The growing income inequality between high-skilled and low-skilled workers: Is the great decoupling responsible?

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Abstract  
This paper aims to explain whether the great decoupling has influenced growing income inequality between high and low skilled labor. Recent findings have demonstrated that beginning in the 1980s there grew a gap between productivity and income, known as the great decoupling. We argue that this gap was due to growing technological advancements. We argue that technology has contributed to inequality between high and low skilled labor by creating higher skilled jobs that work with technology and automating “routine tasks” in low skilled jobs. In the future, we will address these claims with Regression Analysis to analyze the effect of automation on income inequality. In addition, a future case study related to the rubber companies in Northeast Ohio- Firestone, Goodyear, B.F. Goodrich, and General Tire- will be conducted. Our results/findings will have practical implications for businesses in relation to automation.

I. Introduction

The divide between high and low skilled labor has significantly increased since the 1980s due to the growing presence of technical change. Frey & Osbourne (2017) examined how susceptible jobs have become because of computerization. The authors used a task-based model and found that 47 percent of total US employment is at risk of computerization; while wages and educational attainment have a strong negative relationship with the probability of an occupation’s computerization (Frey & Osbourne, 2017). However, automation is not creating unemployment yet. In fact, according to an article by Ernie Tedeschi (2018), unemployment is at its lowest level, but workers of all skill sets have seen a decline in wage growth. Additionally, Ben Tarnoff (2017) points out that productivity increased in 1973-2011 by nearly 80 percent; however, hourly pay for the median worker was only increased by about 10 percent. This growing divide between productivity and wages, has been termed the great decoupling, by Erik Brynjolfsson and Andrew McAfee, both faculty at MIT. Brynjolffson and McAfee (2013) noted that there grew a gap between productivity and income/job prospects during the beginning of the 1980s. The authors point to technical changes as a significant factor in the decoupling.

Furthermore, while technological growth has benefits, everyone will not profit equally from those benefits. Bessen (2016) finds that automation is associated with job growth in occupations that use computers, and with job losses in low wage occupations that do not use computers. In an MIT article, David Rotman discusses that the median income in Silicon Valley (the hub for technology innovation) was 94,000 in 2013 (national average: 53,000), but nearly a third of jobs in the area pay $16 an hour or less (Rotman, 2014). It is not hard to see why place like Silicon Valley, would have such inequality. In Silicon Valley, technology is growing and changing at unprecedented rates. Most of the wealth in the region has been consolidated in the 20 to 25 percent of the population working in the tech sector, which increases the total cost of living (Rotman, 2014). Many of the individuals that work in this sector, have higher skills that work with technology.

While the effects of automation, can contribute to losses in low skilled jobs, it is also apparent, that there is a creation of new jobs that work with technology. This can include jobs such as a graphic designer or engineer, where one would use the computer to enable tasks in a profession. Acemoglu
and Restrepo (2018) found that the creation of new tasks will create a divide between high and low skilled labor. The findings coincide with the great decoupling, as Acemoglu and Restrepo (2018) found that high-skilled workers are better able to work with technological change. Changes in employment and changes in education levels since the 1980s also demonstrate this effect. According to their study, occupations with more skill requirements have seen greater employment growth, which was measured by the average years of education employees had at the start of 1980 (Acemoglu & Restrepo, 2018). Thus, labor has become biased towards increased education.

*After Picketty*, is a book that seeks to examine the implications of Thomas Piketty’s famous book, *Capital*. The book has various economists and social scientists featured throughout, who analyze the implications of *Capital*. Tyson and Spence (2017) examine the effects of technology on income and wealth inequality. They find that technology increases productivity and economic growth, but it also, “favors more skilled over less skilled workers...[reduces] employment and [constrains] wage growth for middle-income workers, particularly in manufacturing and trading services” (as cited in Boushey, DeLong & Steinbaum, 2017, p.171). These implications can be seen throughout history. Keynes predicted that new technologies would lead to unemployment, as technological capital replaced human capital (labor) (Keynes, 1930). With increasing technology progression in the late 20th century, some low skilled jobs have seen the effects of automation. The predictions throughout history about technology replacing jobs have ranged in effect. The view that automation can cause job loss in the short run is widely accepted; although, there have been mixed views on the long-term affect. However, disparities between high and low skilled labor have increased since technology has progressed, starting largely during the early 1980s, around the start of great decoupling. This paper aims to examine whether the great decoupling has influenced inequality between high and low skilled labor.

