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Research Report

Impact of Long Working Hours on Family Life in Korea

KDI Policy Study, No. 2015-01

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Impact of Long Working Hours on Family Life in Korea

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| Preface |

Korea is well known for its long working hours amongst employees, being always no. 1 or 2 in OECD ranking for average annual hours. Researchers find that the long working hours have detrimental effects on productivity and employees' material well-being such as work-related injuries and illness. However, it's less explored how the long working hours affect the subjective well-being of employees and their children. In this regard, Professor Wang of KDI School of Public Policy and Management studies the impacts of employees' working hours on their quality of life, measured by subjective well-being indicators. Professor Wang exploits a nationally representative longitudinal data, the Korean Labor and Income Panel Study (KLIPS) 1998-2012, to conduct the empirical analysis. The study can increase the understanding of workers' subjective well-being and then shed some light on the labor regulations in Korea.

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Joon-Kyung KIM
President of KDI

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Summary

Korea has been famous for its long working hours in recent decades. The Korean government introduced a Five-Day working week in 2004, allowing firms to approach the target gradually, to reduce negative outcomes of long hours and enhance people's quality of life. However, working hours in Korea were still very long even recently. For example, the average annual working hours amounted to 2,163 in 2012, which is the second-largest in OECD countries and is approximately 60 percent higher than that of Dutch workers. How do the long working hours affect people's subjective well-being? In this study I aim to answer this question exploiting the Korean Labor and Income Panel Study (KLIPS) survey data.

In contrast to previous studies which generally explore the impact by considering categorical working hours, or only check the linear relations between working hours and outcome variables, in this study I allow for nonlinear relationships between working hours and subjective well-being measures, specifically, in most cases quadratic and in some cases cubic. I also check the consistency by considering categorical working hours. Moreover, I study several subjective well-being measures including domain satisfactions, going beyond satisfaction with life and job which were typically examined. The studies of domain satisfactions, which are potentially associated with working hours, tell us consistent stories, thus reinforcing confidence in the validity of subjective well-being measures.

In studying the impacts of working hours on subjective well-being measures for all employees, without considering cross-family-member

spillover effects, I find that the optimal numbers for working hours differ a lot, depending on which type of satisfaction is being measured. I find that mild overtime working makes people more satisfied with their income, life and job, however, people are not mostly satisfied with their leisure activities and working hours even at the regular working hours (40). In other words, people are very sensitive to long working hours for hours-related satisfaction, but much less so for income-related satisfaction. The regressions using categorical hours roughly confirm the results using nonlinear hours. Therefore the introduction of Five-Day working policy may have increased employees' satisfaction with leisure and working time, as shown in previous studies, but may have no impacts on other satisfactions.

I also study cross-partner spillover effects of working hours within married-couple families. I find that, as expected, generally there is no spillover effect for those satisfactions with personal issues, specifically satisfaction with job and satisfaction with personal earnings. However, for those satisfactions which are likely to depend on both partners' activities, such as satisfaction with life, satisfaction with household income, and satisfaction with working hours, I do find spillover effects of spouse's working hours, but mainly for husband. This might be consistent with the typical life pattern of married couples in Korea that women become housewives soon after getting married, especially after having children. Similar to those regressions with all employees, the regressions for married couples also show that working hours maximizing satisfaction with income, life, and job are higher than the hours maximizing satisfaction with leisure and working hours.

Lastly I examine the impact of parent's working hours on their children's subjective well-being. Though some papers argue that long working hours may not be good for their young children, it is not possible to examine the effect in this study due to lack of necessary information on very young children. Thus I check the impacts of parents' working hours on children's satisfaction with life for those aged 14 and above. The results suggest that mother's working hours have no impacts, but father's working hours have impacts on those people aged 20-24, with an inverted U-shape.

If we think life satisfaction is the most comprehensive measure of

our life quality, the regressions with all employees show that the optimal hours should be around 47.6. The regressions on the married couples show that the optimal hours should be 55.3 for husband and 44.8 for wife. Why the optimal working hours are bigger than the legislated 40 hours? It maybe because extra hours make them feel safe or feel they are important to the workplace, or extra hours may bring better working performance which may potentially increase their income or future promotion chances. The traditional hard-working values may also play an important role there. However, analysis of categorical hours shows that the optimal hours might not be significantly different from the legislated working hours. Thus we may not conclude that the legislated working hour is not optimal.

However, we still can draw some clear conclusions. Note that there is still around a quarter of employees work more than 55 hours per week. Reduction of their working hours, holding other things constant, shall be good for them no matter which measures of subjective well-being we consider. Moreover, there are about 4% of employees who work less than 24 hours, while increasing their working hours might be good for their well-being enhancement. The varying impacts of working hours on different aspects of life for different groups of people found in this report provide a new angle to evaluate the current labor acts and regulations. Given the long tradition of hard working and long working hours, employees, especially men, and firms have adopted the preference over long working hours. Mild overtime working may bring utility instead of disutility. Thus reducing working hours from 44 to 40 (conditional on that other labor market conditions do not change much along the reduction) might not be a very important issue, if employees just work the official amount of hours. The most important issues shall be the very long working hours, such as more than 55 hours per week, or the very short working hours, such as lower than 24 hours per week. For an average worker, too many or too few hours both bring disutility. Therefore the focus of labor policies and regulations shall be curtailing the very high number of working hours, and help to provide more job opportunities to those who work part-time and desire to work more.

Under the current legal requirements, about 40% of employees report they are not paid for overtime work in 2012, according to KLIPS data.

Moreover, among those who are paid for their overtime work, more than 15% of employees report being paid fixed amount regardless the actual extra hours worked or no clear rule of overtime payment. These facts may suggest that the current overtime working regulation is not properly enforced. Before making other further movements, government should strengthen the enforcement of current labor regulations on working time. For the very long working hours, it might be desirable to design a **progressive** overtime payment scheme. Under current legislation, the overtime payment rate is flat, which may not be effective enough to reduce the long overtime working hours.

CHAPTER 1

Introduction

Empirical research on the determinants of subjective well-being increased rapidly in recent decades. Among many determinants, employment is one of the most important (Clark and Oswald 1994; Winkelmann and Winkelmann 1998). Many find that working is significantly associated with subjective well-being even after controlling for household income. This might be because working implies social participation and engagement, which are some key contributors of individual happiness (Derek 1967). In addition, it could be of more critical value in earning household income, particularly for men who are used to be seen as the breadwinner for a family (Pouwels *et al.* 2008; Knabe and Rätzel 2010). These findings entailed adjustments in traditional household labor supply models which argue that only consumption and leisure cause workers' well-being (utility).

A related strand of study is about the effect of working time on individual or family well-being. Early studies on the determinants of job satisfaction often included the number of working hours in log form among the control variables (Clark 1996, 1997; van Praag *et al.* 2003). The functional form of working hours is generally not well specified. Moreover, the studies mainly focused on job satisfaction rather than life satisfaction or general happiness. More recently researchers started to specifically study the impacts of working hours on job and life satisfaction and relevant domain satisfactions, considering seriously the functional form of working hours and endogeneity issues.

Pouwels *et al.* (2008) is the first to study the impact of working hours

on life satisfaction. They find a negative correlation based on only one wave of the German Socio-Economic Panel (SOEP) data. Knabe and Rätzel (2010) re-examine the issue using the panel data of SOEP and find an inverted U-shape relationship between working hours and life satisfaction, though not statistically significant. Other studies using the SOEP data reach similar conclusions (Muffels and Kempermann 2011; Rätzel 2009). Booth and van Ours (2008) and Willson and Dickerson (2010) do not find significant relationship between working time and subjective well-being, using British Household Panel Survey (BHPS) and the European Community Household Panel (ECHP) respectively. However, some studies find that long working hours are negatively correlated with subjective well-being for women in Australia and in the Netherlands (Booth and van Ours 2009, 2012). Booth and van Ours (2009) find that workers working between 35 and 50 hours a week is most satisfied with life, yet working hours have no impact on satisfaction with job. Collewet and Loog (2015) find suggestive evidence of an inverted U-shaped effect of hours worked on life satisfaction for employees in German public sector. For full time workers, an extra hour of work decreases the life satisfaction of men significantly, while it has no significant impact on the life satisfaction of female full-timers. These results from those countries, such as Germany, UK, Australia, and Netherlands, are often different from each other, which may be due to the difference in working environment and workers' preferences across countries.

Korea, a country notorious for its long working hours (Bae 2012), deserves a study of the impact of working time on subjective well-being measures. Working hours in Korea are very long, and Korea is often ranked no. 1 or 2 for length of working hours in OECD countries in recent decades. Studies such as Yoon *et al.* (2015) find that extended working hours worsen workers' mental and psychological health, using data from the 4th and 5th Korean National Health and Nutrition Examination Surveys.

The Korean government introduced a Five-Day working week in 2004, allowing firms to approach the target gradually. The main purpose of the reform was to enhance people's quality of life and to reduce negative outcomes of long hours, such as low productivity, high rates of

injury, and vulnerable leisure industry. Kim *et al.* (2001)'s ex-ante assessment is that the reform would have affected family leisure activity; however, it will lead to higher work intensity and longer overtime work due to reduction of regular working hours. Seong (2005) analyzes early effects of the reform during its first year of Five-Day working scheme. The research shows that reduction in actual hours worked were particularly widespread for office and professional/managerial workers and it tends to increase work intensity and reduce leave/holidays. Hence, he finds that the reform was successfully increasing satisfaction with working hours, yet not in satisfaction with life. Thus they anticipate a limited increase of well-being. Yang (2009) find that the Five-Day working week reform leads to increased spending on leisure activities and higher leisure satisfaction. However, Rudolf (2014)'s analysis of Korea Labor and Income Panel Studies (KLIPS) 1998-2008 shows that the working hour reduction does not have expected positive effects on individual and their spouse's life and job satisfaction, though it has a significant effect on satisfaction with working hours. On the other hand, Hamermesh *et al.* (2014) find that legislated working hours reduction increase workers' life satisfaction, based on a difference-in-difference analysis of the same data. In terms of other objective well-being measures, Lee and Lee (2015) find that a one-hour reduction in working hours significantly decreases the injury rate by about 15%.

There are a few studies examining the impact of one's working hours on other family member's well-being (Booth and van Ours 2008, 2009; Rudoff 2014). Hand and Lewis (2002) argue that many fathers are under role conflicts with breadwinners and good husbands, since overtime work generally incurs increased work hour stress, fatigue and work-family conflicts, thus it may offset the greater happiness and mental health by additional income (Golden and Wiens-Tuers 2006). Weston, Qu, and Soriano (2002) find that higher income people gain some emotional rewards from longer working hours but have more time stress which may lower the quality of relationship with their partner, however, low income people has both lower life satisfaction and lower quality of relationship because of long working hours.

Gray *et al.* (2004) study the effect of long working hours on the well-being of fathers and their families based on Australian Life Course

Survey. Contrary to expectations, they find that subjective well-being is not directly affected by working hours but it is more likely to be impacted by other costs attached to this practice. For example, it is affected by the working hours perceived by each partner. Another study conducted by Fursman (2009) find that many factors mediated the impact of long hours of work, and long hours is just one factor among many others that affect family functioning and happiness. Golden and Wiens-Tuers (2006) investigate the effects of overtime work by using data from the US's General Social Survey and find that although long working hours result in higher levels of reported stress and perceived work-family imbalance, but they do not significantly affect reported happiness.

In this study I explore the impact of working hours on a few subjective well-being measures, including life satisfaction, job satisfaction, and a few domain satisfactions, such as satisfaction with leisure time, working hours, personal earnings and household income, using KLIPS 1998-2012. I consider both nonlinear (quadratic/cubic) form and categorical form of working time. With nonlinear form of working hours, I can get point estimates of optimal working hours for various well-being measures and subgroups of employees. The categorical form of working time can be used to check the robustness of the results. I will also check the cross-partner effect following Booth and van Ours (2008, 2009) and Rudoff (2014).

In terms of research methodology, most studies in economics use panel data and rely on fixed effects to remove the time-invariant factors. A few studies use exogenous changes in policies on statutory working hours to estimate the causal impacts of working hours on well-being measures. Rudoff (2014) focuses on employer-initiated reductions of fixed regular working hours that induce reductions in actual working hours. However, whether employer-induced reduction is purely exogenous is doubtful. Hamermesh *et al.* (2014) use a difference-in-difference method to study the impact of working time on subjective well-being, exploiting the Five-Day working policy changes since 2003 in Korea. The pre- and post-treatment period is 1999 and 2009 respectively when using KLIPS. There are two issues with this method. First, the sample is greatly reduced by only focusing on those ages 22-

49 in 1999. Second, many other things may change during this 10-year period, from 1999 and 2009, thus it is hard to attribute the effect only to the Five-Day working policy.

