

The relationship between minimum wage and inequality computationally

Group: new-team

Cheng Chung Yu

Lee Chun To

The author divided the work equally

Introduction

Income can be defined as household earnings in a particular period. It consists of wages, capital assets and available cash transfers and minus the income taxes and social security benefactions paid by households. There are different indicators that can measure income inequality between individuals. For instance, the Gini coefficient scaled the ratio of cumulative proportions on the population against cumulative proportions of income they make. It ranges between zero means perfect equality, and one means extreme inequality. And S80/S20 is a ratio estimating the average income of the 20% richest to the 20% poorest. (OECD (2020))

Since income inequality is a worldwide issue, and to some extent, this issue is inevitable. After the 1980s, income inequality grew sharply in China, India, Russia and North America. In 2016, India had the most severe problem among these five countries. (Alvarado, F., Chancal, L., Piketty, T., Saez, E., & Zucman, G. (2018).) Most countries implemented minimum wage. This policy forces employers to pay a certain amount of remuneration to workers who performed work during a given period. Principle of minimum wages aims to protect workers against unfairly low pay. It ensures everyone has an equitable share of the progress. Minimum wage to all who are employed provided necessary protection. Minimum wages can also be one

element of a policy to overcome poverty and reduce inequality. (Minimum wages).

(n.d.).)

Overall, minimum wages provide safety nets for different workers who may increase the quality of daily life. This paper mainly examines the relationship between minimum wages and economic inequality by literature on other articles.

Tradition method

Many studies have been conducted regarding the relationship between minimum wages and income inequality. Upcoming will use two papers to illustrate how minimum wage and income inequality is studied traditionally.

The first paper examines the impact on the wage pattern of the introduction of the national minimum wage (NMW) in the UK in April 1999. Primary outcomes of this study are NMW does have a noticeable impact on the wage distribution, and that agreement with the NMW is widespread. However, the effect is limited because the NMW set a level that only 6–7% of workers are directly affected. The NMW has had virtually no impact on the pay of workers who are not directly involved. Nevertheless, the effect of NMW on overall income inequality is relatively meagre. It had no detectable influence on earnings at the 10th percentile even when the result of the NMW was largest. There also is data showing that evaluates figures of low paid

workers violated with the hypotheses. More work is needed to see how strong alternative measures of the effect of the NMW to different identifying assumptions are. (Richard Dickens, & Alan Manning. (2004).)

The second paper objective is to explore the determinants of wage levels by state governments in the United States, with a particular focus on the effects of income inequality and ethnic difference. This paper evaluates the influence of income inequality, ethnic diversity, and their cooperation on real state minimum wages using a state-level panel of Census demographic data from 1981 to 2010. They find that influence of income inequality negotiated by ethnic diversity. When states are deeply ethnically homogeneous, increases in income inequality are associated with higher state minimum wages. When states are highly ethnically heterogeneous, improvements in income inequality inked with lower minimum wages. Overall, the results imply that negative collision on state minimum wages in heterogeneous states could arise in income inequality. The progress of the social distance between whites and other ethnic groups minimizes care for wage policies that are believed by the public to be profitable to the poor. (Stewart, M. B. (2012).)

Paper studying United States minimum wages mainly used ordinary least squares (OLS) to estimate the state and year fixed effects. Moreover, they used the Gini coefficient built by US federal tax return data. (Stewart, M. B. (2012).) This research only uses OLS

and some regression models to forecast future inequality. This method is a bit too narrow. Meanwhile, they only use data from the US federal and did not cross-check with other databases. Paper studying the UK income inequality used a lot of second-hand data, i.e. trend in income inequality, change in income inequality. (Richard Dickens, & Alan Manning. (2004).) However, this research used less of a model to prophesy the long-term effect on minimum wages. These two papers also have some eliminators that cannot be measured. For instance, they cannot directly measure ethnic diversity. Using the traditional methods clearly has some limitations. We are going to use computational science methods to examine minimum wages and income inequality in a new angle.

Computational method in the research

Background

In the data-driven century, many social-business related topics, for instance, minimum wage and inequality have become one of the favourites for numerous scientists and economists to investigate how they can influence the society socially and economically. The improvement in technology has expanded the database among countries so that researchers now can more easily access the information required to generate useful ideas and conclusions to represent the real situation in society more

accurately. Apart from the accuracy, through the computational method, researchers can even make predictions about the expected future so that professionals can design specific strategies to solve the problems. In this research, our group will focus on the computational method to analyze the correlation between minimum wage and wealth inequality. It is hoped to use the computational approach to examine some traditional data, as well as some statistics from different surveys to build a simulation with real data. Ideally, we hope to generate some useful findings after analyzing all the big data aspects.