II. Literature review

Beginning in the 1980s, companies were able to increase their outputs of goods and services while also not increasing inflation. Bansak, Morin, and Starr (2007) found a negative association between technology progression and utilization rates (ratio of output to output capacity). If utilization is low, then employment and utilization of technology will also be low. The authors point out that changes in these relationships implied changes in the relationship between utilization and inflation during the later 1990s, where inflation and utilization became moderate, but output increased (Bansak, Morin, & Starr, 2007). This implies that companies resorted to automation without increasing inflation or utilization rates. Furthermore, Škare and Škare (2017) examined empirical evidence from 1950-2014 and found that productivity and employment changed for many countries, not just the U.S., after the 1980s. More specifically, the study found the decoupling between productivity and wages experienced a negative correlation coefficient in the 1980s, which demonstrates the great decoupling gap. Thomas Piketty’s famous equation \( r > g \), measured the difference between the return on capital and the rate of economic growth. Magas (2018) analyzed \( r > g \), and found that for the U.S., Piketty was right about the decline of growth due to the slowing down of labor productivity. These findings on the great decoupling have implications for the inequality between high and low skilled labor.

In addition, Acemoglu (2002) finds that labor had been skill biased during most of the 1900s; however, it increased significantly during the late 1900s. This coincides with the timeline of the great decoupling. Technological advancements have introduced technologies that can enable the creation of new tasks. The creation of new tasks seems like a positive for the labor force. However, this has inequality implications for high and low skilled labor. Acemoglu (1998) showed that when there are more skilled workers, there is a bigger market for technologies that enable skills, thus more enabling technologies will be created. While there are jobs created for skills that work with technology, typically those jobs require higher skills that must be acquired through higher education. Acemoglu and Restrepo (2018) also created a task-based framework where labor had an advantage when
coupled with the creation of new tasks. The model distinguishes between high and low skilled labor by using this advantage. They find that both automation, which replaces tasks previously performed by low skilled labor, and the creation of new tasks where high skilled labor has the advantage, contribute to the inequalities that are experienced between high and low skilled labor (Acemoglu & Restrepo, 2015). The findings from their model mirror previous predictions made about the relationship between skills and technology.

Phelps and Nelson (1980) found a greater rate of return on education when the economy is growing technologically. Thus, the engineers who design the software used in technology will see an increase of the jobs available to them, but workers with low skills who weren’t able to receive an advanced education are left behind. Roy (1951) also predicted this outcome, when he stated that the arrival of machines will increase the need for innovating the application of individual tasks, causing occupations to become standardized as technology improves. However, due to automation there is also evidence of polarization in low skilled occupations. Autor and Dorn (2013) found that service occupations (eg. hairdressers, cleaners, janitorial services) grew by 30 percent from 1980-2005, after having flat job growth three decades prior. This contrasted with declines in other low skilled occupations with routine tasks, such as manufacturing and construction. The authors built an equilibrium model of “routine tasks” replacing technological change and found that service professions did not see the same declines as other low skilled occupations because they are harder to automate (Autor & Dorn, 2013). Occupations such as a hairdresser, conform to consumer preferences, which involve having communication and being in proximity with clients. At this point, Artificial Intelligence (AI) has not progressed enough to largely take over these professions. However, the effects of AI place other implications on the inequality between high and low skilled workers.