Collewet and Loog (2015) exploit the changes in the length of the official workweek in the German public sector to estimate the impacts of working time on life satisfaction and find an inverted U-shape. The method is plausible. Interestingly, the estimated coefficients from 2SLS are almost identical to the fixed-effect model, which largely relieve the worry about the endogeneity caused by time-variant factors or reversal causality. Therefore, in this study I stick to the fixed effect model, but will deal with the concerns about the endogeneity issues. The first concern is the time-varying unobserved factors, which is mainly a person's working experience and skills accumulated during work. Those more experienced may be able to finish the same work in shorter working hours. I do the tests for both the old group (specifically aged 40+) and the old cohort (those who were born before 1953, aged 45+ in 1998). The point estimates of optimal working hours for both groups are actually a lot higher than that for the full sample. The second concern is that if people who have a stronger preference on leisure (and did not work before 2004) may tend to participate in the labor market after 2004. If this is the case, the estimate is likely to be biased upward. To relieve this concern, I check the subsample who worked both before and after the policy change. The coefficients for hour and hour squared for both life and job satisfactions are very close to the main regressions. The third concern is reversal causality, i.e. those who are more satisfied with life or job may work longer later. I check this hypothesis by running regressions for working time controlling for lagged life satisfaction and lagged job satisfaction respectively, plus other covariates. I do not find any significant impact.

Next I examine the impact of parents' working hours on life satisfaction of their children aged 14-24. Children, as a part of the family, might also be affected by their parents' working pattern. Contrary to many studies focusing on the parenting time for very young kids, I examine the impact on subjective well-being directly for youths. This is the first study on this issue using Korea data, according to my knowledge.

Romich (2002) examines the impact of parents' work hours, particularly in terms of full-time employment on young adolescents. The research finds that mother-child relationships determine how well families manage parental work and family life. Based on the analysis of the US national survey data, there are no significant or very modest effects of long parental work hours on children's behavior problems. However, children in two-parent families who report having less close relationships with their mothers shows more troublesome behavior in the case of full-or overtime working mom. Alexander and Baxter (2005), exploiting the first wave of the Longitudinal Study of Australian Children, finds that parent with a youngest child aged four or five were more likely to report work-to family strain than those whose youngest child was younger than four. The authors also show the importance of different work arrangement for family life. Higher autonomy, more flexibility in starting working time and finishing time and the capacity of changing the number of working hours are more desirable conditions for working parents. Baxter (2007) also examines the relationships between fathers' working hours and the extent to which they undertake different roles in families with children aged 4-5 years, by analyzing data from the Longitudinal Study of Australian Children. They find that father's time spending with children and co-parenting was only partially depending on working hours. Jamal (2010) finds that increased parents' working hours have an impact on the amount of parental involvement for the third generation Latino students, but not on their academic outcomes, based on the National Educational Longitudinal Study (NELS) from 1988-1992.

In summary, studies on the impacts of working hours are increasing, yet the conclusions are generally not consistent with each other. This might be because the base amount of working hours those studies refer to in different countries are very different, or because the work ethics are different across countries. This study will focus on the case of Korea, which is notorious for its long working hours. I will use panel data, specifically KLIPS 1998-2012, allowing for the nonlinear structure of the impacts of working hours on various subjective well-being measures, using mainly fixed effect model. I will also study the impact of parents' working hours on their children, aged 14-24.

The rest of this report is organized as follows. Chapter 2 discusses the data and methodology. Chapter 3 reports the impacts of working hours on employees' subjective well-being. Chapter 4 documents the impacts of parents' working hours on their children's life satisfaction. Chapter 5 concludes and discusses some policy implications.

CHAPTER 2

Data and Methodology

The data I use for this research are drawn from the KLIPS. KLIPS is a longitudinal survey conducted by the Korea Labor Institute. It mainly covers labor market and income activities of households and individuals in urban areas. In each year the survey covers around 5,000 households and their family members aged 14 or plus. The survey was launched in 1998. The most recent data publicly available is the 2012 wave.

KLIPS contains both general and domain life satisfaction questions. The general life satisfaction question is surveyed since the first wave. Specifically, the question is “How satisfied are you with your life in general?” The response is 1-5 point, “1” for “very satisfied”, “2” for “satisfied”, “3” for “neither satisfied nor dissatisfied”, “4” for and “dissatisfied”, and “5” for “very dissatisfied”. The question for domain satisfactions is “How satisfied or dissatisfied are you with the following aspects of your life? (1) Household income, (2) Leisure life.” Both questions were surveyed since 1998. Other domains which are not directly related with working hours are not shown here. The 1-5 point answer to the domain questions are the same as the one for general life satisfaction.

KLIPS also contains questions on general and domain job satisfaction. The question on job satisfaction is “Overall, how satisfied or dissatisfied are you with your main job (workplace)?” The question is available between 2000 and 2012. For domain job satisfaction, we consider two of them which are potentially related with working hours. The question is “How satisfied or dissatisfied are you with regard to

your main job on the following aspects? (1) Wages or earnings, (4) Work hours”. The former one started from 1998, while the latter from 1999. The scale of answers to these questions is the same as the one for general life satisfaction.

When I conduct analysis in this study, I reverse-code all the answers so that “5” represents “very satisfied” and “1” represents “very dissatisfied”. The summary statistics of those variables for employees were shown in Table 2.1. We can see that the average score of satisfaction with life is 3.29, which is higher than the midpoint, 3. The average satisfaction with job is 3.21, which is close to life satisfaction. Domain life and job satisfactions are generally less than 3, except for satisfaction with working ours which is 3.16. Satisfaction with household income and personal earnings are very similar.

The analysis subject in this report is restricted to paid employees only. The main explanatory variables are working hours and working hours squared (divided by 100). The reason of including both original hours and the squared term is there might be nonlinear relationship between working hours and the outcome variables. Too few working hours may mean the job is part-time, which might not be desirable. Too many working hours may not be good either since it means overtime working. The summary statistics of these two variables are reported in Table 2.2. The average weekly working hours reported by employees in the period of 1998-2012 is 46.82 hours. Some respondents report very

Table 2.1 Summary Statistics of Dependent Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Satisfaction with life	56,205	3.29	0.65	1	5
Satisfaction with job	48,349	3.21	0.66	1	5
Satisfaction with leisure activities	56,213	2.98	0.76	1	5
Satisfaction with working hours	52,247	3.16	0.79	1	5
Satisfaction with household income	56,214	2.83	0.75	1	5
Satisfaction with personal earnings	56,235	2.77	0.79	1	5
Satisfaction with life, aged 14-24	25,741	3.28	0.64	1	5

Notes: The summary statistics of satisfactions except for the one for aged 14-24 are only for those who are working.

Table 2.2 | Summary Statistics of Independent Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
<i>Individual-level</i>					
Working hours	56,471	46.82	13.63	1	100
Working hours squared/100	56,471	23.78	14.11	0.01	100
Female	56,471	0.39	0.49	0	1
Married	56,464	0.61	0.49	0	1
Separated or divorced	56,464	0.04	0.18	0	1
Widowed	56,464	0.03	0.16	0	1
<i>Household-level</i>					
Number of children 0-6	45,893	0.16	0.47	0	3
Number of children 7-14	45,893	0.22	0.56	0	4
Number of children 15-24	45,893	0.33	0.72	0	5
Ln household income	44,826	7.35	1.39	0	13.82
Dummy for having additional real estate	42,901	0.19	0.40	0	1
Dummy for having financial assets	45,893	0.64	0.48	0	1
Dummy for having debt	45,893	0.48	0.50	0	1

Notes: The summary statistics of all individual-level variables in this table are only for those who are working. Similarly, those statistics of household-level variables are only for those families at least one member is working.

high working hours, such as 120, 140 or even 168. To make them more realistic, I recode the working hours as 100 for those who report hours higher than 100. In total there are 131 observations recoded.

Figure 2.1 shows the distributional pattern of working hours. Clearly there are two peaks, one is around 40 hours, and another one is around 44 hours. The former is the legal working hours since the official reduction of working hours (introduction of Five-Day working policy), and the latter is the legal hours before implementing the policy. From the figure we can also see that most people work more than 40 hours, and the large amount of people work between 40 and 60 hours. Figure 2.2 shows the histograms for males and females separately. We can see that females are not exempted from overtime working, and there are a larger proportion of females working less than 40 hours than males.

In the analysis I use a few social demographic variables for employees including individual characteristics such as gender and

Figure 2.1 Distribution of Working Hours, Average of 1998-2012

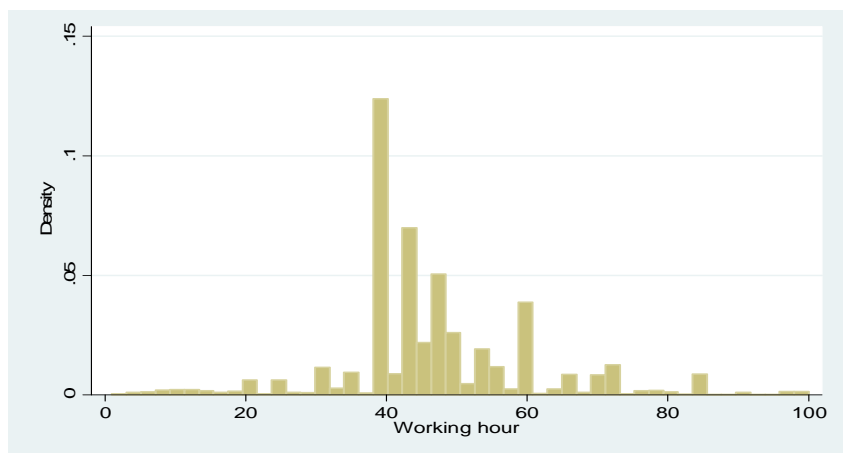
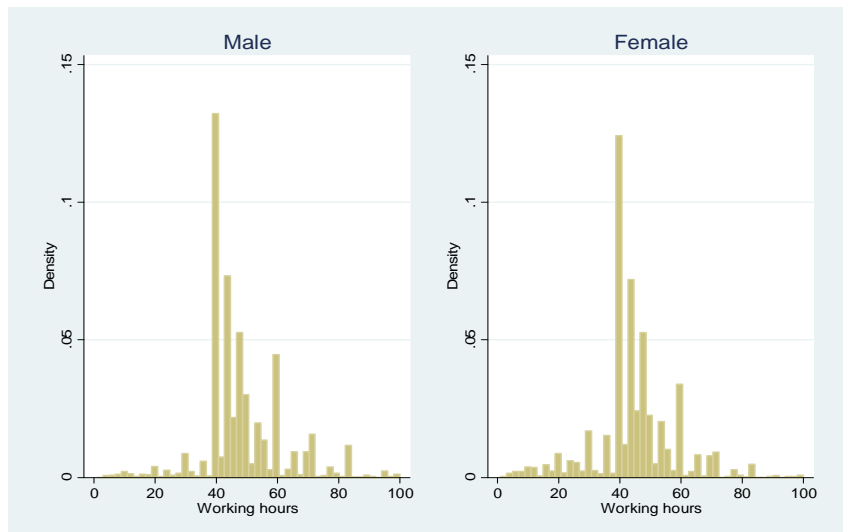


Figure 2.2 Distribution of Working Hours by Gender, Average of 1998-2012



marital status, and household-level characteristics such as number of children, In household income, and three dummy variables indicating family financial situation. The summary statistics of these variables are

also reported in Table 2.2. Among the employees, only 39% is female. This is compatible with the fact that women's labor force participation rate is much lower than men's in Korea. There are three dummy variables for marital status, married, separated or divorced, and widowed. The reference category, single, is not shown in the table. The major group is the married, which accounts for 61%. The separated, divorced, or widowed together accounts for 7%.

The summary statistics of household-level variables are calculated based on families in which at least one member is working. Household income is total earned income of household after tax deductions last year (unit: krw 10,000). The dummy for having additional real estate property is equal to 1 if a household owns real estate or property other than current dwelling. From the table we see that 20% of working families owns additional properties. The dummy for having financial assets has the value "1" if a household has savings in bank, having stock, bond, or trust fund, or has saving-type insurance. The dummy for having debt has the value "1" if one household has any sort of loans from financial institutions, non-financial institutions or individuals. On average, 64% of families report having some financial assets and 48% of them report having loans.

I also control for employees' industry and occupation in most models. I produced 12 industries mainly based on the Korean Standard Industrial Classification of 1991 (KSIC-91). Actually KLIPS uses new classification which contains more industries in later years. To maintain the same classification all over the study period, I used the old one. I also merge some categories with very small sample size. The 12 categories include: 1) agriculture, forestry, fishing, mining, and quarrying; 2) manufacturing; 3) electricity, gas, and water supply, and construction; 4) wholesale and retail trade; 5) hotels and restaurants; 6) transport, post and telecommunication; 7) financial institutions and insurance; 8) real estate and renting and leasing; 9) public administration and defense, and compulsory social security; 10) education; 11) health and social work; 12) other community, repair and personal service activities.

