The effect of long working hours on productivity.

～Benefits of lowering the working hours: Do Japanese need to work this hard?～

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Abstract

Japanese are known to have one of the longest working hours in the world with some young workers literally working themselves to death. This is causing many problems as the people have less and less time for their personal lives and are less willing to get married. This vicious circle of working and trying to balance personal life is causing the Japanese population to suffer. This paper examines how population, adult education level, and working hours affect labor productivity by comparing G7 countries using a fixed effect model. The results revealed that working long hours negatively affects productivity, and that population and adult education level have a positive effect on productivity. These results also suggest that people will be more productive by reducing working hours and this has a positive influence on the social life of Japanese people and the Japanese economy.

Introduction

In Japan, there is a term for the death of people from overworking: *Karoshi*, which can be directly translated to “death by overwork.” For instance, 158 people died because of *Karoshi*, and 2,018 people committed suicide because of the stress of working in 2019 (Korosyo, 2019). This unhealthy working life style is accelerating population decline and creating labor shortages. Despite long working hours in Japan, Japan has the lowest productivity among G7 countries, according to data from OECD Compendium of Productivity Indicators in 2018. There is a severe labor shortage in the Japanese economy even though the labor force is constantly under full employment. With this shortage in the workforce, it is likely that excess labor demands will continue for a long time, even if there are temporary fluctuations. In order to increase economic growth under full employment, it is necessary to raise Japan's potential growth by increasing productivity (Morikawa, 2019).

Productivity has been studied by many scholars. Collewet (2017) used daily information on working hours and performance in call center agencies to study the effect of increasing the working hours in productivity and found that as the number of hours worked increases, the productivity of employee declines. Moreover, Inagaki (2013) studied productivity in the healthcare industry using the dynamic labor data model, his findings show that performance of healthcare workers is particularly affected by long working hours, indicating that long working hours lead to a serious loss of productivity. Furthermore, Lonni (2012) finds that manufacturing productivity does not necessarily increase when hours are lengthened in many industries. Also, the flexible time arrangement has positive effects on enterprise performance.

Previous researchers have studied the influence of working hours on productivity in different sectors and the effect of having flexible working style on productivity. By reviewing previous studies, it can be implied that reducing working hours is a focal point of the economy and social life of employees. This study is trying to look at the national level data of the G7 countries and analyze productivity for the years from 1997 to 2018.

Methodology

This paper uses secondary panel data from OECD statistics (1), which covers the period from 1997 to 2018 for the G7 countries; the United States, Canada, Germany, France, Italy, the United Kingdom and Japan. These regions were chosen because they are considered the most industrial countries in the world. This paper also explores the effect of working hours, population, adult education level and productivity, using the fixed effects model, which can be presented by the following equation:

$$Yit = \beta o + \beta 1it + \beta 2it + \beta 3it + uit$$

Where:

Y it = GDP per hour worked for country i at time t; GDP per hour worked is a measure of labor productivity. It measures how efficiently labor input is combined with other factors of production and used in the production process. Labor input is defined as the total hours worked of all persons engaged in production. Labor productivity only partially reflects the productivity of labor in terms of the personal capacities of workers or the intensity of their effort. The ratio between the output measure and the labor input depends to a large degree on the presence and/or use of other inputs (e.g. capital, intermediate inputs, technical, organizational and efficiency change, economies of scale). This indicator is measured in USD (constant prices 2010 and PPPs) and indices.

β 1it = Hour Worked for country i at time t; Average annual hours worked is defined as the total number of hours actually worked per year divided by the average number of people in employment per year. Actual hours worked include regular work hours of full-time, part-time and part-year workers, paid and unpaid overtime, hours worked in additional jobs, and exclude time not worked because of public holidays, annual paid leave, own illness, injury and temporary disability, maternity leave, parental leave, schooling or training, slack work for technical or economic reasons, strike or labor dispute, bad weather, compensation leave, and other reasons. The data covers employees and self-employed workers. This indicator is measured in terms of hours per worker per year. The data are published with the following health warning: The data are intended for comparisons of trends over time; they are unsuitable for comparisons of the level of average annual hours of work for a given year, because of differences in their sources and method of calculation.

β 2it = population for country i at time t; Population is defined as all nationals present in, or temporarily absent from a country, and aliens permanently settled in a country. This indicator shows the number of people that usually live in an area. Growth rates are the annual changes in population resulting from births, deaths and net migration during the year. Total population includes the following: national armed forces stationed abroad; merchant seamen at sea; diplomatic personnel located abroad; civilian aliens resident in the country; displaced persons resident in the country. However, it excludes the following: foreign armed forces stationed in the country; foreign diplomatic personnel located in the country; civilian aliens temporarily in the country. Population projections are a common demographic tool. They provide a basis for other statistical projections, helping governments in their decision making. This indicator is measured in terms of annual growth rate and in thousands of people.