Moreover, Acemoglu and Restrepo (2018) have also looked at the effects of AI on labor. They acknowledge that throughout history, automation has also brought the creation of new tasks, but they seek to understand what happens when AI interacts with wages, labor, and employment (Acemoglu & Restrepo, 2018). Their conceptual task-based framework shows the relationship between automation replacing labor in tasks that were once performed by labor. The framework finds that the relationship of replacement causes a displacement effect where, if not counterbalanced by other economic forces, labor demand, wages, and employment will decrease (Acemoglu & Restrepo, 2018). Acemoglu and Restrepo also found several important implications for the future of AI from the extension of the framework. The analysis showed the negative effects of a shortage of skills for actualizing productivity gains from automation and for inequality. Problems may occur from workers having the wrong skills instead of a shortage. For example, if AI create a need for communication and problem-solving skills to be different from those taught in current education, the implications are identical to a shortage of skills, but can’t be survived by increasing educational spending with current practices in place. Korinek and Stiglitz (2017) also highlighted that skill adjustments to AI may not be fast enough to keep up with increasing automation. Through economic models, they find that AI changes bring large adjustments for the economy, because individuals and the economy may adjust more slowly to these transitions, especially when the pace of AI innovation is rapid.

AI has been able to automate tasks that once seemed impossible to automate, such as self-driving cars. This has led some to believe in “technological singularity,” where advances in AI lead to machines that are smart and able to program themselves. Kurzweil (2005) speculates that by 2045, AI will become more intelligent than humans. While this is speculation, it based on the fact that technology will continue to improve itself. The effects of AI will make the playing field uneven for high and low skilled workers. Berg, Buffie, and Zanna (2016) use a model to find that the wages of unskilled workers will collapse, even over the long run, when AI is used in combination with higher skilled labor. As this increase’s inequality, capital will also grab a larger share of income. They find that as productivity and wages increase for higher skilled labor, lower skilled labor’s wages will
These findings also have impacts on low skilled laborers share in national income. They find low skilled worker’s share of national income will decrease from 35% to 11% in their model over time (Berg et al., 2016). Chui, George, Manyika, and Miremadi (2017) looked at how susceptible manufacturing jobs were to automation. The authors acknowledge that in the past couple of decades, automation has transformed manufacturing jobs and facilities. The study looked at manufacturing jobs in developed and undeveloped nations. The analysis found that as of 2015, 64% of hours spent on manufacturing related tasks are automatable with current technology (Chui et al., 2017). Robots are being increasingly used in the manufacturing center, because they are profitable.

### III. Case Study

The downfall of the Akron rubber industry also highlights the effects of the great decoupling on high and low skilled labor. World War II gave the rubber industry in Akron a boost, and allowed the “Big Four”- Firestone, Goodyear, B.F. Goodrich, and General Tire- to employ more workers. However, the companies cut back on more hourly workers than salaried workers (those with higher skills), in 1981. During 1981, 743 salaried jobs were lost in Akron’s firms, compared to 1,220 hourly workers (Oplinger, 1982). The unions gradually lost their hold on the companies, as plants started to leave the area, and blue-collar jobs fell out of favor. By 1995, the United Rubber Workers (URW) were striking Bridgestone Firestone (Bridgestone bought Firestone in 1988) unsuccessfully for attempting to cut 4,000 union jobs, because there were more than enough workers, but fewer jobs. “Those doing the hiring these days are offering $7.50, $9, $10 an hour for low skilled, low interest, nonunion jobs” (Block, 1995, p. A13).

Akron, Ohio was a part of the manufacturing area that bordered the Great Lakes, commonly referred to as the Rust Belt. According to Alder, Lagakos, and Ohanian (2014), productivity growth in the Rust Belt was 1.3 percent from 1950-1980 but jumped after the 1980’s to 1.6 percent per year. This demonstrates that productivity increased for all industries in the Rust Belt after 1980. The effects of the great decoupling were felt by the tire companies largely because they did not innovate toward new technology until the 1980s. In the 1960s, tire companies had knowledge of a new tire, the radial tire, that was gaining popularity in European countries. According to Love and Giffels, the switch to radial tires was delayed until the 1980s for two reasons: the conversion would be expensive (requiring 25-35 percent more labor than the bias tire), and it required technical skills that tire builders did not yet have (Love & Giffels, 1999, p. 184).