The 9 occupation categories are taken from Korean Standard Classification of Occupation of 1992 (KSCO-92). Though KLIPS

adopts newer version of the classification, I use the old one to maintain the same classification through the research period. I merge the elementary occupations category with the armed forces due to the very small sample size of the latter group. Thus I yield 9 occupations: 1) legislators, senior officials and managers; 2) professionals; 3) technicians and associate professionals; 4) clerks; 5) service and sales workers; 6) skilled agricultural, forestry and fishery workers; 7) craft and related trades workers; 8) plant, machine operators and assemblers; 9) elementary occupations and armed forces.

Given the panel structure of KLIPS, I mainly run linear fixed-effect regressions to eliminate the potential endogeneity associated with individual fixed effect. As suggested by Ferrer-i-Carbonell & Frijters (2004), it won't make a substantial difference whether treating answers to satisfaction questions ordinal or cardinal. I thus just treat the 1-5 point responses cardinal to make the interpretation of the coefficients of independent variables easier.

I first consider the following model for all employees:

$$y_{ijt} = \beta_0 + \beta_1 H_{ijt} + \beta_2 H_{ijt}^2 + X'_{ijt} \Phi + Z'_{jt} \Psi + \varepsilon_i + \zeta_t + \epsilon_{it} \quad (1)$$

where i , j , and t indicates individual, household, and year respectively. y is the dependent variable. H is working hours. X indicates personal marriage status. Z indicates household characteristics including number of children at different ages and financial situation. ε is individual fixed effect. ζ is year fixed effect. ϵ is the error term which is assumed to follow standard normal distribution. In certain cases, the cubic term of working hours is also included in the model.

Next I restrict the sample to married-couple families with at least one worker. I thus can estimate the cross-partner effects of working hours, separately for both husband and wife. The model for husband and wife is given as follows:

$$y_{ijt}^h = \beta_0^h + \beta_1^h H_{ijt}^h + \beta_2^h (H_{ijt}^h)^2 + \beta_3^w H_{ijt}^w + \beta_4^w (H_{ijt}^w)^2 + Z'_{jt} \Psi^h + \varepsilon_i^h + \zeta_t^h + \epsilon_{it}^h, \quad (2)$$

$$y_{ijt}^w = \beta_0^w + \beta_1^w H_{ijt}^w + \beta_2^w (H_{ijt}^w)^2 + \beta_3^h H_{ijt}^h + \beta_4^h (H_{ijt}^h)^2 + Z'_{jt} \Psi^w + \varepsilon_i^w + \zeta_t^w + \epsilon_{it}^w. \quad (3)$$

In these two equations, the superscripts h and w indicate husband and wife respectively. Note that different from equation (1), marriage variables are not controlled for in these two equations since these regressions are only for married couples. The non-working spouse's working hours are coded as zero. In certain cases, the cubic term of working hours is also included in the model to better characterize the nonlinear impact of working hours.

Lastly I study the impact of parents' working hours on their children's life satisfaction. KLIPS only asks life satisfaction questions for those aged 14+, thus in this analysis I choose those aged 14-24 as the children group. This group is generally economically dependent on their parents. The model is given as follows:

$$y_{ijt}^c = \beta_0^c + \beta_1^c H_{ijt}^h + \beta_2^c (H_{ijt}^h)^2 + \beta_3^c H_{ijt}^w + \beta_4^c (H_{ijt}^w)^2 + Z_{jt}' \Psi^c + \varepsilon_i^c + \zeta_t^c + \epsilon_{it}^c, \quad (4)$$

where the superscripts c indicates children.

CHAPTER 3

Working Hours and Employees' Subjective Well-being

1. Trend of Working Hours

Working hours in Korea has been notoriously high comparing with other countries. Among OECD countries, Korea has been long ranked no. 1 in the average annual hours actually worked per worker. The earliest data available in OECD is in 1980, 2,864 hours. This no. 1 status was maintained until 2007, and was surpassed by Mexico from 2008 to 2014. In Figure 3.1 I show the ranking of working hours among OECD countries in three years, the starting year, the middle year, and the end year of this study, specifically 1998, 2005, and 2012 respectively. The number of working hours in Korea in 1998 is 2,488, which is 70% higher than the hours in the lowest-ranking country, Denmark (1,463). In 2005, Korea's number of working hours (2,351) is 66.7% higher than the number in the lowest-ranking country, Germany (1,411). In 2012, Korea's number of working hours (2,163) is still 57.4% higher than the number in the lowest-ranking country, Germany (1,374). We can also see that the number of working hours in Korea is decreasing in both absolute size and the relative size to the lowest country, though the gap is still huge.

Figure 3.2 shows the dynamics of working hours in Korea, in Germany, and the OECD averages in recent 20 years, 1995-2014. From this figure we can see the downward trend of working hours in Korea more clearly. The gap between Korea and OECD average, and the gap

Figure 3.1 | Ranking of Annual Working Hours in OECD

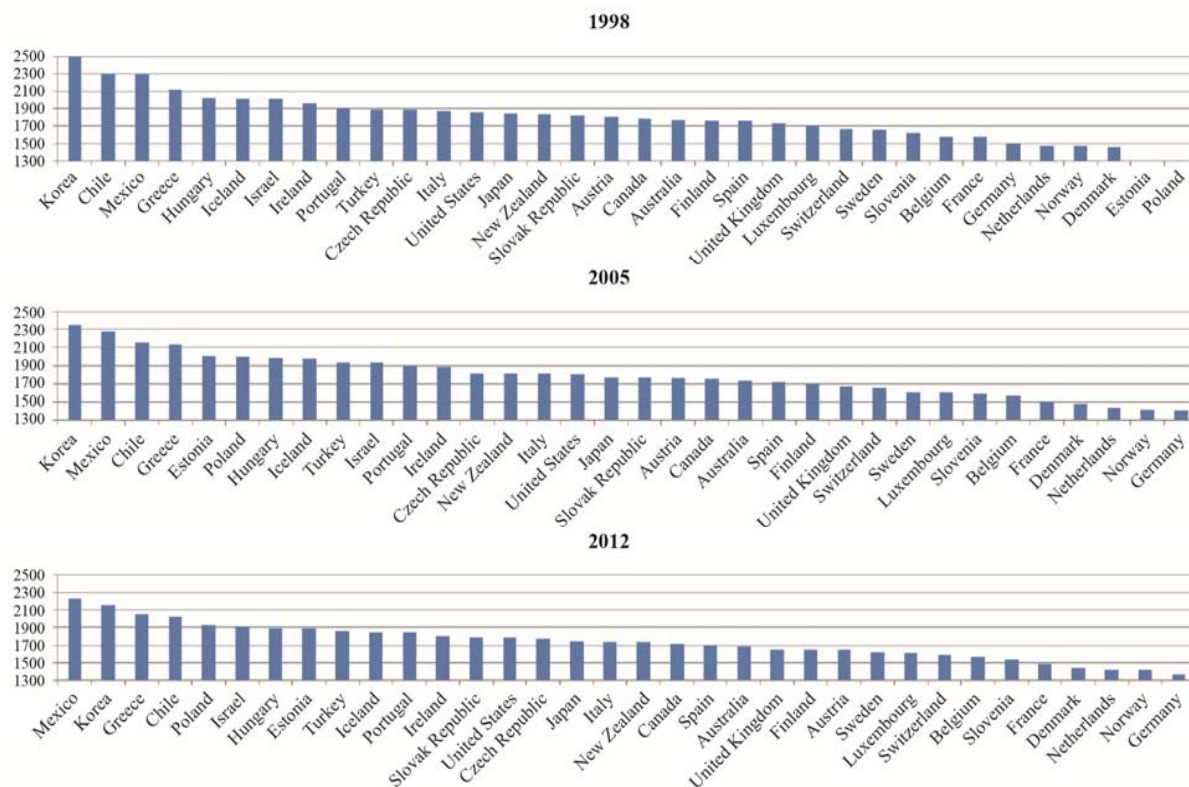
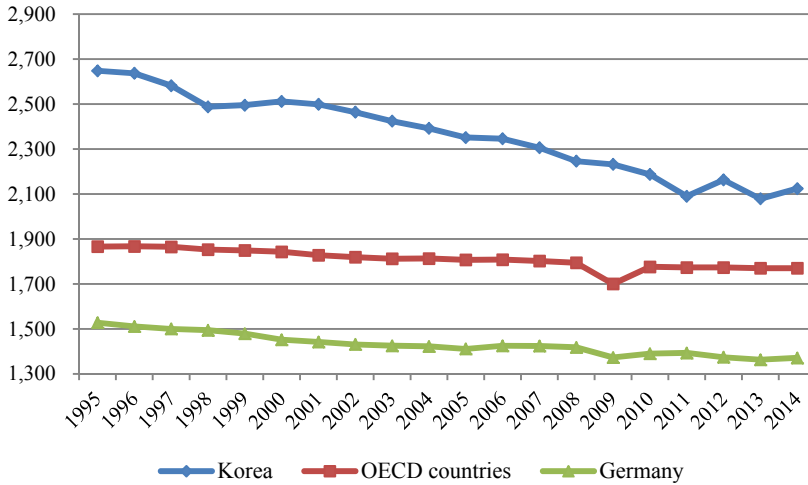


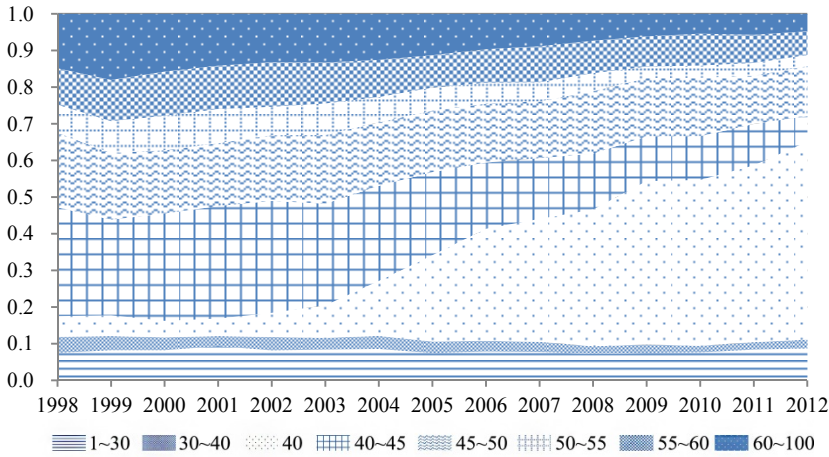
Figure 3.2 Dynamics of Annual Working Hours Comparing Korea with Germany and OECD Averages, 1995-2014



between Korean with Germany are both narrowing down. To tackle with the long working hours, Korea government introduced the stepwise Five-Day working policy in Korea since 2004. The reform was adopted stepwise since 1st July 2004, starting from the workplace with over 1,000 employees, and then gradually applied to other workplaces with smaller size. Korea's working hours have been reduced continuously since 2004, though the decreasing trend is not much different from the period before introducing the policy.

I then illustrate the trend of weekly working hours in Korea during the period of 1998 and 2012, based on the KLIPS data. I separate the weekly working hours into the following 8 groups, [1, 30], (30, 40), 40, (40, 45], (45, 50], (50, 55], (55, 60], and (60, 100] and calculate the percentage of employees fall in each group in each year. In Figure 3.3 I show the dynamics of those percentages from 1998 to 2012. A few important changes can be observed. First, the percentage of employees working less than 40 hours is roughly stable in this period. Second, the percentage of employees working 40 hours is small and stable before 2003 (5-6%), but starts to increase rapidly since 2003 along with the gradual introduction of Five-Day working policy. The increase of the

Figure 3.3 Trend of Working Hours Compositions



percentage of 40-hour employees is fairly stable, at around 5% per year. The percentage of this group reaches 54% in 2012. In other words, more than half employees are not working overtime in a typical week in 2012. In the meantime, the percentage of employees working over 40 hours but less than or equal to 45 hours decreases, from 28% in 2003 to 7% in 2012. The percentage of employees whose working hours lies in the three groups, (50, 55], (55, 60], and (60, 100] also reduces by 5.5%, 5%, and 8.5% respectively from 2003 to 2012. These reductions by group predict a reduction of average working hours in the period.

