"Working hours reduction, financial constraints, and employment: evidence from Korean firms"

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WORKING HOURS REDUCTION, FINANCIAL CONSTRAINTS, AND EMPLOYMENT: EVIDENCE FROM KOREAN FIRMS

Abstract

This study analyzes the effect of reducing working time to a 40-hour week standard on employment, using the data of 1,961 publicly traded firms in Korea. The objective of the study is to empirically estimate the economy-wide effect of this working hours reduction on employment in Korea. This paper also attempts to uncover the effect of financial constraints, defined as the degree of accessibility to finance, on employment stability or sustainability. Some economic theories suggest that financial constraints have mixed or conflicting effects on employment. Building on labor and finance literature such as Garmaise (2007), easing financial constraints helps firms to optimally substitute capital for labor, thereby decreasing employment. Likewise, financially constrained firms are limited by the availability of internal funds, and a decrease in the external financing cost will increase firm-level human resource investment, such as employment. Using a longitudinal data on publicly listed companies in Korea, the author examines variations in the timing of implementing the working hours reduction in terms of establishment size to see if the effect of working hours reduction on employment differs with the degree of financial constraints of firms. This paper finds that the economy-wide effect on employment of work-hours reduction is positive, approximately 3.5% increase in employment. The results, however, show that there is no effect of the working hours reduction on employment in less financially constrained firms or larger corporations, whereas a substantial positive effect on employment is in smaller firms or financially constrained firms, supporting the Garmaise's prediction.

Keywords	working hours reduction, financial resources constraints, human resources, employment
JEL Classification	M51, M54

INTRODUCTION

More than ten years have passed since the mandatory reduction of legal working hours to 40 hours a week, starting with establishments that have more than 1,000 employees in Korea. Since the 1997–1998 economic crisis, the total number of working hours of Korean workers has reached 2,500 hours per year (2,512 hours in 2000 and 2,072 hours in 2015), the greatest number of working hours among OECD countries of average 1,691 hours (Ministry of Employment and Labor, 2017). In 2000, the Tripartite Commission shortened the legal working hours to a maximum of 40 hours and agreed on the basic principles of reducing working hours to gradually implement them in accordance with the type of industry and size. The purpose of introducing the 40-hour week working hours reduction is threefold. First, it was intended to improve the workers' quality of life by improving the working environment, where long working hours are prevalent. Second, it aimed to stimulate the economy by increasing the domestic consumption of new industries, such as culture, tourism, and transportation (Boll & Bublitz, 2018). Third, it is expected that working hours reduction can create jobs to solve unemployment problems (Park, Kim, Chung, & Hisanaga, 2001).

Despite its expectation, studies on the reduction of working hours do not provide clear evidence to support the positive effects on employment (Kim & Lee, 2012; Rho, 2014; Pencavel, 2015). Most of the earlier studies have shown that the reduction of working hours has a positive effect on employment (Grobler, 2005; Levitan & Belous, 1977; Park et al., 2001; Seifert, 1991). Recent research has found that shortening working hours reduces the marginal profitability of firms, but increases the real wages of the workers, which in turn affects employment negatively (Hart, 2010; White & Ghobadian, 1984). In addition, the results suggest that introduction of the system has no effect because of the offsets of the positive and negative effects of shortening the working hours on employment (Fan et al., 2017).

To explain such mixed results, this study emphasizes that the effects of reducing working hours may depend on the characteristics of the firm, particularly its size and the degree of financial constraints. Therefore, the objective of the study is to empirically estimate the economy-wide effect of working hours reduction on employment in Korea. Furthermore, we examine that the effects of 40-hour employment differ with firm size and attempt to answer the question of why this difference occurs. Specifically, this paper explores the possibility of financial constraints, such as the access to finance, for employment in explaining such difference. This study empirically tests whether the effect of working hours reduction on employment depends on the degree of financial constraints of firms building on Garmaise's (2007) theoretical prediction, indicating that easing financial constraints helps firms to optimally substitute capital for labor, thereby decreasing employment (Garmaise, 2007).

