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Research Report

The Impact of a Workweek Reduction on Labor Productivity

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The Impact of a Workweek Reduction on Labor Productivity

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* Based on Park and Park (2017) which revised and extended Park and Park (2015). Park and Park (2017) is available through individual requests to authors.

Summary

- **Estimating the causal effect of the standard 40-hour workweek policy (2004-11) on the annual output per worker showed an increase of 1.5% at manufacturing establishments with 10-plus employees.**
 - The policy reduced the standard workweek from 44 to 40 hours and was gradually implemented in establishments according to size and industry.
 - Tentative but suggestive evidence was found that the potential mechanism through which the output per worker increased was owed to the improved efficiency in the production process rather than to the growth in capital input, implying that working hours were inefficiently long before the reduction.

- **Future policies aiming to reduce working hours should focus on identifying and amending systems and incentive mechanisms that promote inefficient overtime.**
 - Current laws related to maximum working hours and overtime premiums are ambiguous and thus need to be clarified.
 - Wage structures should be revised to encourage employees to work more efficiently, in a shorter time. Specifically, worker compensation should be based on output (e.g. performance) rather than input (e.g. working hours) and the current high level of the overtime premium should be adjusted.

1

Introduction

- **Despite an overarching recognition in Korean society to redress the long-hours culture, concerns are also being raised over the negative repercussions this would have in terms of productivity.**
 - Long working hours engender costs to workers including risks to health and safety and upsetting the work-life balance. However, if the reduction in working hours leads to a drop in productivity, this could eventually undermine the well-being of society as a whole.

- **This study introduces both domestic and overseas research on the relationship between working hours and labor productivity and presents policy implications based on the findings.**

2

International Comparison: Working Hours and Labor Productivity

[Figure 1] Working Hours and Labor Productivity in OECD Countries: 1990-2016



Note: * 2010 purchasing-power parity.

Source: Article from *The Economist* (Dec. 9, 2014) revised by authors using the OECD's statistics DB.

- A distinct negative correlation was found between the yearly average working hours per employee and the value added (GDP) per hour worked (labor productivity) in 35 OECD countries during 1990-2016 (Figure 1). This implies that:

- Countries with shorter working hours are more likely to have higher labor productivity.
- Globally, working hours have decreased while labor productivity has increased.

- However, [Figure 1] is insufficient to conclude that shorter working hours enhance productivity because:

- Shorter working hours could be a consequence of improved labor productivity.
- More rigorous analysis is needed to better understand the impact of working hours on labor productivity.

3

Case Studies on the Impact of Working Hours on Labor Productivity

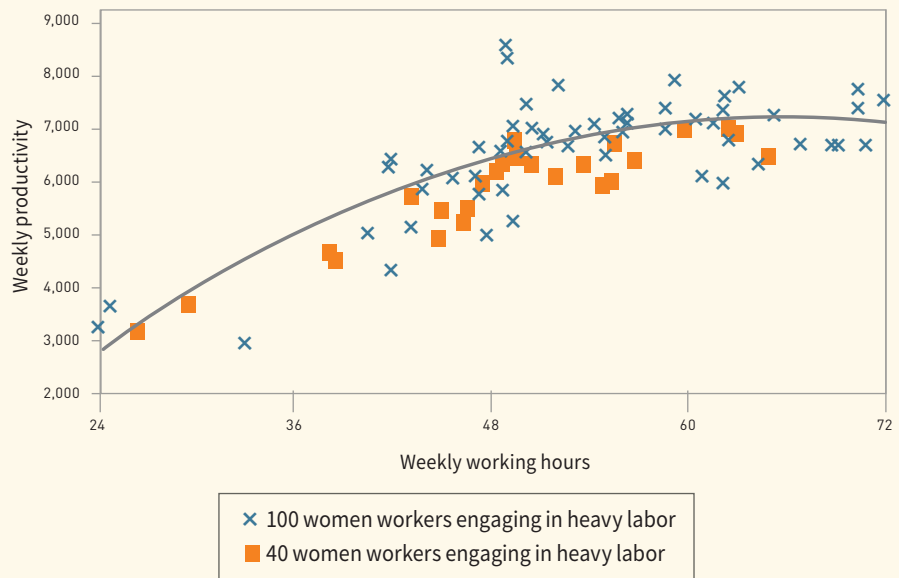
- Pencavel (2015) analysed the relationship between the working hours and productivity of British munitions workers engaged in the same work in the same workshop during World War I.