Figure 3.4 shows the trend of average working hours from 1998 to 2012 by the dotted line and the 95% confidence interval by the shaded area. Consistent with the change of percentage of employees in each hour group, the average working hours decreases continuously from 48.9 hours in 2003 to 43.1 hours in 2012. This suggests approximately a 6-hour reduction ever since the introduction of Five-Day working policy in Korea, which may indicate the effectiveness of the policy. Actually there is already some downward trend before the policy, though the trend is more flat than the later period. Figure 3.5 shows the trends of average working hours by gender and their corresponding 95% confidence intervals. Clearly in all years, males work longer than females significantly. The gap is around 5 hours before the policy, and

Figure 3.4 Trend of Average Working Hours

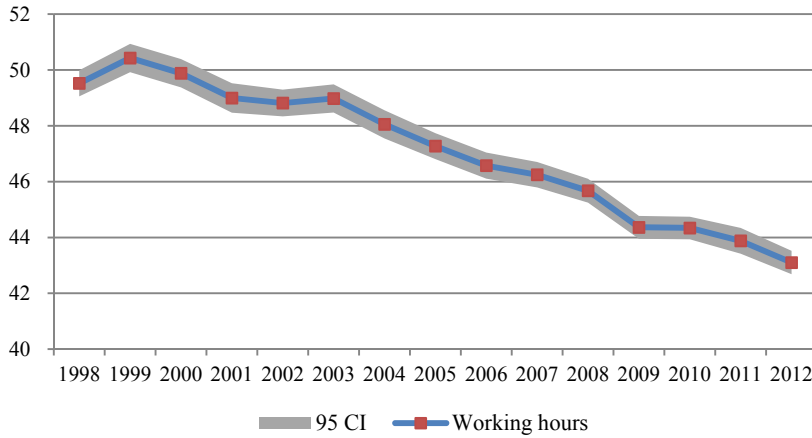
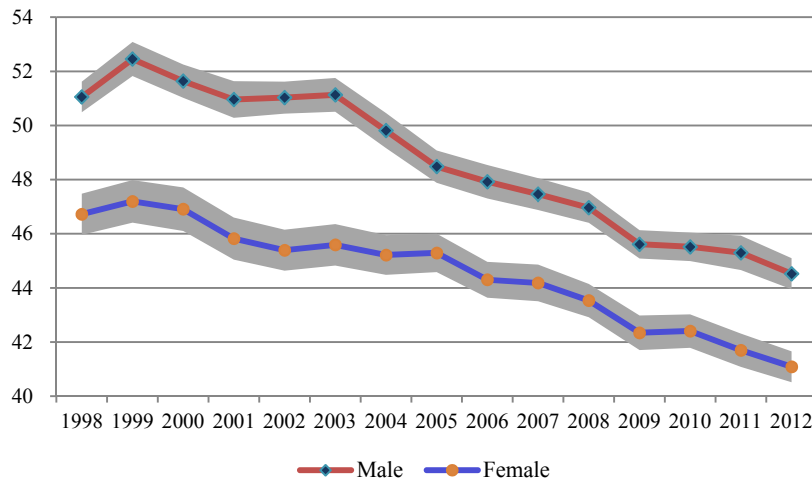
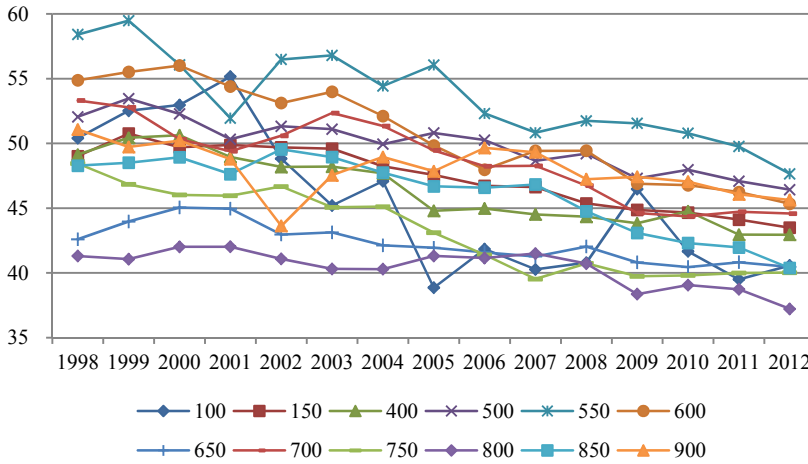


Figure 3.5 Trend of Average Working Hours by Gender



reduces to around 3.5 hours in recent years. In terms of trend, both males' and females' working hours are decreasing. In early period of policy adoption, specifically in 2004 and 2005, males show much rapid reduction than females. Since 2006 when the policy applies to more broad types of firms, the reduction rate is not much different between males and females.

Figure 3.6 Trend of Average Working Hours by Industry

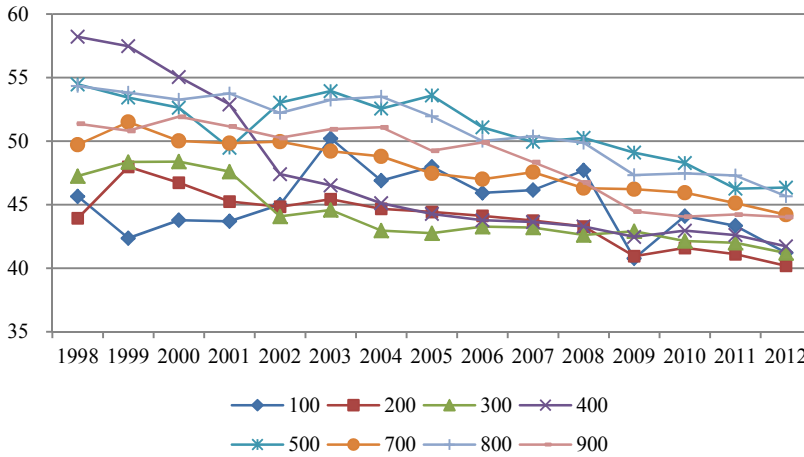


Note: The industry codes are defined as follows:

- 100: agriculture, forestry, fishing, mining, and quarrying;
- 150: manufacturing;
- 400: electricity, gas, and water supply, and construction;
- 500: wholesale and retail trade;
- 550: hotels and restaurants;
- 600: transport, post and telecommunication;
- 650: financial institutions and insurance;
- 700: real estate and renting and leasing;
- 750: public administration and defense, and compulsory social security;
- 800: education;
- 850: health and social work;
- 900: other community, repair and personal service activities.

Figure 3.6 depicts the trends of average working hours by industry code. From the figure we can see that there are big variations of average working hours before 2000, and the variations shrink as time goes by. The largest gap in 1998 is 17 hours, between hotels and restaurants industry (58.4) and education industry (41.3). Most industries experienced reduction in working hours since 2003, though in different magnitudes. The primary sector (agriculture, forestry, fishing, mining, and quarrying) decreased to around 40 hours but then had a jump in 2009. The top three industries in terms of reduction in hours from 2003 to 2012 are: 1) hotels and restaurants (9.2), 2) transport, post and telecommunication (8.6), and 3) health and social work (8.6). The

Figure 3.7 Trend of Average Working Hours by Occupation



Note: The industry codes are defined as follows:

- 100: agriculture, forestry, fishing, mining, and quarrying;
- 150: manufacturing;
- 400: electricity, gas, and water supply, and construction;
- 500: wholesale and retail trade;
- 550: hotels and restaurants;
- 600: transport, post and telecommunication;
- 650: financial institutions and insurance;
- 700: real estate and renting and leasing;
- 750: public administration and defense, and compulsory social security;
- 800: education;
- 850: health and social work;
- 900: other community, repair and personal service activities.

reductions in financial service, education and other service are fairly small, about 2 to 3 hours.

Figure 3.7 shows the trends of average working hours by occupation. We can see though the level of working hours vary across occupations, but the decreasing trends is similar since 2003. The top three occupations in terms of reduction in hours from 2003 to 2012 are: 1) legislators, senior officials and managers (9), 2) service and sales workers, 3) plant, machine operators and assemblers (7.6). The reduction in hours from 2003 to 2012 for technicians and associate professionals is the smallest, only 3.4 hours.

2. Trend of Subjective Well-being Measures

In this section I discuss the trends of subjective well-being measures. Figure 3.8 depicts the trend of average satisfaction with life for the employees and non-employees with the dotted lines and the corresponding 95% confidence intervals with the shades in the period of 1998 and 2012. In general we observe an increasing trend for both groups, though the levels become stable between 2009 and 2012. The life satisfaction of the employees rises from 3.3 in 2003 to 3.5 in 2012. The 0.2 increase is not a small amount, which accounts for 6% of the 2003 satisfaction level.

Figure 3.9 depicts the trend of average satisfaction with job for the employees with the dotted line and the corresponding 95% confidence interval with the shade between 2000 and 2012. Similar to the trend of life satisfaction, we see the average level of job satisfaction is generally increasing, though are steady in a few years especially between 2009 and 2012. The amount of increase from 2003 to 2012 is 0.2, or 6.5%.

Figure 3.10 shows the trends of domain satisfactions for employees. The two in job domains are satisfaction with working hours and satisfaction with personal earnings. The two in life domains are satisfaction with leisure activities and satisfaction with household

Figure 3.8 Trend of Average Satisfaction with Life

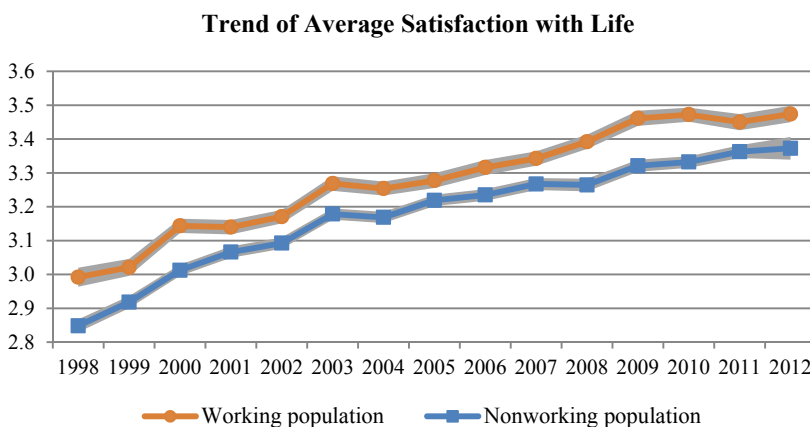
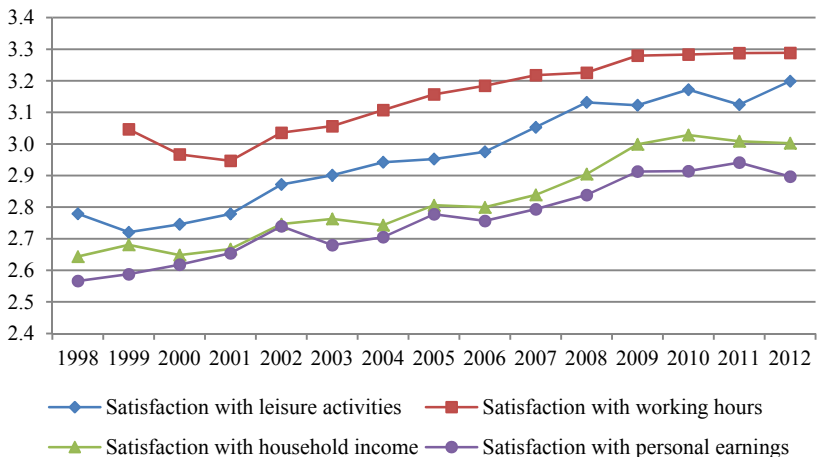


Figure 3.9 Trend of Average Satisfaction with Job



Figure 3.10 Trend of Average Domain Satisfactions



income. Satisfaction with working hours is higher than satisfaction with leisure activities. Satisfaction with household income and personal earnings are very close, but both are lower than satisfaction with leisure activities. All four domain satisfactions show increasing trends between 2003 and 2009 but become stable after 2009. The increase of the four domain satisfactions from 2003 to 2012 ranges between 0.2 and 0.3 in levels, or between 7.6% and 10.3% in percentages.

Comparing the trend of working hours and trend of subjective well-being measures, clearly we see the directions are on the opposite. Does the reduction in working hours contribute to the increase of subjective well-being? In next section we would show the regression results.

3. Regression Results

(1) For All Employees

In this section I report the fixed-effect regression using all employees for those six subjective well-being measures, based on Equation (1). Table 3.1 reports five models for satisfaction with life. In all the five columns I control for ln household income, three dummies on financial status, three dummy variables on marital status, three variables on number of children at different ages, as well as year, industry and occupation dummies. Column (1) is for all employees, considering both working hours and the squared working hours. The coefficients of working hours and squared working hours are both statistically significant at 0.001, which indicates an inverted U-shape between working hours and satisfaction with life. I show the inverted U-shape and the corresponding 95% confidence interval in Appendix Figure 1. The confidence interval is calculated based on Delta-method standard error. Using the two coefficients we can calculate the number of working hours which maximizes satisfaction with life, 47.6 hours, when other things are equal.¹ However, the variation of the predicted life satisfaction is not fairly big. The difference between the maximum and the minimum predicted value is about 0.11.

People may wonder if this result is largely driven by those who are working less than 40 hours reporting lower life satisfaction. Thus in columns (2) to (5) I do a few tests for people working different categories of hours and see if I can find consistent results. I only include working hours in these columns since the squared hours do not work. In

¹ Note that the Five-Day working policy not just reduced legislated working hours, but also may increase the general level of social protection over employees.