1. LITERATURE REVIEW, THEORETICAL BACKGROUND AND HYPOTHESES

The theoretical literature argued that differences in a firm's capital procurement capacity (or financing constraints) could lead to cross-sectional differences in a firm's employment and human resources dependence (Garmaise, 2007). It is expected that the actual increase in wages due to the 40-hour work week could decrease employment, since firms have more incentive to substitute labor for physical capital when the financial constraint is lower. As financial constraints increase, firms tend to use human capital more than physical capital (Hennessy, Levy, & Whited, 2007). In other words, for firms that cannot acquire the capital needed for investment, it is difficult to reduce labor costs given labor productivity, such as through factory automation and advancement of Human Resource (HR) practices. Put differently, a decline in labor supply because of the introduction of a 40-hour work week is likely to lead to investment in human capital, such as in new employment, rather than in automated production systems that require large investment. Therefore, firms will continue to maintain their existing employees as firm-specific human capital becomes more important, since the core production technology in a firm is highly dependent on human capital.

On the other hand, less financially constrained firms find it relatively easy to raise the capital needed for investment, so relatively expensive labor can be replaced by automated production lines, in which case there is no employment increase, rather, an incentive to replace the existing manpower with the automated production system. In addition, previous studies also suggest that the labor productivity may be improved by the concentration of labor because of the overall change in the human resource or performance management system (White, 1987; White & Ghobadian, 1984). As such, when labor productivity increases and output per unit of time is higher than before the reduction of working hours, then the incentive to increase labor demand will be decreased, as the total output can be maintained (Raposo & van Ours, 2010; Fan et al., 2017).

The size of the firm is closely related to its ability to raise capital. Popov (2014) shows that a large corporation is generally less financially constrained than are small and medium-sized firms (SMEs) (Popov, 2014). In large firms, it is expected that human capital is replaced by investments in fixed assets, such as automated production systems or advancement of HR system, since financial con-

straits are generally low and investment capital is relatively abundant. However, SMEs depend on human capital, because they tend to lack the investment capital; hence, new production will be made by means of new employment rather than by investments in fixed assets (Popov, 2014). If the claim proposed by Garmaise (2007) is correct, the reduction in labor supply because of the introduction of the 40-hour work week can differ with organizational size. Specifically, large companies can substitute for reduced labor supply by the efficient use of automated production systems or new investments, but, for SMEs, capital constraints may replace labor supply, which is reduced by new employment.

The reduction of working hours in Korea was initially introduced for large enterprises. The scope of implementation was gradually expanded to SMEs. Building on the financial constraints perspective, it seems plausible that the introduction of the system may not lead to employment growth when the sampled firms are generally large corporations. In an extreme case, a company with abundant investment capital is likely to reduce investment in relatively expensive human capital and introduce an automated production system in an efficient manner. On the other hand, if the recent data on working hours reduction would include the sample of SMEs, who introduced the practice later than did large firms, it seems probable that the policy can lead to increased employment. However, it may be difficult to gauge the average effect of the scheme when conducting research involving all data, regardless of size.

As the size of the firm increases, the reduction of working hours may not have any effect on job creation, or it might have a negative effect, for the following reasons. First, according to the Samsung Economic Research Institute, it was suggested that wages would increase by 14.4% because of the increase in hourly wages and overtime hours if the workers worked as long as actual working hours without wage cuts (Lee, McCann, & Messenger, 2007; Lee & Kim, 2010). Therefore, the increase in real wages per hour and the extra wages for overtime will increase the cost burden, which would weaken the competitiveness of enterprises and decrease employment. Such a wage increase may worsen the labor cost burden for large enterprises with a relatively high wage level and high wage

rigidity compared to that of SMEs. Therefore, corporations may not increase employment or job creation (Mellow, 1982). Overall, this reasoning leads to the following hypotheses:

H1: *The effect of reducing the working hours will depend on the size of the firm, such that the larger the firm size, the smaller the effect of working hours reduction on employment.*

