the 1989 wave of the Survey of Consumer finance show that business owners or self-employed workers occupy 52.9% share of the total wealth even if this group of people only take up around 16.7% in the population in the United States [8]. Meanwhile, households with entrepreneurial experience

are approximately 20% more likely to become self-employed or business owners compared with those households without the experience [13]. Thereby, households with entrepreneurship are confronted with a higher likelihood to become richer and accumulate more wealth due to their professions.

Most researchers have shown that the increasing numbers of entrepreneurship generally move at the same trend as income inequality. According to the empirical analysis conducted by the Atems and Shand [6], self-employment is positively and significantly correlated with the income inequality in the United States measured using Gini index, the degree of inequality in the distribution of family income in a country [10]. The studies show that as self-employment rate increases by 1 percent, the gini index would increase by 0.0354, which is statistically significant at 5% significance level [6]. The study also captures income inequality using the Theil index and obtains the similar but even higher trend of the result that one percent increase in self-employment rate would add on 0.12-point increase in the income inequality [6]. Both results show that the increase in entrepreneurship is strongly related with the increase in income inequality in society.

3. CONCLUSION

This review paper summarizes the research studies about the effect of changes in different skilled labor demand and entrepreneurship on the income inequality from the point of view under innovation market. The study result presents that the demand for high skilled labor and number of entrepreneurs are both positively correlated with the income inequality in the society. Nevertheless, in the review process, this study has also found out several research gaps and potential future research directions in the related studies and academic areas. The research gaps existing in research studies surrounding by changes in labor demand and entrepreneurship on income inequality are present in majorly two areas—study content and detailed division of the topic of entrepreneurship.

To start with, most of the studies focus on one single aspect of changes brought by innovations and research simply on the corresponding relationship with income inequality. It is highly suggested that comprehensive factors instead of traditional single perspective and alternation under innovations could be considered and added into future studies. The comprehensive study with multiple factors adding in would provide the related studies with further guidance and more comprehensive overview on the relationship between innovation and income inequality. Moreover, the majority of the current studies ignore the size of entrepreneurship which may pose exactly opposite effects on the income inequality under innovation. It is highly likely that the rising of large enterprises under innovation may widen income

inequality due to high income only targeted toward high-skilled labors; comparatively, increasing small self-owned business could provide with more working opportunity and save part of people from unemployment. In this way, detailed classifications for the size of firms under innovation could be added for future studies and analyze their specific effects on income inequality separately. It is expected that research studies about the effect of labor demand and entrepreneurship on income inequality could help government design proper policies regulating the innovative market and help society better allocate and utilize the resources under innovations effectively and rationally.

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