Advantages of the method

Since Computational social science method is specifically used to collect objective and irrefutable facts which are called "Statistics", the data is structured statistical data. When researchers need to draw a result from the research, or they want to prove the hypotheses designed, the result analyzed by using computational science methods can strongly support the ideas. Moreover, with the quantitative method, the number of participants will be much more than other methods like observation, focus group, face-to-face interview, etc. Thus, quantitative research can help us find exact answers to a wide range of questions, also increase its credibility.

Moreover, simulations are an essential element in this research topic. Through building simulations, we can find out what the simulation is able so to understand the system between minimum wage and wealth inequality. Based on simulations, researchers can simulate a condition that is similar to reality, but they can change some variables to understand the correlation clearer. On the other hand, since it is not possible to observe and find all the elements required in the same dataset, simulations are needed to build with real data for researchers.

Furthermore, the algorithm is necessary as it can benefit the research to make it more persuasive and trustworthy. Through such a method, we can predict how the change in minimum wage will affect wealth inequality to a certain extent. Ideally, it is hoped to use some primary regression method such as linear regression to predict whether or not it is possible to continuously adjust the minimum wage to reduce the gap of wealth inequality, or else it is not a suitable policy for citizens.

Shortcomings of the method

Although applying the computational social science method can facilitate the researchers to investigate the topic in a more convenient and macro way, the method has its shortcomings which are required to be understood.

The major issue is that it requires a larger amount of quantitative data from different databases, or even build a related database to utilize the quantitative research method. Timely responses are often problematic since adequate resources might not be available to obtain, store and process extensive data within a reasonable period of time. A sufficient sample size is required to ensure sufficient statistical power to determine whether the discovery is correct. Moreover, the research cost is relatively higher because it takes time to collect suitable data, and researchers might need to spend capital on several databases and software.

Another issue is that about its data complexity. It is incredibly difficult to differentiate between true and false or accurate and inaccurate data, except with the best methods of data cleaning to eliminate any inherent data unpredictability. Big data 's intrinsic complexity (including complex forms, complex constructs, and intricate patterns) makes it much more challenging to interpret, represent, comprehend, and calculate, resulting in sharp increases in computational complexity relative to conventional computing models focused on total data. Traditional data analysis and mining tasks, such as retrieval, topic discovery, semantic analysis, and sentiment analysis, become extremely difficult when using big data.

Conclusion

In this study, we are going to investigate the relationship between minimum wage and inequality, especially wealth inequality using computational social science method. Apart from that, it is also necessary to make use the traditional social science method to make the study more structured. In reality, both traditional method and computational method have its advantages and limitations. Therefore, in order to exert their functions, different methods would be adopted to analyze different parts for the study.

For the computational social science method, we adopt methods like simulations, algorithm and machine learning skills to handle various data to understand the correlations of each variables in the relationship, and to predict the future condition in the society.

Besides, there are limitations of computational social science method as just adopted collected quantitative data is more superficial, and the explanation of the phenomenon is relatively weak. It might also ignore some intrinsic value behind the study. Therefore, in order to understand the entire problem, both methods should put together into a complete solution to achieve the goals of the study.

Appendix

Alvarado, F., Chancal, L., Piketty, T., Saez, E., & Zucman, G. (2018). World inequality report. Retrieved from <https://wir2018.wid.world/files/download/wir2018-full-report-english.pdf>

Bárány, Z., & Po, S. (n.d.). The Minimum Wage and Inequality: The Effects of Education and Technology. Retrieved November 10, 2020, from <https://www.journals.uchicago.edu/doi/10.1086/682346>

How to define a minimum wage? (Minimum wages). (n.d.). Retrieved November 09, 2020, from <https://www.ilo.org/global/topics/wages/minimum-wages/definition/lang--en/index.htm>

Jin, X., Wah, B., Cheng, X., & Wang, Y. (2015, February 26). Significance and Challenges of Big Data Research. Retrieved November 10, 2020, from <https://www.sciencedirect.com/science/article/pii/S2214579615000076>

OECD (2020), Income inequality (indicator). doi: 10.1787/459aa7f1-en (Accessed on 09 November 2020)

Richard Dickens, & Alan Manning. (2004). Has the National Minimum Wage Reduced UK Wage Inequality? *Journal of the Royal Statistical Society. Series A, Statistics in Society*, 167(4), 613-626.

Stewart, M. B. (2012). Wage inequality, minimum wage effects, and spillovers.

Oxford Economic Papers, 64(4), 616-6