H2: *The effect of reducing the working hours will depend on the degree of financial constraints, such that the greater the financial constraint, the greater the effect of working hours reduction on employment.*

2. METHODS

This study conducted an empirical analysis using the TS2000, collected by the Korea Listed Companies Association. The TS2000 database provides financial statements, stock index information and employment related information of all publicly traded companies in Korea. The TS2000 are subject to less attrition bias or mismeasurement errors, since they are publicly verified through external audits with legal obligations (Kim & Lee, 2012). Regarding the information on the introduction of the shortened working hours, most companies have introduced the practice according to the firm size. As for the sample construction, 798 of TS2000 companies were included in the sample to satisfy the above conditions. In addition, it is worth noting to control the events such as acquisitions, mergers, and corporate divisions or splits, which have a sudden large impact on the total number of employees, which is a dependent variable of this study. Therefore, information on major events listed by company and year was confirmed in the data annotation, and the company was excluded from the analysis. Specifically, 151 companies were merged (M&A), 50 out of 151 companies were split at the same time, and 123 companies were spinoffs. Finally, TS2000 data and data were integrated to use the Korean Industry Classifications (KIC), and five companies were excluded in this process by eliminating missing control variables to be used for regression analysis. Finally, the sample used for the analysis included 6,127 firm-year cases of 569 firms.

Table 1. 40-hour work week and covered establishments by firm size

Number of employees	More than 1,000	300-999	100-299	50-99	20-50	5-20
Introduction date	'04.7.1	'05.7.1	'06.7.1	'07.7.1	'08.7.1	'11.7.1

As noted above, we examine differences in the timing of implementing the working hours reduction in terms of establishment size. In Korea, the introduction time to implement the 40-hour work week differs with the size of the enterprise, as specified in Table 1. Therefore, it provides a 'natural experimental' setting to analyze how the employment effect of the reduction of working hours depends on the size of the enterprise. Moreover, this study attempts to analyze short-term and mid-term effects by using a window of 11 years covering five years before and five years after the implementation of the working hours reduction. It is noteworthy that the event window used for analysis is different for each firm size (MacKinlay, 1997). For example, in 2012, companies with the size of 1,000 or more, companies with 300-999, firms with 100-299, but not including 50-99 and companies with 20-50 are included in the sample. This method has the effect of including companies of similar size in the difference-in-difference (DID) method and controlling the employment change over the same period (Papke & Wooldridge, 2008).

The dependent variable of this study is the ln (total number of employees) in the year t of firm i (Rho, 2014). In the case of independent variables, the reduction in working hours for each company was introduced based on the effective year of the legislation. In addition, to verify the difference in the employment effect of the reduction of working hours by the size of enterprises (SMEs vs. large corporations), it is necessary to create dummy variables for the companies with less than 300 employees (SMEs).

Another independent variable for testing Hypothesis 2 is a firm's degree of financial constraints, measured by the Kaplan-Zingales index (KZ index, hereafter), the most frequently used measurement of financial constraints constructed by Kaplan and Zingales (1997). The KZ index finds a significant sensitivity of investment to cash flow (Hadlock & Pierce, 2010). It uses an ordered logit model to estimate the degree of financial constraints in terms of five readily available accounting variables such as cash flow, market value, debt,

dividends, and cash holdings, each scaled by total assets. A higher index value suggests that a firm is more constrained.

Yearly dummy variables were included to control the year effect to control time. In the case of companies included in the sample, there is a data window for 11 years, including a total of 11 years, five years before and after the statutory fiscal year. For example, if the firms are larger with more than 1,000 employees, the deadline for shortening the working hours is July 1, 2004, and these companies have data windows from 1999 to 2009 in the sample. Therefore, the total years of data included in the sample is up to 1999 (first introduction date 2004 – 5 years) and 2013 (last introduction date 2008 + 5 years). In addition, we included industry dummies to control for the possibility that pattern of employment differs depending on the type of industry. Lastly, we controlled labor costs per person t–1 and last year's t–1 business assets, $\ln\left(fixed\ assets_{t-1}\right)$. These variables are controlled by using variables at time t–1 to avoid statistical bias due to endogeneity (Greene, 2003). The estimation model of this study is as follows:

$$
\begin{aligned}
\ln\left(total\ number\ of\ employees_{it}\right) = \\
= \beta_0 + \beta_1\left(WTR\ introduction\right) + \\
+ \beta_2\left(WTR\ introduction\right) \times \\
\times\left(SME\ dummy\right) + \beta_3\left(Size\ Dum_i\right) + \\
+ \beta_4\ln\left(sales_{i,t-1}\right) + \\
+ \beta_5\ln\left(fixed\ assets_{i,t-1}\right) + \\
+ \beta_6\ln\left(per\ labor\ cost_{i,t-1}\right) + \\
+ Year\ effects + Industry\ effect + \varepsilon_{it}.
\end{aligned} \tag{1}
$$

In the equation (1), it is assumed that the coefficients of all control variables except for the cross-product term are the same regardless of the size of the firm. These assumptions are inconsistent with the hypothesis that large firms are more dependent on physical capital than SMEs. To avoid statistical bias due to misspecification errors that may arise from such simple assumptions, firm fixed

effect panel regression analysis was conducted to examine the robustness of the results in the following in the following equation (2):

$$\ln\left(total\ number\ of\ employees_{it}^{j}\right) =$$
$$= \alpha_0^j + \alpha_1^j\left(WTR\ introduction\right) +$$
$$+ \alpha_2^j\left(sales_{i,t-1}\right) + \alpha_3^j\left(Fixed\ Assets_{i,t-1}\right) +$$
$$+ \alpha_4^j\left(labor\ cost_{i,t-1}\right) + year\ fixed\ effects +$$
$$+ firm\ fixed\ effects + \varepsilon_{it}.$$
$$(2)$$

The estimation model of equation (2) has the advantage of reducing the unobserved heterogeneity bias since the coefficients of the control variables may differ, as well as the inability to consider the characteristics of the company that might not be measured in regression analysis (Papke & Wooldridge, 2008). Lastly, the standard error of all regression coefficients can be large due to potential serial correlation, and if not corrected, the standard error may be biased downward and the t-value may be larger than actual. Therefore, the firm-level clustering robust standard error was used to control for (Petersen, 2009).

3. RESULTS

Descriptive statistics are presented in Table 2.

Table 3 shows the results of panel regression. First, the column (1) of Table 3 is the result of controlling the group fixed effect of the five groups designated by size of company in the law and estimating the employment effect. In equation (1) above, we control the year-fixed effect, industry-fixed effect, and the interaction of two at a specific time. Results show that the coefficient for the implementation period of the shortened working hours is 0.037,

implying that employment increased 3.7% due to the reduction of working hours. In the column (2) of Table 3, we estimated the firm-fixed effect model considering firm heterogeneity. As presented in (2), the coefficient of working hour reduction is 0.035, which is slightly lower than the coefficient of estimation in (1), indicating increased employment by 3.5%. In other words, the analysis of the average effect of reducing working time on employment for all listed companies in Korea showed employment increase of about 3.5%.

Column (3) of Table 3 presents the result of the hypothesis that the effect of reducing the working hours can vary by the size of the firm. Building on the equation (2), we included the interaction between the dummy variable of the SMEs (fewer than 300 employees) and working hours reduction dummy variable. It finds that the employment effect of the reduction of working hours was larger in the SMEs than in the large enterprises. On the other hand, when the interaction term between working hours and SMEs is included, the estimated coefficient is no longer statistically significant, indicating little employment effect in larger enterprises.

The columns (4) and (5) in Table 3 are the results of robustness check on the result of the column (3), which shows the difference in employment effect by the firm size. Column (4) presents the result for large firms, while column (5) shows the results of using a sample of small firms, defined as the firms with fewer than 300 employees. As a result, in the case of large enterprises, the effect or working hours reduction on employment was found to be negligible in larger firms, whereas the legal implementation of the working hour reduction seemed to increase employment by 4%. Moreover, compared to the results of (2), which show the average effect of listed companies, SMEs seem to have led to a total effect of 3.5% increase in employment.