Table 3.1 | Linear Fixed Effects Models for Satisfaction with Life

	(1)	(2)	(3)	(4)	(5)
	All	<40 hours	40+ hours	40-50 hours	40-60 hours
Working hours	0.0039*** (0.0010)	0.0031* (0.0014)	-0.0016*** (0.0003)	0.0008 (0.0011)	-0.0018** (0.0006)
Working hours squared/100	-0.0041*** (0.0009)				
Ln household income	0.0646*** (0.0059)	0.0561** (0.0196)	0.0632*** (0.0064)	0.0598*** (0.0081)	0.0623*** (0.0071)
Dummy for having additional real estate	0.0281*** (0.0083)	0.0313 (0.0374)	0.0279** (0.0087)	0.0187+ (0.0103)	0.0241** (0.0092)
Dummy for having financial assets	0.0633*** (0.0062)	0.0597** (0.0226)	0.0585*** (0.0065)	0.0572*** (0.0082)	0.0575*** (0.0071)
Dummy for having debt	-0.0189** (0.0061)	-0.0391 (0.0239)	-0.0156* (0.0064)	-0.0163* (0.0077)	-0.0137* (0.0068)
Married	0.1598*** (0.0173)	0.0780 (0.1166)	0.1680*** (0.0178)	0.1615*** (0.0201)	0.1719*** (0.0184)
Separated or divorced	-0.0685* (0.0322)	-0.1002 (0.1413)	-0.0703* (0.0338)	-0.0757+ (0.0428)	-0.0640+ (0.0370)
Widowed	0.1478** (0.0533)	0.2462 (0.1574)	0.1435* (0.0592)	0.1561* (0.0708)	0.1295* (0.0610)
Number of children 0-6	-0.0337*** (0.0077)	-0.0107 (0.0417)	-0.0355*** (0.0079)	-0.0377*** (0.0091)	-0.0404*** (0.0083)
Number of children 7-14	-0.0261*** (0.0070)	-0.0195 (0.0340)	-0.0276*** (0.0073)	-0.0237** (0.0086)	-0.0308*** (0.0078)
Number of children 15-24	-0.0358*** (0.0054)	-0.0501* (0.0247)	-0.0364*** (0.0056)	-0.0333*** (0.0068)	-0.0342*** (0.0060)
Year dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y	Y
Within R-squared	0.0582	0.0659	0.0582	0.0511	0.0548
Overall R-squared	0.1433	0.0788	0.1392	0.1067	0.1303
Number of observations	60,319	6,718	53,601	37,626	47,193
Number of individuals	11,454	3,351	10,608	9,216	10,130

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

column (2) I consider the sub-sample with less than 40 hours. Consist with the results in column (1), the positive coefficient of working hours suggest that for those who work less than the legislated working hours, the more hours people work, the higher life satisfaction people tend to have. In column (3) I consider the sub-sample with at least 40 working hours. Consist with the results in column (1), the negative coefficient of working hours suggest that the more hours people work, the lower life satisfaction people report. In column (4) I further restrict the sample to those who work between 40 and 50 hours. In this case, I do not find significant impact of working hours. In column (5) I extend the sample to include those who work between 40 and 60 hours, again I find negative coefficient of working hour, which is very similar to the one in column (3) where I include all those work 40+ hours. Columns (3)-(5) together suggest that people are indifferent for hours between 40 and 50, but longer hours make them report lower life satisfaction. These results are consistent with the estimated optimal hours 47.6 in column (1). Therefore I may conclude that only reducing working hours from 44 to 40 might not have significant impact on one's life satisfaction, but reducing the extreme high working hours to at least lower than 50 will increase life satisfaction. Increasing those who work less than full-time working hours (more likely to have part-time jobs) can also increase one's life satisfaction.

In all five columns we see that the coefficient of \ln household income is significant and positive, with a value around 0.06. This implies 1% increase in household income will lead to a 0.06 increase in life satisfaction on the 1-5 point scale or in other words a 1.8% increase from the average level of life satisfaction. All other variables also tell consistent story, though in some models especially in column (2), many are not significant. Having additional real estate or property and having financial assets are associated with higher life satisfaction, while having debts is associated with lower life satisfaction. In terms of marriage status, we find that getting married are more satisfied with life than being single, while becoming separated or divorced is less satisfied than being single, while becoming widowed is also more satisfied with life than being single. As for number of children, all three variables are negative, which may suggest increasing the number of children lowers

one life satisfaction.

Next in Table 3.2 I report the results by subgroup, specifically by gender (male/female) in columns (1)-(2), and by cohort (birth year >1963, 1953-63, and <1953, who were <35, 35-45, and >45 years old in 1998) in columns (3)-(5). The results in columns (1) and (2) indicate that the inverted U-shape is mainly driven by male employees, since the coefficients of working time and squared term is not significant at 5% for female employees. The optimal working time for males is 51.0 hours. The cohort analysis in columns (3)-(5) show that working time has a negative impact on life satisfaction for the young cohort, but it is inverted U-shaped for middle-aged and old cohort. The optimal working time for the middle-aged and old cohort is 58.0 and 65.4 respectively. It seems the older cohort tends to work longer hours, which relieves the concern of the potential bias that those more experienced may be able to finish the same work in shorter working hours and thus working shorter.

I then report the regression results for satisfaction with job in Table 3.3, with the same five columns as in Table 3. Similarly, I get the inverted U-shape between satisfaction with job and working hours, as shown in Appendix Figure 2. Both the coefficients of working hours and of the squared working hours are statistically significant. The optimal number of hour is calculated to be 42.4. Since job satisfaction is peaked at 42.4 hours, we expect to see that more work will reduce job satisfaction if working hours are higher than this number, and more work will increase job satisfaction if hours are less than this number. Moreover, In contrast to satisfaction with life, we can see from the Figure that satisfaction with job is more sensitive to working hours, as the difference between the maximum and the minimum predicted value is about 0.26, more than twice as large as the counterpart for satisfaction with life.

As expected, the coefficient of working hour is positive in column (2), and the coefficients in columns (3)-(5) are negative and quantitatively similar. This suggests that the quadratic model works well in exploring the impact of work hours on job satisfaction. In the later regressions, I would not show columns (3)-(5) for other dependent variables.

I also conduct regressions for job satisfaction by subgroup in Table 3.4, parallel to those for life satisfaction in Table 3.2. We can see

Table 3.2 Linear Fixed Effects Models for Satisfaction with Life by Subgroup

	(1)	(2)	(3)	(4)	(5)
	Male	Female	>1963	1953-1963	<1953
Working hours	0.0050*** (0.0014)	0.0029 (0.0018)	0.0022 (0.0015)	0.0065** (0.0022)	0.0068** (0.0022)
Working hours squared/100	-0.0049*** (0.0013)	-0.0035+ (0.0019)	-0.0037* (0.0015)	-0.0056** (0.0022)	-0.0052** (0.0020)
Ln household income	0.0707*** (0.0077)	0.0572*** (0.0114)	0.0561*** (0.0083)	0.0846*** (0.0166)	0.0801*** (0.0143)
Dummy for having additional real estate	0.0382*** (0.0115)	0.0123 (0.0152)	0.0151 (0.0123)	0.0345+ (0.0178)	0.0588** (0.0225)
Dummy for having financial assets	0.0575*** (0.0085)	0.0703*** (0.0114)	0.0531*** (0.0091)	0.0763*** (0.0130)	0.0739*** (0.0169)
Dummy for having debt	-0.0263** (0.0084)	-0.0067 (0.0112)	-0.0132 (0.0087)	-0.0293* (0.0136)	-0.0124 (0.0177)
Married	0.1855*** (0.0233)	0.1216*** (0.0337)	0.1832*** (0.0203)	0.2248* (0.0911)	0.2368*** (0.0448)
Separated or divorced	-0.1024* (0.0446)	-0.0356 (0.0591)	-0.0826+ (0.0453)	0.0269 (0.1017)	0.0683 (0.0971)
Widowed	-0.1030 (0.1047)	0.2103** (0.0718)	-0.0482 (0.0905)	0.1157 (0.1446)	0.2799*** (0.0837)
Number of children 0-6	-0.0290** (0.0099)	-0.0492** (0.0169)	-0.0397*** (0.0091)	0.0206 (0.0334)	0.0047 (0.1197)
Number of children 7-14	-0.0219* (0.0093)	-0.0334* (0.0144)	-0.0223* (0.0100)	-0.0015 (0.0198)	0.0455 (0.0495)
Number of children 15-24	-0.0366*** (0.0081)	-0.0353*** (0.0095)	-0.0312*** (0.0086)	-0.0224+ (0.0136)	-0.0031 (0.0165)
Year dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y	Y
Within R-squared	0.0607	0.0586	0.0531	0.0656	0.0903
Overall R-squared	0.1661	0.0974	0.1186	0.1885	0.1711
Number of observations	36,330	23,989	36,286	14,446	9,587
Number of individuals	6,329	5,127	7,362	2,251	1,844

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.3 Linear Fixed Effects Models for Satisfaction with Job

	(1)	(2)	(3)	(4)	(5)
	All	<40 hours	40+ hours	40-50 hours	40-60 hours
Working hours	0.0067*** (0.0011)	0.0037* (0.0015)	-0.0042*** (0.0004)	-0.0046*** (0.0012)	-0.0055*** (0.0006)
Working hours squared/100	-0.0079*** (0.0010)				
Ln household income	0.0470*** (0.0061)	0.0190 (0.0236)	0.0413*** (0.0064)	0.0457*** (0.0075)	0.0431*** (0.0069)
Dummy for having additional real estate	0.0198* (0.0090)	0.0434 (0.0403)	0.0129 (0.0094)	0.0032 (0.0110)	0.0068 (0.0100)
Dummy for having financial assets	0.0471*** (0.0066)	0.0409 (0.0261)	0.0438*** (0.0068)	0.0388*** (0.0085)	0.0452*** (0.0073)
Dummy for having debt	-0.0134* (0.0064)	-0.0324 (0.0274)	-0.0083 (0.0067)	-0.0055 (0.0081)	-0.0088 (0.0071)
Married	0.0177 (0.0178)	0.1312 (0.1130)	0.0107 (0.0182)	-0.0007 (0.0210)	0.0140 (0.0187)
Separated or divorced	-0.0035 (0.0327)	0.0371 (0.1423)	-0.0080 (0.0344)	-0.0496 (0.0449)	-0.0160 (0.0378)
Widowed	0.1025* (0.0516)	0.3555* (0.1545)	0.0935 (0.0571)	0.1156 (0.0793)	0.0979 (0.0646)
Number of children 0-6	-0.0065 (0.0082)	-0.0251 (0.0525)	-0.0052 (0.0084)	-0.0042 (0.0096)	-0.0085 (0.0088)
Number of children 7-14	-0.0067 (0.0077)	-0.0260 (0.0418)	-0.0035 (0.0079)	-0.0030 (0.0093)	-0.0047 (0.0084)
Number of children 15-24	-0.0180** (0.0057)	-0.0115 (0.0283)	-0.0136* (0.0060)	-0.0081 (0.0073)	-0.0111+ (0.0063)
Year dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y	Y
Within R-squared	0.0399	0.0385	0.0421	0.0339	0.0385
Overall R-squared	0.1529	0.0693	0.1426	0.0930	0.1319
Number of observations	56,514	6,259	50,255	35,738	44,539
Number of individuals	11,104	3,143	10,288	8,965	9,840

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.4 Linear Fixed Effects Models for Satisfaction with Job by Subgroup

	(1)	(2)	(3)	(4)	(5)
	Male	Female	>1963	1953-1963	<1953
Working hours	0.0074*** (0.0016)	0.0063*** (0.0019)	0.0050** (0.0016)	0.0111*** (0.0023)	0.0074** (0.0024)
Working hours squared/100	-0.0083*** (0.0014)	-0.0077*** (0.0020)	-0.0072*** (0.0016)	-0.0117*** (0.0022)	-0.0071** (0.0022)
Ln household income	0.0550*** (0.0090)	0.0340*** (0.0103)	0.0373*** (0.0087)	0.0823*** (0.0148)	0.0463** (0.0159)
Dummy for having additional real estate	0.0159 (0.0126)	0.0272 (0.0166)	0.0118 (0.0135)	0.0392* (0.0189)	0.0139 (0.0245)
Dummy for having financial assets	0.0471*** (0.0095)	0.0464*** (0.0115)	0.0385*** (0.0097)	0.0622*** (0.0141)	0.0507** (0.0181)
Dummy for having debt	-0.0166+ (0.0090)	-0.0081 (0.0117)	-0.0134 (0.0092)	-0.0052 (0.0144)	-0.0274 (0.0180)
Married	0.0070 (0.0250)	0.0326 (0.0325)	0.0365+ (0.0209)	0.0345 (0.0876)	-1.0095*** (0.0480)
Separated or divorced	0.0101 (0.0491)	-0.0156 (0.0542)	-0.0172 (0.0494)	0.0678 (0.1005)	-1.0317*** (0.1091)
Widowed	0.2049* (0.1005)	0.0780 (0.0724)	0.0846 (0.1610)	0.1145 (0.1205)	-0.9438*** (0.0954)
Number of children 0-6	-0.0137 (0.0109)	0.0143 (0.0171)	-0.0025 (0.0098)	-0.0430 (0.0394)	0.0517 (0.1179)
Number of children 7-14	-0.0085 (0.0107)	-0.0097 (0.0142)	0.0101 (0.0108)	-0.0476* (0.0217)	0.0168 (0.0575)
Number of children 15-24	-0.0250** (0.0088)	-0.0130 (0.0095)	-0.0074 (0.0092)	-0.0377** (0.0138)	-0.0137 (0.0186)
Year dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y	Y
Within R-squared	0.0455	0.0335	0.0338	0.0566	0.0605
Overall R-squared	0.1593	0.1410	0.1167	0.1946	0.1434
Number of observations	34,061	22,453	34,475	13,357	8,682
Number of individuals	6,162	4,944	7,222	2,170	1,715

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

inverted U- shapes for all the five subgroups. The calculated optimal working hours are 44.6, 40.9, 34.7, 47.4, and 52.1 for males, females, born after 1963, during 1953 and 1963, and earlier than 1953. We have similar pattern with life satisfaction. Males' hours are higher than females', and older cohort's hours are higher than younger cohort's.