β 3it = adult education level for country i at time t; Adult education level: This indicator looks at adult education level as defined by the highest level of

education completed by the 25-64-year-old population. There are three levels: below upper secondary, upper secondary and tertiary education. Upper secondary education typically follows the completion of lower secondary schooling. Lower secondary education completes the provision of basic education, usually in a more subject-oriented way and with more specialized teachers. The indicator is measured as a percentage of the same age population; for tertiary and upper secondary, data are also broken down by gender.

u it = unobserved characteristics.

Results and Discussion

Table 1 shows a summary of statistics of the variables collected for the years from 1997 to 2018 that is used to explore how working hours, population, and adult education level affects productivity. The average productivity of an individual residing in a G7 country is 48.87 dollars per hour, (productivity can be classified in dollars) using the purchasing power parity law. The average of population is 102.63 million people. The average of working hours is 1662.79 hours per year and the average adult education level is 31.75%. The data is for the time period from 1997 to 2018 for G7 countries.

Table 1 Summary of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Productivity	126	48.87232	6.986888	32.82251	62.91748
Population	126	102.6307	84.27305	29.90595	318.857
Working hours	126	1662.794	149.5467	1362.7	1873.8
Adult education level	125	31.75297	11.31412	8.59318	53.61496

In order to compare productivity, the regression was conducted for G7 countries. The order of regression is Canada, Germany, France, the United Kingdom, Italy, the United States, and the base country is Japan. Table 2 presents the results of the fixed-effects model. It was conducted to quantitatively understand how productivity is characterized by population, working hours, and adult education level. The first column in Table 2 presents the marginal effects of the three independent variables, using the fixed-effects model. The second column in Table2 represents the standard error of the three variables, using the fixed-effects model. In this Table, the P value is 0.01. As the population increases by one million, the GDP increases by the amount of 0.27 million dollars. As the adult education level increases by 1%, 0.29 amount dollars increases. As one working hour increases, the GDP decreases by 0.02 million dollars. Productivity of individuals in Canada, Germany, France, the United Kingdom and Italy are 30.65, 24.70, 33.76, 26.04, 37.18 dollars respectively, higher than the productivity of individuals in Japan. On the other hand, the labor force in the USA has lower productivity than the one in Japan by -28.10 dollars.

Table 2 Comparison of productivity based on Japan

Variable	Coef.	Std. Err.
Population	0.2787795	0.0246239
Adult education level	0.2900306	0.0430851
Working hours	-0.0245343	0.0054231
Canada	30.65994	2.465302
Germany	24.70829	2.680053
France	33.76778	2.37455
United Kingdom	26.04415	2.26422
Italy	37.18874	1.78123
United States	-28.10059	4.205006

As some prior studies have found, long working hours lead to a serious loss of the productivity in some sectors such as in call center agencies, healthcare services and the manufacturing industry. Table 2 also suggested that long working hours have a negative effect on productivity. From the results in this paper, it can be concluded that reducing working hours may

lead to the increase in productivity for Japanese workers in companies. This may solve a lot of the labor and social problems that are related to the low productivity problem. Therefore, some policies could be applied to reduce the working hours. For example, Microsoft in Japan has reduced the working days to only four days a week. Productivity work drastically increased by about 40% in August 2019. Also, in Finland the prime minister; Marin floated the idea of a four-day week. She believes the country would prosper even more if the citizens could spend more time with their families

Conclusion

This paper aimed to reveal the effect of working hours on productivity with the data from OECD statistics by using the fixed-effect model. The paper revealed that hours worked could have a negative correlation with productivity. This means that if Japan decreases the number of working hours, people will have more time for their private lives. Therefore, reducing working hours has a potential to solve the problem of the labor shortage in Japan.

As discussed in the previous section, there is a trend to decrease working hours in the world. Sweden tested out six-hour workdays a couple of years ago for 40 nurses in a hospital, and this led to an increase in productivity. Moreover, the UK's opposition party floated the idea of introducing a four-day week for the entire country. Such policies could be applied in Japan, where the labor market suffers from low productivity. Overall, this paper could be considered as a guide for policy makers who can utilize such policies to overcome the barriers that face Japan in the future, especially the shortage of labor.

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