Table 2. Descriptive statistics

Variables	Mean	S.D.	(1)	(2)	(3)	(4)	(5)
(1) Total number of employees	533.7	928.1	–	–	–	–	–
(2) Labor cost per[1]	16.04	0.87	0.52***	–	–	–	–
(3) Working hours reduction	0.55	0.49	-0.02	0.01	–	–	–
(4) Fixed assets[1]	17.37	1.44	0.54***	0.34***	0.08***	–	–
(5) Total sales[1]	18.59	1.25	0.58***	0.32***	0.14***	0.73***	–
(6) KZ index	0.08	1.57	−0.02*	0.03*	0.00	−0.08**	−0.09**

Note: [1] log-transformed.

To explain why the effect of working hours reduction on employment can be different depending on the size of the firm, we explore one possibility that financial constraints may play an important role in explaining the source of difference. Column (6) shows the results of the degree of firm's financial constraints in moderating the relationship between working hours reduction and employment change. We include the KJ index and the interaction term between KJ index and working hours reduction. It shows that the coefficient of interaction term is significantly positive $(\beta = 0.023, p < 0.1)$, indicating that the employment effect of the reduction of working hours was larger in highly financially constrained firms than in less financially constrained firms.

In sum, the results show that the effect of reducing the working hours can be different depending on the size of the firm. Specifically, the Hypothesis 1 is supported indicating that SMEs have a greater employment effect on the reduction of working hours. Likewise, the effect of working hours reduction on employment is greater in more financially constrained firms, which supports Hypothesis 2.

Table 3. Panel analysis of the effect of working hours reduction on employment

Variables	Dependent variable: ln(number of employees)					
	(1)	(2)	(3)	(4)	(5)	(6)
Working hours reduction	0.037*** (0.00)	0.035*** (0.00)	0.003 (0.89)	−0.005 (0.79)	0.040** (0.03)	0.002 (0.72)
ln(Fixed assets) t–1	0.101*** (0.00)	0.114*** (0.00)	0.100*** (0.00)	0.081*** (0.00)	0.126*** (0.00)	0.092*** (0.00)
ln(Total sales) t–1	0.242*** (0.00)	0.363*** (0.00)	0.243*** (0.00)	0.430*** (0.00)	0.323*** (0.00)	0.454*** (0.00)
ln(total wages) t–1	0.262* (0.09)	0.477 (0.17)	0.261* (0.09)	−0.083 (0.43)	1.060** (0.01)	0.158* (0.08)
KJ index	–	–	–	–	–	0.001 (0.15)
Group 1	2.495*** (0.00)	–	2.529*** (0.00)	–	–	2.418*** (0.00)
Group 2	1.718*** (0.00)	–	1.749*** (0.00)	–	–	1.726*** (0.00)
Group 3	1.083*** (0.00)	–	1.080*** (0.00)	–	–	1.079*** (0.00)
Group 4	0.491*** (0.00)	–	0.488*** (0.00)	–	–	0.482*** (0.00)
Working hours reduction × SMEs	–	–	0.060** (0.02)	–	–	–
Working hours reduction × KJ index	–	–	–	–	–	0.023* (0.05)
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	–	Yes	–	Yes	Yes	
Industry-fixed effect	Yes	–	Yes	–	–	Yes
Year × industry	Yes	–	Yes		–	Yes
Firm-level clustering in errors	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−2.32*** (0.00)	−2.81*** (0.00)	−2.32*** (0.00)	−3.04*** (0.00)	−3.03*** (0.00)	−2.92*** (0.00)
Adjusted R square	0.885	0.328	0.885	0.388	0.295	0.625
N	6,127	6,127	6,127	2,753	3,374	6,127

DISCUSSION AND CONCLUSION

In this study, the purpose of the working hours reduction, which was intended to increase employment by reducing working hours, appears to have had a positive effect in Korea. However, the results find that the effect of reducing the working hours is different depending on the size of the firm. Specifically, SMEs have a greater employment effect on the reduction of working hours, whereas there is no employment increase in larger corporations. Moreover, the effect of working hours reduction on employment is much higher in more financially constrained firms.