I report the regression results for four domain satisfactions, specifically satisfaction with leisure activities, satisfaction with working hours, satisfaction with household income and satisfaction with personal earnings from column (1) to (4) in Table 3.5. All the control variables are the same as previous tables. There is a small variation in columns (1) and (2) for leisure and working hours where I use cubic model which fits better. For the household income and personal earnings, I still use quadratic model. The coefficients of working hours, and the squared and cubic forms suggest that the optimal working hours for satisfaction with leisure activities is 30.6, and the optimal one for satisfaction with working hours is 27.3. Both numbers of working hours are smaller than the current legal working hours, 40. The reduction of working hours from 44 to 40 induced by the Five-Day working policy will increase employees' satisfaction with these two related aspects. For satisfaction with household income and personal earnings, we have inverted U-shapes for working hours. Based on the coefficients we can yield the optimal working hours for satisfaction with household income and satisfaction with personal earnings. They are 52.7 and 51.9 respectively. These hours are much higher than the official working hours. Only the reduction of hours for those who work extremely high hours can improve their life satisfaction. One thing deserved to mention is the coefficient of \ln household income in the equation for satisfaction with household income is much larger than the coefficients in other models, as predicted, suggest that these equations do pick up the true impact of household income.

In summary, the optimal amount of working hours differs a lot for different measures of subjective well-being, in the way consistent with our intuition. I summarize the optimal working hours in Table 3.6. Considering satisfaction with income only, people want quite high working hours, over 50 hours per week, which means on average more than 2 hours overtime work per day. Considering life as a whole, not

Table 3.5 Linear Fixed Effects Models for Domain Satisfactions

	(1)	(2)	(3)	(4)
	Leisure	Working	Household	Personal
Working hours	0.0154*** (0.0028)	0.0496*** (0.0030)	0.0075*** (0.0011)	0.0082*** (0.0012)
Working hours squared/100	-0.0316*** (0.0059)	-0.1174*** (0.0063)	-0.0071*** (0.0010)	-0.0079*** (0.0012)
Working hours cubic/1000	0.0014*** (0.0004)	0.0065*** (0.0004)		
Ln household income	0.0659*** (0.0075)	0.0312*** (0.0070)	0.1529*** (0.0087)	0.0904*** (0.0079)
Dummy for having additional real estate	0.0222* (0.0102)	0.0102 (0.0106)	0.0268** (0.0098)	0.0038 (0.0108)
Dummy for having financial assets	0.0641*** (0.0075)	0.0348*** (0.0076)	0.1200*** (0.0071)	0.0764*** (0.0080)
Dummy for having debt	-0.0700*** (0.0076)	-0.0359*** (0.0076)	-0.0741*** (0.0070)	-0.0592*** (0.0078)
Married	-0.0095 (0.0220)	-0.0259 (0.0226)	0.0456* (0.0215)	-0.0151 (0.0228)
Separated or divorced	-0.0834* (0.0378)	-0.0759* (0.0375)	0.0192 (0.0379)	0.0088 (0.0392)
Widowed	0.0271 (0.0558)	-0.0372 (0.0547)	0.2528*** (0.0532)	0.1943** (0.0639)
Number of children 0-6	-0.0529*** (0.0099)	-0.0018 (0.0103)	-0.0635*** (0.0096)	-0.0071 (0.0104)
Number of children 7-14	-0.0207* (0.0086)	0.0136 (0.0092)	-0.0501*** (0.0085)	-0.0129 (0.0095)
Number of children 15-24	-0.0334*** (0.0066)	-0.0043 (0.0067)	-0.0488*** (0.0061)	-0.0188** (0.0069)
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y
Within R-squared	0.0602	0.0806	0.0710	0.0383
Overall R-squared	0.1373	0.2091	0.1921	0.0942
Number of observations	60,325	60,319	60,327	60,327
Number of individuals	11,454	11,454	11,454	11,454

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.6 | Optimal Working Hours Derived from Regression Results

	Satisfaction with					
	Household income	Personal earnings	Life	Job	Leisure activities	Working hours
All	52.8	51.9	47.6	42.4	30.6	27.3
Male	54.6	53.7	51.0	44.6	33.2	30.8
Female			o	40.9		
>1963			-	34.7		
1953-1963			58.0	47.4		
<1963			65.4	52.1		

Notes: "o" indicates no significant effect; "-" means being negatively correlated with working hours, so no optimal level exists. The regression results for calculating the optimal hours for subgroups are not presented.

surprisingly, the optimal number of working hours reduces by a few hours, since we know life satisfaction is not just a function of income. For satisfaction with job, the optimal number is even lower, which is only slightly over the legal 40 hours. However, people really do not want to work more for the sake of leisure time. This could be shown by the small number of working hours maximizing their satisfaction with leisure and working hours. The reduction in official working hour may improve people's satisfaction with leisure time and working hours. I also report the optimal hours for life and job satisfaction by subgroup, from which we see the heterogeneity across subgroups.

Lastly in this section I report the regressions using categorical working hours in Table 3.7, to check the consistency with the main results in column (1) of Table 3 for life satisfaction, column (1) of Table 5 for job satisfaction, and columns (1)-(4) of Table 7 for the four domain satisfactions. Column (1) shows the results for life satisfaction. We can see that the group working (45, 50] hours are not statistically different from the group working (40, 45] hours. However, either few hours or more hours than (40, 50] will lower down life satisfaction. As for job satisfaction, the group working 40 hours is not statistically different from the group working (40, 45] hours. People working other group of hours will have lower life satisfaction. These results are consistent with the optimal working hours for life satisfaction, 47.6, and job satisfaction,

Table 3.7 Linear Fixed Effects Models Using Categorical Working Hours

	(1)	(2)	(3)	(4)	(5)	(6)
	Life	Job	Leisure	Working hours	Household income	Personal earnings
Working hour (Ref group: (40,45] hours)						
[1, 30]	-0.0562*** (0.0157)	-0.1212*** (0.0171)	-0.0346+ (0.0187)	-0.0389* (0.0186)	-0.1134*** (0.0175)	-0.1258*** (0.0198)
(30, 40)	-0.0333+ (0.0189)	-0.0539** (0.0202)	-0.0121 (0.0225)	0.0127 (0.0225)	-0.0343 (0.0214)	-0.0542* (0.0226)
40	-0.0182+ (0.0094)	0.0060 (0.0102)	0.0318** (0.0117)	0.0670*** (0.0121)	-0.0003 (0.0108)	0.0093 (0.0123)
(45, 50]	-0.0028 (0.0095)	-0.0284** (0.0103)	-0.0257* (0.0118)	-0.0966*** (0.0120)	0.0102 (0.0111)	0.0021 (0.0124)
(50, 55]	-0.0416** (0.0133)	-0.0668*** (0.0149)	-0.0929*** (0.0165)	-0.2423*** (0.0173)	-0.0436** (0.0152)	-0.0177 (0.0167)
(55, 60]	-0.0362** (0.0119)	-0.0920*** (0.0131)	-0.1019*** (0.0148)	-0.3625*** (0.0157)	-0.0266+ (0.0139)	-0.0230 (0.0152)
(60, 100]	-0.0459*** (0.0131)	-0.1123*** (0.0147)	-0.2265*** (0.0168)	-0.5953*** (0.0177)	-0.0502*** (0.0151)	-0.0525** (0.0166)
Ln household income	0.0641*** (0.0065)	0.0444*** (0.0067)	0.0639*** (0.0083)	0.0269*** (0.0077)	0.1513*** (0.0096)	0.0883*** (0.0087)
Dummy for having additional real estate	0.0282** (0.0092)	0.0198* (0.0100)	0.0219+ (0.0114)	0.0098 (0.0118)	0.0266* (0.0109)	0.0035 (0.0120)
Dummy for having financial assets	0.0633*** (0.0068)	0.0468*** (0.0073)	0.0640*** (0.0083)	0.0344*** (0.0085)	0.1200*** (0.0079)	0.0762*** (0.0088)
Dummy for having debt	-0.0186** (0.0067)	-0.0130+ (0.0072)	-0.0695*** (0.0084)	-0.0348*** (0.0085)	-0.0736*** (0.0078)	-0.0589*** (0.0086)
Married	0.1604*** (0.0192)	0.0167 (0.0198)	-0.0111 (0.0245)	-0.0269 (0.0251)	0.0448+ (0.0239)	-0.0168 (0.0254)
Separated or divorced	-0.0700+ (0.0357)	-0.0066 (0.0363)	-0.0864* (0.0421)	-0.0797+ (0.0417)	0.0166 (0.0420)	0.0062 (0.0434)
Widowed	0.1455* (0.0592)	0.0993+ (0.0577)	0.0211 (0.0623)	-0.0485 (0.0606)	0.2499*** (0.0590)	0.1910** (0.0709)
Number of children 0-6	-0.0334*** (0.0085)	-0.0061 (0.0092)	-0.0526*** (0.0110)	-0.0012 (0.0114)	-0.0631*** (0.0107)	-0.0066 (0.0115)
Number of children 7-14	-0.0257*** (0.0078)	-0.0069 (0.0085)	-0.0213* (0.0096)	0.0125 (0.0101)	-0.0500*** (0.0094)	-0.0131 (0.0105)

Table 3.7 (Continue)

	(1)	(2)	(3)	(4)	(5)	(6)
	Life	Job	Leisure	Working hours	Household income	Personal earnings
Number of children 15-24	-0.0354*** (0.0060)	-0.0177** (0.0064)	-0.0335*** (0.0073)	-0.0045 (0.0074)	-0.0488*** (0.0068)	-0.0190* (0.0077)
Year dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y	Y	Y
Within R-squared	0.0585	0.0419	0.0602	0.0821	0.0718	0.0389
Overall R-squared	0.1459	0.1631	0.1413	0.2157	0.1950	0.0966
Number of observations	60,319	56,514	60,325	60,319	60,327	60,327
Number of individuals	11,454	11,104	11,454	11,454	11,454	11,454

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

42.4. As for satisfaction with leisure and working hour, the optimal working hours in column (3) and (4) are both 40 hours. More working hours lead to lower satisfaction. Note that these numbers are a little bigger than the estimates from the cubic model. The regressions in columns (5) and (6) are for satisfaction with household income and personal earnings respectively. Column (5) show that people are indifferent for working (30, 50] hours, while higher or lower than this amount lead to lower satisfaction. Column (6) show that people are indifferent for working [40, 60] hours, while higher or lower than this amount lead to lower satisfaction. These estimates are roughly consistent with the quadratic regressions results.

Endogeneity

Though fixed effect regressions can eliminate the time-invariant variables, however there might still be time-variant factors or reversal causality. Though I am not too much worried about it, given the IV estimates are almost identical to the fixed effect estimates in Collewet and Loog (2015), I deal with the concerns about the endogeneity issues. The first concern is the time-varying unobserved factors, which is

mainly a person's working experience and skills accumulated during work. Those more experienced may be able to finish the same work in shorter working hours. I do the tests for different cohorts as shown in Tables (4) and (6). The point estimates of optimal working hours for older cohorts are actually higher than those for the full sample, suggesting that the conjecture of working experience is invalid. The second concern is that if people who have a stronger preference for leisure (and did not work before 2004) may tend to participate in the labor market after 2004. If this is the case, the estimate is likely to be biased upward. To relieve this concern, I check the subsample who worked both before and after the policy change. The results are reported in Appendix Table 1. The coefficient for hour and hour squared is 0.0035 and -0.0037 for life satisfaction, and 0.0068 and -0.0081 for job satisfaction respectively. These coefficients are very close to the main results in column 1 of Tables 3.1 and 3.3. The third concern is reversal causality, i.e. those who are more satisfied with life or job may work longer later. I check this hypothesis by running regressions for working hours controlling for lagged life satisfaction and lagged job satisfaction respectively, plus other covariates. I try 1-year lag and 3-year lag respectively. The results are reported in Appendix Table 2. I do not find any lagged variables statistically significant at 0.05.