Thus, this hesitation to switch created competition once the radial tire was introduced in America by competitors during the late 1970s. The competition inspired a series of mergers and takeovers in the area by foreign competitors, as the major tire companies overestimated their growth prospects with the bias tire. This series of takeovers, as well as the URW losing bargaining power, led to a series of plant closures and investments. The number of Akron jobs in the tire industry dropped from 32,700 in 1974 to 15,400 by 1984 (Love and Giffels, 1999, p. 185). Goodyear was the only one of the “Big Four” to stay in the Akron area after the takeovers of the late 1980s. Additionally, by the end of 1978, Goodyear had converted one of its plants into a technical center, creating 500 white collar jobs (Love and Giffels, 1999, p. 194). According to Rajan, Volpin, and Zingales (1997), Goodyear’s ability to stay in the area and not sell off the company, may be attributed to its early investment in research and development (R &D). The other rubber companies moved their operations down south, where there was more efficiency and fewer unions for blue collar workers. From 1979-1985, the Akron area lost 23,000 manufacturing jobs (Gerdel, 1987).

Fast forward to today, and one will find that Akron has reinvented itself. Akron is investing in other polymers, like plastic, instead of rubber. The manufacturing industry that once brought low skilled workers jobs is also decreasing, while white collar jobs in polymer research and development are expanding. Since the 2008 recession, output from manufacturing has grown by 20 percent, but employment in this area has only grown 5 percent (Montlake, 2017, para. 14). This demonstrates the
gap between productivity and wages. Akron has turned the economy towards innovation, instead of on the “ups and downs” of labor in manufacturing, which can be automated or outsourced (Montlake, 2017, para. 3). The more advanced industries in polymers that have inhabited Akron over the years tend to hire fewer people in smaller locations and prefer education and computer skills when employing staff (Montlake, 2017, para. 14). This case study will demonstrate the ability of higher skilled jobs to utilize enabling technologies and fare better than low skilled jobs in the long run.

We are utilizing the Akron case study to satisfy our hypothesis. The findings from the Akron case study will demonstrate the shift from manufacturing (lower skilled labor) to polymers (higher skilled labor); with the emergence of developing technology in Akron. The decline in manufacturing in the area has left a gap between high and low skilled jobs. Akron was named a national designation as a “Tech Hire Community,” encouraging students to gain IT and coding skills through education (Anon, 2017). This is a way for the city to address the growing skills gap between the old economy, which was focused on manufacturing, and the new economy, focused on technology. While high skilled jobs are growing in the area, many of the residents of Akron do not have the technical skills to enter into this area of the workforce. Between 2000-2013, Akron saw a 25% decline in manufacturing jobs (Anon, 2016). This decline in manufacturing has contributed to rising inequality in the city, with projections showing higher skilled jobs faring better in the long run. The Greater Akron Chamber of Commerce is predicting the largest growth in industries that are white collar: management, scientific and technical consulting services, computer systems design, and education (as cited in Anon, 2016). Thus, the findings from this case study will fit in with our hypothesis by displaying the change in wage distribution and availability of low skilled jobs since the 1980s in Akron.

IV. Conclusions and the Future Research Avenues

Currently, this is the limitation of the data. In the future, Regression Analysis will be conducted to analyze the effect of automation on income inequality. Publicly available longitudinal data will be collected to run the regression analysis. SPSS software will be used to perform the task. In addition, a case study related to the rubber companies in Northeast Ohio- Firestone, Goodyear, and B.F. Goodrich- will be conducted. The case study will demonstrate the wage disparity between high and low skilled workers that formed after the 1980s. The research will be used to expand on the effects of the great decoupling and the impact it has had on the income differentiation between high and low skilled workers.

References