The results of this study are consistent with Garmaise's (2007) claim of financial constraint status. Specifically, the financial constraints of large corporations are relatively low, it is likely that the recruitment of new workers is relatively easy, and the dependence on human capital with the core skills required for production is relatively low (Garmaise, 2007; Bayar et al., 2017). In other words, it seems probable that the increase in productivity allowed by the substitution of capital for labor is likely. In addition, the improvement of Human Resources (HR) and Labor Relations (LR) systems can lead to replace labor supply or additional employment since the new legislation of working hours reduction tends to increase incentives for larger firms or less financially constrained firms to replace the existing highly skilled worker with the low-cost new worker through the automation or improvement of HR/LR system. On the other hand, SMEs are relatively financially constrained, which makes it difficult to cut costs by means of workforce automation. Put differently, SMEs or financially constrained firms are not easily replacing capital for labor, since the core technology of production is highly dependent on human capital.

This study also has the following practical and policy implications, particularly in terms of HR management policies in dealing with working hours reduction practices. First, the results indicate that the introduction of working hours reduction have little effect on employment in large corporations. This is particularly problematic, given that most of the government's attention and efforts to increase the effectiveness of reducing working hours in large corporations. Part of the reason may be that large companies could be less burdensome than SMEs in terms of costs associated with working hour reduction, and, therefore, reducing working hours is more beneficial to large corporations than SMEs. It seems plausible that there will be a virtuous cycle in which new employment opportunities will be boosted by improved performance. However, unlike such an expectation, the results of this study show that there is little employment effect in large corporations.

On the other hand, SMEs showed a much larger effect than expected, leading to an overall employment impact in the Korean economy while increasing the burden on total labor costs simultaneously. In a sensitivity analysis, the effect on the total labor cost of the company caused by shortening the working time differs according to the size of the firm, as in the case of the employment effect. Specifically, the labor cost of the SMEs is larger than that of the large enterprises. When we compare the above results with the results of the employment effect, the employment of the large enterprises has not been increased, and, therefore, the effect on the total labor cost is little, but the labor cost of SMEs increases with the increase in employment.

Furthermore, if the working hours are reduced, the biggest concern might be the effect of the labor cost on productivity. In practice, it is difficult to reduce wages simply due to shortening of working hours by labor law (Lee et al., 2007; Blyton et al., 2017). To improve competitiveness by improving employee productivity, it is suggested that firms should make substantial efforts to improve the performance management system by having flexible working hours and a flexible working system, and by trying to improve labor culture.

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REFERENCES

1. Bayar, O., Huseynov, F., & Sardarli, S. (2017). Corporate Governance, Tax Avoidance, and Financial Constraints. *Financial Management, 47*(3), 651-677. https://doi.org/10.1111/fima.12208

2. Blyton, P., Hassard, J., Hill, S., & Starkey, K. (2017). *Time, work and organization* (Vol. 7). Taylor & Francis. https://doi.org/10.4324/9781315267272

3. Boll, C., & Bublitz, E. (2018). A Cross-Country Comparison of Gender Differences in Job-Related Training: The Role of Working Hours and the Household Context. *British Journal of Industrial Relations, 56*(3), 503-555. https://doi.org/10.1111/bjir.12299

4. Fan, Y., Kühn, K. U., & Lafontaine, F. (2017). Financial constraints and moral hazard: The case of franchising. *Journal of Political Economy, 125*(6), 2082-2125. https://doi.org/10.1086/694566

5. Garmaise, M. J. (2007). Production in entrepreneurial firms: The effects of financial constraints on labor and capital. *The Review of Financial Studies, 21*(2), 543-577. https://doi.org/10.1093/rfs/hhm081