- With the country being in a state of emergency, the government suspended regulations on working hours, banned strikes and changing employers and closely examined working hours and output.
- Data and records collected during such extraordinary circumstances contribute to the understanding of the causal relationship between working hours and productivity.

- The analysis found that working in excess of a certain amount of hours will not only reduce labor productivity but will also have almost no impact on the total output.

- For female workers, working up to 49 hours a week increased their total output in proportion to their working hours. But, the growth gradually declined as the workweek exceeded 49 hours and even contracted after 60 hours.
- Men's productivity dropped sharply on working over 55 hours per week.

[Figure 2] Weekly Working Hours and Productivity of British Women Munitions Workers during World War I



Note: Each 'X' (or ■) denotes the weekly working hours and productivity of 100 (or 40) women workers logging in the same labor for 56 weeks (or 26 weeks). Productivity was calculated based on the number of products while working hours was based on the hours worked (scheduled working hours minus hours spent on sick leave, absence, break time, work preparation and closing.) Weekly working hours changed due to various reasons including product demand, raw materials shortage, national holidays, injuries and illness.

Source: Based on a partial revision of Figure 1 from Pencavel (2015).

- Although Pencavel (2015) presents the possibility that long working hours diminish labor productivity and reduce output, this cannot be generalized as his observations are made of special circumstances, i.e. war.

4

Impact of a Reduction in Standard Working Hours on Labor Productivity

- To understand the relationship between working hours and labor productivity in Korea, the authors analyzed the impact of the standard 40-hour workweek—implemented during 2004-2011—on the value added per worker of manufacturing establishments with 10-plus employees.

- Korea's standard workweek was reduced from 44 hours to 40 hours. It was gradually phased in by industry and size of establishment (Table 1).

<Table 1> Implementation of the Standard 40-Hour Workweek

Establishments by size (no. of full-time equivalent employees)	Implementation of standard 40-hour workweek	Time of legislation
Financial and public sectors, or establishments with over 1,000 employees	July 1, 2004	Passed by the National Assembly in August 2003
Establishments with 300-999 employees	July 1, 2005	
Establishments with 100-299 employees	July 1, 2006	
Establishments with 50-99 employees	July 1, 2007	
Establishments with 29-49 employees	July 1, 2008	Voted by the Cabinet in October 2010
Establishments with 5-19 employees	July 1, 2011	

- The reduction on real working hours was confirmed to be effective in numerous preceding studies. A separate analysis by the authors of this study observed that there was a reduction of approximately 2.9% (70 hours per year) in working hours per worker in establishments with 10-plus employees.¹⁾

■ **The data used for this study is from Statistics Korea’s 2000-2012 Mining and Manufacturing Survey on 11,692 manufacturing establishments with 10-plus employees in operation during the respective period.**

- The sample pool was limited to firms that were in operation for the duration of the survey period.

■ **An analysis found that there was a 1.5% increase in labor productivity (the value added per worker) on the adoption of the standard 40-hour workweek (① in Table 2).**

- Establishments were tracked over time, and those that implemented the reduced workweek were compared to those that did not to examine whether there were any differences in their labor productivity.²⁾

■ **The positive impact of the 40-hour workweek on productivity was verified through numerous additional analyses.**

- Firstly, labor productivity increased 1.6% even after the observation values ($\pm 10\%$) for the thresholds (20, 50, 100, 300 employees) for establishment size were removed in consideration of possible errors (② in Table 2).
- Secondly, labor productivity increased 1.9% even after excluding establishments with less than 20 employees for whom the 40-hour standard workweek was agreed upon in October 2010 (③ in Table 2).
- Thirdly, while the standard had no impact on sectors whose average regular working hours was less than 40 hours a week (2002), as per expected (④ in Table 2), the labor productivity in sectors where employees had to work over 40 hours increased 2.1% (⑤ in Table 2).³⁾

1 Kim and Lee (2012), Park (2014), Yoo and Lee (2014), Ahn (2015) and Lee and Lee (2016) found that the standard 40-hour workweek was effective in reducing real working hours. The authors obtained the same findings from the analysis based on the Wage Structure Survey for 2000-2012.