(2) For Married-Couple Families in Which At Least One Is Working

In this section I examine the cross-partner impacts of working hours. I do regressions separately for husband and wife following Equations (2) and (3) respectively. In each regression, I include both own and partner's working hours and the higher-order components. In addition to the same set of control variables as in previous regressions, I include a dummy variable indicating spouse's nonworking status. It may pick up the difference between working and nonworking status. In the regression for working husband, his wife's working hours is coded as zero if she is not working. Similarly, in the regression for working wife, her husband's working hours is coded as zero if he is not working.

In Table 3.8 I report the regression results for satisfaction with life in columns (1) and (2), and for satisfaction with job in column (3) and (4).

Table 3.8 Linear Fixed Effects Models for Satisfaction with Life and Job for Married-Couple Families with at Least One Worker

	(1)	(2)	(3)	(4)
	Life		Job	
	Husband	Wife	Husband	Wife
Own working hours	0.0042** (0.0015)	0.0046* (0.0021)	0.0078*** (0.0018)	0.0074*** (0.0022)
Own working hours squared/100	-0.0038** (0.0014)	-0.0054* (0.0021)	-0.0087*** (0.0016)	-0.0092*** (0.0024)
Spouse working hour	0.0048* (0.0022)	0.0046 (0.0030)	-0.0022 (0.0025)	-0.0043 (0.0028)
Spouse working hours squared/100	-0.0048* (0.0024)	-0.0032 (0.0028)	0.0023 (0.0027)	0.0048+ (0.0026)
Spouse not working	0.0981+ (0.0517)	0.0509 (0.0828)	-0.0279 (0.0575)	-0.0861 (0.0743)
Ln household income	0.0748*** (0.0090)	0.0571*** (0.0166)	0.0713*** (0.0109)	0.0517*** (0.0136)
Dummy for having additional real estate	0.0334** (0.0124)	0.0029 (0.0183)	0.0095 (0.0135)	0.0110 (0.0204)
Dummy for having financial assets	0.0535*** (0.0094)	0.0715*** (0.0137)	0.0403*** (0.0101)	0.0253+ (0.0140)
Dummy for having debt	-0.0201* (0.0090)	0.0040 (0.0138)	-0.0133 (0.0099)	-0.0024 (0.0136)
Number of children 0-6	-0.0410*** (0.0101)	-0.0621*** (0.0176)	-0.0129 (0.0114)	0.0076 (0.0176)
Number of children 7-14	-0.0370*** (0.0097)	-0.0370* (0.0163)	-0.0095 (0.0111)	-0.0163 (0.0159)
Number of children 15-24	-0.0508*** (0.0090)	-0.0512*** (0.0135)	-0.0305** (0.0096)	-0.0251+ (0.0128)
Year dummies	Y	Y	Y	Y
Own industry dummies	Y	Y	Y	Y
Own occupation dummies	Y	Y	Y	Y
Within R-squared	0.0488	0.0573	0.0472	0.0324
Overall R-squared	0.1510	0.1129	0.1684	0.1592
Number of observations	25,168	13,260	23,446	12,424
Number of individuals	4,261	2,970	4,112	2,850

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

The odd columns are for husband, and the even ones are for wife. Own and spouse's working hours are introduced in a quadratic form. In column (1) we see husband's life satisfaction is inverted-U-shaped in own and wife's working hours. The optimal working hours for men and spouses are 55.3 and 50.0 respectively. The coefficient of the dummy variable indicating nonworking wife is positive, though not even significant at 0.05. In column (2) we find that wife's life satisfaction is also inverted-U-shaped in own working hours, but is not correlated with husband's working hours. The optimal working hours for women is calculated to be 42.6, which is much lower than husband's. For satisfaction with job, there is no spillover effect from spouse as shown in columns (3) and (4). Only own working hours play significant roles. The optimal working hours for husband and wife are calculated to be 44.8 and 40.2 respectively.

Comparing the coefficients of financial variables between husband and wife, we can infer that husband's life satisfaction is more likely to be affected by those factors, since having additional real estate property and having debt only have impacts on husband rather than on wife, though both husband's and wife's life satisfaction is affected by household income and financial assets. This is consistent with our perception that in the society men are usually assumed more responsibility for family finance.

In Table 3.9 I show the regression results for satisfaction with leisure and satisfaction with working hours. Columns (1) and (2) are for the former and columns (3) and (4) for the latter. Again regressions for husband are in odd columns and that for wife are in even columns. I use cubic form for both own and spouse's working hours. For satisfaction with leisure activities, only own working hours and higher-order terms matter. Spouse's working hours and higher-order terms are not significant. The optimal working hours for husband is and for wife are 33.6 and 29.5 respectively.

In the equations for husband's satisfaction, we see cubic forms of own working hours for both husband and wife. However, it seems that husband cares about wife's working hours, but not the reverse. To maximize husband's satisfaction with working hours, his own and spouse's optimal working hours are 31.0 and 40.0 respectively. On the

Table 3.9 Linear Fixed Effects Models for Satisfaction with Leisure and Working Hours for Married-Couple Families with at Least One Worker

	(1)	(2)	(3)	(4)
	Leisure		Working hours	
	Husband	Wife	Husband	Wife
Own working hour	0.0191*** (0.0049)	0.0136* (0.0059)	0.0597*** (0.0050)	0.0357*** (0.0058)
Own working hours squared/100	-0.0370*** (0.0099)	-0.0279* (0.0129)	-0.1283*** (0.0101)	-0.0916*** (0.0132)
Own working hours cubic/1000	0.0017** (0.0006)	0.0011 (0.0009)	0.0069*** (0.0006)	0.0050*** (0.0009)
Spouse working hour	0.0059 (0.0065)	0.0067 (0.0078)	0.0176** (0.0068)	0.0125 (0.0085)
Spouse working hours squared/100	-0.0036 (0.0149)	-0.0124 (0.0159)	-0.0334* (0.0155)	-0.0223 (0.0174)
Spouse working hours cubic/1000	-0.0006 (0.0010)	0.0006 (0.0010)	0.0019+ (0.0011)	0.0013 (0.0011)
Spouse not working	0.1188 (0.0896)	0.0317 (0.1234)	0.2689** (0.0918)	0.2477+ (0.1381)
Ln household income	0.0620*** (0.0120)	0.0783*** (0.0183)	0.0351** (0.0123)	0.0139 (0.0152)
Dummy for having additional real estate	0.0293+ (0.0155)	0.0103 (0.0227)	0.0248 (0.0163)	0.0223 (0.0236)
Dummy for having financial assets	0.0307** (0.0116)	0.0825*** (0.0168)	0.0353** (0.0120)	0.0116 (0.0165)
Dummy for having debt	-0.0741*** (0.0114)	-0.0703*** (0.0165)	-0.0344** (0.0120)	-0.0351* (0.0162)
Number of children 0-6	-0.0391** (0.0132)	-0.1113*** (0.0221)	-0.0036 (0.0146)	-0.0017 (0.0226)
Number of children 7-14	-0.0096 (0.0119)	-0.0773*** (0.0191)	0.0173 (0.0133)	-0.0067 (0.0198)
Number of children 15-24	-0.0363*** (0.0108)	-0.0810*** (0.0154)	0.0084 (0.0114)	-0.0343* (0.0157)
Year dummies	Y	Y	Y	Y
Own industry dummies	Y	Y	Y	Y
Own occupation dummies	Y	Y	Y	Y
Within R-squared	0.0586	0.0728	0.0784	0.0737

Table 3.9 (Continue)

	(1)	(2)	(3)	(4)
	Leisure		Working hours	
	Husband	Wife	Husband	Wife
Overall R-squared	0.1425	0.1676	0.1952	0.2289
Number of observations	25,173	13,263	25,177	13,254
Number of individuals	4,260	2,972	4,260	2,972

Notes: Robust standard errors in parentheses; + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

extensive margin, wife being not working contributes a lot to his husband's satisfaction with working hours. Thus we may conclude that husband prefers his wife either not working or working regularly. For a working wife, the optimal working hours to maximize her satisfaction with working hours is 24.3.

Next I show the regressions for satisfaction with household income and satisfaction with personal earnings in Table 3.10. Quadratic form of both own and spouse's working hours are included in regressions. Both own and spouse's working hours show inverted U-shapes for husband's satisfaction with household income and the same for wife's, as can be seen in columns (1) and (2). To maximize husband's satisfaction with household income, the optimal working hours for him is 54.9 and for his wife is 50.6. To maximize wife's satisfaction with household income, the optimal working hours is 48.5 for her and 54.4 for her husband. The two groups of estimated hours show that the requirements of working hours from their spouses are quite similar. On the extensive margin, husband prefers wife not working, while wife does not.

In columns (3) and (4) of Table 3.10 I show the satisfaction with personal earnings. As it is more personal, I do not expect to see impact of their spouse's working status or working hours. The results do support this conjecture. As shown in columns (3) and (4), there is no significant spillover effect of spouse's working status or working hours. Satisfaction with personal earnings, is inverted-U-shaped in own working hours, for husband only. The optimal number of working hours for husband is 55.9. Wife's satisfaction with personal earnings is not related with own working ours.

Table 3.10 Linear Fixed Effects Models for Satisfaction with Household Income and Personal Earnings for Married-Couple Families with at Least One Worker

	(1)	(2)	(3)	(4)
	Household income		Personal earnings	
	Husband	Wife	Husband	Wife
Own working hour	0.0112*** (0.0018)	0.0063** (0.0022)	0.0133*** (0.0020)	0.0041 (0.0027)
Own working hours squared/100	-0.0102*** (0.0016)	-0.0065** (0.0022)	-0.0119*** (0.0018)	-0.0039 (0.0028)
Spouse working hour	0.0087*** (0.0026)	0.0086** (0.0033)	0.0008 (0.0028)	-0.0012 (0.0030)
Spouse working hours squared/100	-0.0086** (0.0028)	-0.0079* (0.0031)	-0.0011 (0.0030)	0.0005 (0.0029)
Spouse not working	0.1180* (0.0583)	0.0511 (0.0880)	0.0344 (0.0631)	-0.0332 (0.0817)
Ln household income	0.1407*** (0.0150)	0.1930*** (0.0241)	0.1110*** (0.0145)	0.0763*** (0.0186)
Dummy for having additional real estate	0.0108 (0.0147)	0.0314 (0.0213)	-0.0180 (0.0160)	0.0208 (0.0246)
Dummy for having financial assets	0.0980*** (0.0111)	0.1171*** (0.0159)	0.0584*** (0.0123)	0.0762*** (0.0175)
Dummy for having debt	-0.0702*** (0.0102)	-0.0769*** (0.0156)	-0.0712*** (0.0117)	-0.0547*** (0.0166)
Number of children 0-6	-0.0595*** (0.0124)	-0.0830*** (0.0225)	-0.0059 (0.0139)	-0.0188 (0.0237)
Number of children 7-14	-0.0560*** (0.0119)	-0.0820*** (0.0195)	-0.0213 (0.0137)	-0.0279 (0.0201)
Number of children 15-24	-0.0616*** (0.0104)	-0.0950*** (0.0156)	-0.0317** (0.0119)	-0.0379* (0.0159)
Year dummies	Y	Y	Y	Y
Own industry dummies	Y	Y	Y	Y
Own occupation dummies	Y	Y	Y	Y
Within R-squared	0.0697	0.0804	0.0503	0.0301
Overall R-squared	0.1901	0.2493	0.1193	0.1016
Number of observations	25,173	13,265	25,181	13,258
Number of individuals	4,260	2,972	4,260	2,972

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.11 Optimal Working Hours for Husband and Wife,
Derived from Regression Results

	Satisfaction with					
	Household income	Personal earnings	Life	Job	Leisure activities	Working hours
<i>Panel A: husband</i>						
Own optimal working hour	54.9	55.9	55.3	44.8	33.6	31.0
Spouse optimal working hour	50.6	o	50.0	o	o	40.0
Spouse not working	+	o	o	o	o	+
<i>Panel B: wife</i>						
Own optimal working hour	48.5	o	42.6	40.2	29.5	24.3
Spouse optimal working hour	54.4	o	o	o	o	o
Spouse not working	o	o	o	o	o	o

Notes: "o" indicates no significant effect; "+" means positive correlation.

In Table 3.11 I summarize the main results of the impacts of own and spouse working hours on the subjective well-being of husband and wife respectively. Panel A is for husband and Panel B for wife. In summary, we can see spillover effect of wife's working status and working hours (if working) for husband in terms of satisfaction with life, household income, leisure activities, and working hours. Working males generally prefer their wives not working. The spillover effect for wife is only for satisfactions with household income. For those satisfactions with personal issues, such as satisfaction with personal earnings and job, we observe no spillover effects. The results together suggest that the six subjective well-being measures do pick up those effects of own and spouse working hours in the right way, which adds confidence in the validity of those measures.