6. Greene, W. H. (2003). *Econometric analysis: Pearson Education India*. Retrieved from https://www.pearson.com/us/higher-education/product/Greene-Econometric-Analysis-5th-Edition/9780130661890.html

7. Grobler, P. A. (2005). *Human resource management in South Africa*. Cengage Learning EMEA. Retrieved from https://www.cengage.co.uk/books/9781408074220/

8. Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies, 23*(5), 1909-1940. https://doi.org/10.1093/rfs/hhq009

9. Hart, B. (2010). *Working Time and Employment (Routledge Revivals)*. Routledge. https://doi.org/10.4324/9780203844670

10. Hennessy, C. A., Levy, A., & Whited, T. M. (2007). Testing Q theory with financing frictions. *Journal of Financial Economics, 83*(3), 691-717. https://doi.org/10.1016/j.jfineco.2005.12.008

11. Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics, 112*(1), 169-215. https://doi.org/10.1162/003355397555163

12. Kim, H. L., & Lee, J. (2012). The effect of 40 hour work-week on working hours, wage, and employment. *Korean Labor Economics, 35*(3), 83-100.

13. Korean Statistical Information Service (2017). *Statistical Database*. Retrieved from http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&parentId=B

14. Lee, J. S., & Kim, H. S. (2010). Smartwork and its implementation. *Korea Regional Information, 13*(4), 75-96.

15. Lee, S., McCann, D., & Messenger, J. C. (2007). *Working time around the world*. Geneva: ILO. https://doi.org/10.4324/9780203945216

16. Levitan, S. A., & Belous, R. S. (1977). *Shorter hours, shorter weeks: Spreading the work to reduce unemployment*. Johns Hopkins University Press.

17. MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature, 35*(1), 13-39. Retrieved from https://econpapers.repec.org/article/aeajeclit/v_3a35_3ay_3a1997_3ai_3a1_3ap_3a13-39.htm

18. Mellow, W. (1982). Employer size and wages. *The Review of Economics and Statistics, 64*(3), 495-501. https://doi.org/10.2307/1925949

19. Papke, L. E., & Wooldridge, J. M. (2008). Panel data methods for fractional response variables with an application to test pass rates. *Journal of Econometrics, 145*(1-2), 121-133. https://doi.org/10.1016/j.jeconom.2008.05.009

20. Park, J., Kim, Y., Chung, H. K., & Hisanaga, N. (2001). Long working hours and subjective fatigue symptoms. *Industrial Health, 39*(3), 250-254. https://doi.org/10.2486/indhealth.39.250

21. Pencavel, J. (2015). The productivity of working hours. *The Economic Journal, 125*(589), 2052-2076. https://doi.org/10.1111/ecoj.12166

22. Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies, 22*(1), 435-480. https://doi.org/10.3386/w11280

23. Popov, A. (2014). Credit constraints and investment in human capital: Training evidence from transition economies. *Journal of Financial Intermediation, 23*(1), 76-100. https://doi.org/10.1016/j.jfi.2013.11.003

24. Raposo, P. S., & van Ours, J. C. (2010). How working time reduction affects jobs and wages. *Economics Letters, 106*(1), 61-63. https://doi.org/10.1016/j.econlet.2009.10.001

25. Rho, Y. (2014). The effect of 40-hour work week on employment. *Korea Labor and Industrial Relations, 24*(2), 109-129.

26. Seifert, H. (1991). Employment effects of working time reductions in the former Federal Republic of Germany. *International Labor Review, 130*, 495. Retrieved from https://heinonline.org/HOL/LandingPage?handle=hein.journals/intlr130&div=47&id=&page=

27. White, M. R. M. (1987). *Working hours: Assessing the potential for reduction*. International Labour Organisation. https://doi.org/10.2307/2523224

28. White, M. R. M., & Ghobadian, A. (1984). *Shorter working hours in practice*. Policy Studies Institute.