2 The authors linked the Mining and Manufacturing Survey to the panel data at the establishment level—the dependent variables are the natural log conversions of the actual value added per worker; explanatory variables are the implementation of the standard 40-hour workweek, establishment dummy, variable characteristics (corporation or not, square term of firm’s age, capital intensity, location), year dummy, interaction terms between year dummy and industrial classification (sub-class) dummy, interaction terms between year and region dummies and interaction terms between establishment size and time trend. The authors used the ordinary least squares (OLS) method and clustered the standard errors at the establishment level.

3 As of 2002, sectors with less than 40 hours in a workweek are manufacturers of tobacco products, coke (fuel), refined petroleum products, nuclear fuel, rubber, plastic products, structural metal products, etc. while those with more are manufacturers of food and beverages, textiles, leather, bags and shoes, primary metal, etc.

<Table 2> Impact of the Standard 40-hour Workweek on Labor Productivity in the Manufacturing Industry

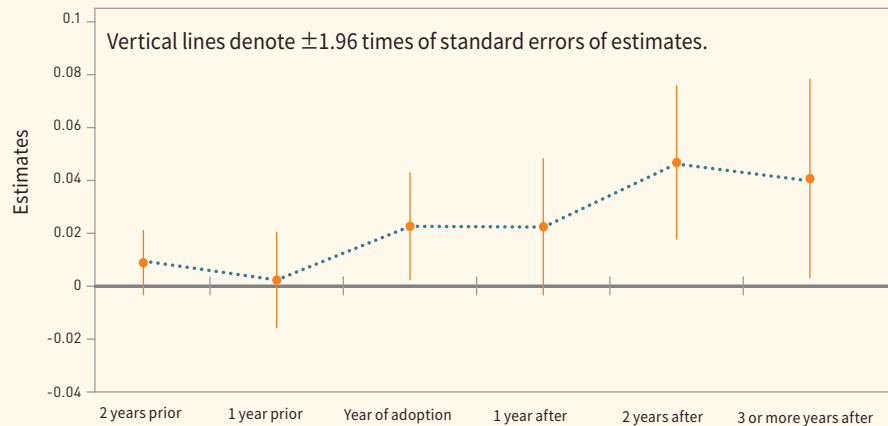
(Natural log)

	①	②	③	④	⑤	⑥	⑦
Dependent variable	Labor productivity					Capital intensity	Total factor productivity
Samples	Total	After removal of $\pm 10\%$ at the thresholds	Establishments with over 20 employees	Sectors with an average workweek of less than 40 hours	Sectors with an average workweek of more than 40 hours	Total	Total
40-hour workweek	0.015***	0.016**	0.019***	0.004	0.021***	0.005	0.018***
(Standard errors)	(0.006)	(0.006)	(0.007)	(0.010)	(0.007)	(0.008)	(0.006)
Number of observations	140,304	137,162	108,930	43,451	96,853	140,304	140,304
Coefficient of determination	0.713	0.712	0.732	0.620	0.738	0.753	0.696

Note: Labor productivity and capital intensity means the value added per worker and real tangible assets (total), respectively. Total factor productivity was estimated using the method proposed by Levinsohn and Petrin (2003).

Source: Drawn up by authors summarizing Table 3 and 4 from Park and Park (2017).

[Figure 3] Impact of the Standard 40-hour Workweek (2004-2011) on the Value Added per Employee in the Manufacturing Industry



Note: The reference period is 3 or more years prior.

Source: Based on the translated version of Figure 2 from Park and Park (2017).

■ **Ultimately, labor productivity was enhanced mainly due to the improved efficiency in overall production activities rather than to the increase in capital intensity.**

- An additional analysis into the impact of the 40-hour workweek on capital intensity and total factor productivity found little change in the former (⑥ in Table 2) but a 1.8% increase in the latter (⑦ in Table 2).
- This implies that overall production activities sustained a certain degree of inefficiency before the adoption of the 40-hour workweek.

■ **The improvements in labor productivity were not evident prior to the implementation of the 40-hour workweek but became apparent after (Figure 3).**

- The improvements in productivity following the implementation of the standard proves that the 40-hour workweek does in fact increase labor productivity.

5

Policy Implications

■ **Policies aiming to reduce working hours should focus on identifying and amending systems and incentive mechanisms that promote inefficient overtime.**

- The aforementioned findings imply that Korea's working hours have been too long to be efficient. And, in light of the rationality of economic agents, this is most likely due to a distorted system and flawed incentive mechanism.

■ **Relevant systems need to be streamlined in a way that can clarify legal uncertainties with respect to working hours and overtime premiums.**

- Korea's Labor Standard Act stipulates that workers can work up to 52 hours a week and be paid a 50% premium for overtime. However, due to the ambiguity in the legal interpretation of 'one week'—does it include holidays and/or weekends, etc.—employees can actually work for a maximum of 68 hours and their overtime premium can range from 50 to 150% depending on the time (day or night) and day of the week (weekday or weekend) they work.
- This controversy over the legal interpretation adds to the uncertainty of the labor market and hence, hinders the efficient decision-making of economic agents.

■ **The wage structure should be reformed to provide more workers' compensation for quicker, more efficient work practices.**

- Under rigid employment conditions, a raise in overtime premiums means firms will reduce on straight-time wages to reduce labor costs. This, in turn, creates a vicious cycle as workers will be forced to work overtime to secure their income.⁴⁾
 - For instance, in the UK where overtime premiums are determined through labor-management negotiations, the higher the overtime premium, the lower the straight-time wage (Bell and Hart, 2003).
- Support should be provided in order to achieve lower overtime premiums and increased straight-time wages through labor-management negotiations. More importantly, workers' compensation should be based on output (production) rather than input (working hours).

References

- Ahn, Taehyun, "Reduction of Working Time: Does It Lead to a Healthy Lifestyle?" *Health Economics*, 25(8), 2016, pp.868~983.
- Bell, David and Robert A. Hart "Wages, Hours, and Overtime Premia: Evidence from the British Labor Market," *Industrial and Labor Relations Review*, 56(3), 2013, pp.470~480.
- Kim, Hyung Rak and Jungmin Lee, "The Impacts of the 40-hour Workweek Standard on Actual Working Hours, Wages and Employment," *Korean Journal of Labour Economics*, 35(3), 2012, pp.83~100 (in Korean).
- Lee, Jungmin and Yong-Kwan Lee, "Can Working Hour Reduction Save Workers?" *Labour Economics*, 40, 2016, pp.25~36.
- Levinsohn, James and Amil Petrin, "Estimating Production Functions Using Inputs to Control for Unobservables," *Review of Economic Studies*, 70(2), 2003, pp.317~341.
- Park, Cheol Sung, "A Study of the Non-market Effects of Five-day Workweek," *Korean Journal of Labour Economics*, 37(4), 2014, pp.59~88 (in Korean).
- Park, WooRam and Park Yoonsoo, *Effect of Working Time on Labor Productivity: Evidence from Korean Manufacturing Sector*, Policy Study 2015-24, Korea Development Institute, 2015 (in Korean).
- Park, WooRam and Yoonsoo Park, "When Less is More: The Impact of the Workweek Reduction Policy on Output of Workers in South Korea," Mimeo, 2017.
- Pencavel, John, "The Productivity of Working Hours," *The Economic Journal*, 125(589), 2015, pp.2052~2076.
- The Economist, "Working Hours: Proof That You Should Get a Life," 2014. 12. 9. (<https://www.economist.com/blogs/freeexchange/2014/12/working-hours>)
- Yoo, Gyeong Joon and Jin Lee, "Analysis on Employment Effects of Working Hours Reduction with the Emphasis of Industry Size," *Korean Journal of Labour Economics*, 37(1), 2014, pp.1~28 (in Korean).

(Materials)

- Ministry of Employment and Labor, "Wage Structure Survey," 2000~2012 (in Korean).
- Statistics Korea, "Mining and Manufacturing Survey," 2000~2012 (in Korean).
- OECD statistical databases.

4 In a usual economic model, firms are assumed to take on the wage rate determined by the market and overtime premiums ruled on by the government as exogenous variables and endogenously choose the number of employees (employment) and their working hours. However, in the real world, employment is considerably rigid due to various employment protection legislations and turnover costs. Therefore, a more realistic description would be that firms and workers jointly determine (or negotiate) the wage and working hours under the given level of employment and overtime premium.