Table 3.12 reports the regression results for life and job satisfaction for married couples using categorical working hours for both of them. The reference group for each of them includes those who work (40, 45] hours. Columns (1) and (2) are for satisfaction with life, and columns (3) and (4) are for satisfaction with job. The odd and even columns are for husband and wife respectively. From column (1) we can see that husband's life satisfaction reaches the highest when his own working

Table 3.12 Linear Fixed Effects Models for Satisfaction with Life and Job for Married-Couple Families with at Least One Worker, Using Categorical Working Hours

	(1)	(2)	(3)	(4)
	Life		Job	
	Husband	Wife	Husband	Wife
Working hour (Ref group: (40,45] hours)				
[1, 30]	-0.0879***	-0.0106	-0.1649***	-0.0771**
	(0.0245)	(0.0260)	(0.0289)	(0.0273)
(30, 40)	-0.0148	0.0096	-0.0494	-0.0293
	(0.0296)	(0.0296)	(0.0316)	(0.0309)
40	-0.0052	-0.0224	0.0297*	-0.0285
	(0.0129)	(0.0184)	(0.0144)	(0.0191)
(45, 50]	-0.0007	0.0247	-0.0226	-0.0275
	(0.0130)	(0.0201)	(0.0142)	(0.0202)
(50, 55]	-0.0153	-0.0179	-0.0477*	-0.0441
	(0.0183)	(0.0271)	(0.0203)	(0.0297)
(55, 60]	-0.0364*	0.0001	-0.0681***	-0.0762**
	(0.0159)	(0.0254)	(0.0178)	(0.0265)
(60, 100]	-0.0246	-0.0470+	-0.1044***	-0.1146***
	(0.0168)	(0.0274)	(0.0195)	(0.0311)
Spouse working hour (Ref group: (40,45] hours)				
[1, 30]	-0.0717**	-0.1145**	0.0047	-0.0152
	(0.0260)	(0.0420)	(0.0284)	(0.0414)
(30, 40)	-0.0157	-0.0544	0.0117	0.0375
	(0.0332)	(0.0448)	(0.0342)	(0.0559)
40	-0.0456*	-0.0216	-0.0462*	0.0150
	(0.0194)	(0.0218)	(0.0210)	(0.0245)
(45, 50]	-0.0379	-0.0233	-0.0301	-0.0226
	(0.0232)	(0.0219)	(0.0248)	(0.0237)
(50, 55]	-0.0227	-0.0951**	-0.0065	-0.0018
	(0.0311)	(0.0316)	(0.0349)	(0.0355)
(55, 60]	0.0314	-0.0551*	0.0026	-0.0175
	(0.0290)	(0.0273)	(0.0322)	(0.0289)
(60, 100]	-0.0783*	0.0021	-0.0057	0.0405
	(0.0340)	(0.0284)	(0.0367)	(0.0312)

Table 3.12 (Continue)

	(1)	(2)	(3)	(4)
	Life		Job	
	Husband	Wife	Husband	Wife
Spouse not working	-0.0450*	-0.1231***	0.0039	-0.0011
	(0.0186)	(0.0253)	(0.0204)	(0.0262)
Ln household income	0.0733***	0.0559***	0.0665***	0.0485***
	(0.0090)	(0.0166)	(0.0109)	(0.0136)
Dummy for having additional real estate	0.0337**	0.0024	0.0076	0.0112
	(0.0124)	(0.0183)	(0.0134)	(0.0204)
Dummy for having financial assets	0.0531***	0.0718***	0.0403***	0.0263+
	(0.0094)	(0.0138)	(0.0101)	(0.0141)
Dummy for having debt	-0.0197*	0.0038	-0.0122	-0.0024
	(0.0090)	(0.0138)	(0.0099)	(0.0136)
Number of children 0-6	-0.0410***	-0.0611***	-0.0137	0.0085
	(0.0101)	(0.0175)	(0.0113)	(0.0176)
Number of children 7-14	-0.0370***	-0.0353*	-0.0118	-0.0157
	(0.0097)	(0.0164)	(0.0110)	(0.0160)
Number of children 15-24	-0.0504***	-0.0503***	-0.0320***	-0.0251+
	(0.0091)	(0.0136)	(0.0096)	(0.0129)
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y
Within R-squared	0.0502	0.0588	0.0505	0.0322
Overall R-squared	0.1546	0.1166	0.1828	0.1641
Number of observations	25,168	13,260	23,548	12,440
Number of individuals	4,261	2,970	4,122	2,855

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

hours are in the range (30, 55], and her wife's is in the range (45, 60]. Comparing the reference group of working (40, 45] hours, nonworking wife has a negative impact on husband's life satisfaction. Note that this result may not be viewed as a conflict with the coefficient of nonworking spouse in Table (1), since the coefficients of the two dummy variables in the two tables have different meanings. Column (2) shows that wife's life satisfaction reaches the highest point when her

own working hours is at the range (45, 50], though not significantly different from other hour groups, and her husband's hour is at the range (30, 50]. Comparing with the reference group of working (40, 45] hours, nonworking husband has a negative impact on wife's life satisfaction. This result is a little different from the one using quadratic form of working hours, especially in terms of significance of own and husband's working hours. It might be because quadratic does not fit the function well, since the coefficients of wife's groups of hours change a few times in terms of signs. Column (3) shows that husbands' job satisfaction reaches the maximum level when he is working 40 hours, while his wife is not working at 40 hours. Column (4) shows that wife's job satisfaction reaches the maximum when her own working hours is at the range (30, 55]. These results are largely consistent with the results in the corresponding quadratic regressions.

In summary, the polynomial form of working hours can be used to estimate the point estimates, but it may fail to capture some unusual changes of satisfaction at certain level of working hours. The categorical hours settings is better at detecting unusual jumps, yet the results may be sensitive to the way of categorizing working hours, thus it is hard to find the turning point of working hours. However, the roughly consistent (though sometimes slightly different) results from the two methods give us the confidence of the results.

CHAPTER 4

Working Hours and Children' Life Satisfaction

In this section I discuss the impact of parent's working hours on their children's life satisfaction. Since the KLIPS data only ask life satisfaction questions for those aged 14+, in this analysis I choose those aged 14-24 as the children group. These groups are mostly still economically dependent on their parents. In Figure 4.1 I show the trend of average life satisfaction for this youth group, specifically those aged 14-24. The increasing trend is very similar to employees. The change from 2003 to 2012 is 0.18 in level, or 5.5 in percentage.

In Table 4.1 I report the regression results, based on Equation (4), for children aged 14-24 in column (1), and then for two subgroups, aged 14-

Figure 4.1 Trend of Average Satisfaction with Life of Youth (14-24)

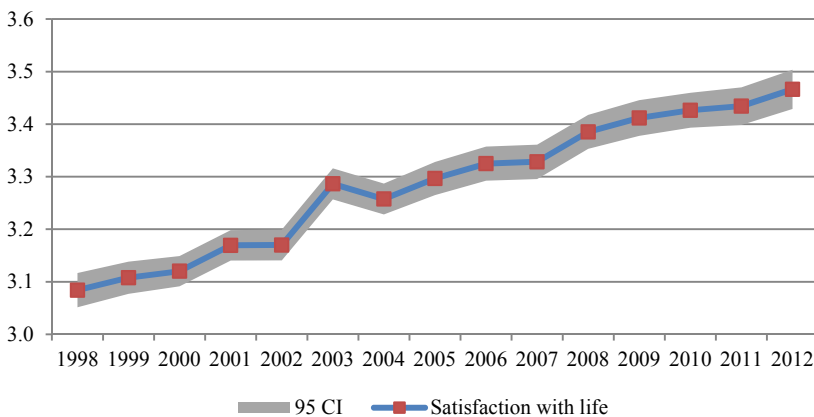


Table 4.1 Linear Fixed Effects Models for Life Satisfaction of Children (Aged 14-24)

	(1)	(2)	(3)
	All	14-19	20-24
Father's working hours	0.0030 (0.0025)	-0.0006 (0.0032)	0.0079* (0.0037)
Father's working hours squared/100	-0.0027 (0.0023)	0.0019 (0.0030)	-0.0079* (0.0035)
Father not working	-0.0127 (0.0745)	-0.0642 (0.0946)	0.0889 (0.1072)
Mother's working hours	0.0022 (0.0027)	-0.0039 (0.0037)	0.0015 (0.0049)
Mother's working hours squared/100	-0.0018 (0.0027)	0.0038 (0.0036)	-0.0008 (0.0047)
Mother not working	0.0634 (0.0691)	-0.1072 (0.0939)	0.1009 (0.1308)
Ln household income	0.0654*** (0.0131)	0.0444* (0.0200)	0.1080*** (0.0247)
Dummy for having additional real estate	0.0369* (0.0184)	0.0236 (0.0271)	-0.0016 (0.0328)
Dummy for having financial assets	0.0122 (0.0139)	0.0128 (0.0192)	0.0089 (0.0236)
Dummy for having debt	0.0029 (0.0138)	0.0130 (0.0194)	-0.0036 (0.0240)
Number of children 0-6	0.0205 (0.0889)	-0.1479 (0.1015)	0.5075** (0.1940)
Number of children 7-14	0.0589+ (0.0311)	0.0159 (0.0493)	0.0200 (0.0707)
Number of children 15-24	0.0100 (0.0201)	-0.0261 (0.0407)	0.0016 (0.0346)
Year dummies	Y	Y	Y
Within R-squared	0.0170	0.0157	0.0194
Overall R-squared	0.0816	0.0637	0.0829
Number of observations	12,583	7,508	5,075
Number of individuals	3,466	2,640	2,121

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

19 in column (2), and 20-24 in column (3). The former group is generally enrolled in secondary school. The latter group is generally attending post-secondary school or starts to have some part-time job. From the three columns we see that in all cases mother’s working status and working hours have no significant impact at all. However, having nonworking father always has a negative impact on children’s life satisfaction. For the subgroup of 20-24, there is an inverted U-shape with father’s working hour, which is peaked at 50.0 hours. Father has a regular job, not working too many but also not working too less, contributes to this group of children’s life satisfaction. The reason might be that this group will face the problem of looking for jobs soon. Their fathers may serve as role models for them.

In Table 4.2 I report the regressions using categorical hours for both parents and dummy variables indicating nonworking father and mother. We see in all columns father’s nonworking status has a negative impact on children’s life satisfaction, comparing with the reference group, who are working (40, 45] hours a week. While mother’s nonworking status has no impact. We also see that in column (3) those aged 20-24 has the highest satisfaction when father’s working hour is in the range [40, 55], which is consistent with the estimation in the quadratic form in Table 4.2.

|| Table 4.2 || Linear Fixed Effects Models for Life Satisfaction of Children (Aged 14-24),
Using Categorical Hours

	(1)	(2)	(3)
	All	14-19	20-24
Father's working hours (Ref group: (40,45] hours)			
[1, 30]	-0.0495 (0.0371)	-0.0601 (0.0541)	-0.0909+ (0.0550)
(30, 40)	-0.0380 (0.0459)	-0.0442 (0.0613)	-0.1636* (0.0818)
40	-0.0072 (0.0219)	-0.0107 (0.0302)	-0.0556 (0.0395)
(45, 50]	-0.0061 (0.0211)	-0.0125 (0.0278)	-0.0530 (0.0386)

Table 4.2 (Continue)

	(1)	(2)	(3)
	All	14-19	20-24
(50, 55]	-0.0319 (0.0326)	-0.0508 (0.0445)	-0.0775 (0.0551)
(55, 60]	-0.0272 (0.0264)	-0.0018 (0.0364)	-0.0802+ (0.0460)
(60, 100]	-0.0216 (0.0277)	0.0259 (0.0371)	-0.0962+ (0.0504)
Not working	-0.1103*** (0.0328)	-0.0995* (0.0451)	-0.1487* (0.0596)
Mother's working hours (Ref group: (40,45] hours)			
[1, 30]	-0.0382 (0.0378)	0.0281 (0.0526)	-0.0840 (0.0659)
(30, 40)	-0.0422 (0.0442)	0.0024 (0.0567)	-0.1026 (0.0830)
40	-0.0186 (0.0296)	-0.0055 (0.0411)	-0.0523 (0.0505)
(45, 50]	0.0215 (0.0297)	0.0125 (0.0381)	0.0026 (0.0555)
(50, 55]	0.0182 (0.0371)	0.0251 (0.0487)	-0.0362 (0.0596)
(55, 60]	0.0154 (0.0358)	0.0349 (0.0507)	-0.0378 (0.0604)
(60, 100]	-0.0213 (0.0372)	-0.0290 (0.0517)	-0.0489 (0.0630)
Not working	-0.0017 (0.0302)	-0.0076 (0.0427)	0.0083 (0.0534)
Ln household income	0.0648*** (0.0131)	0.0434* (0.0203)	0.1072*** (0.0248)
Dummy for having additional real estate	0.0362* (0.0184)	0.0247 (0.0272)	-0.0049 (0.0325)
Dummy for having financial assets	0.0118 (0.0139)	0.0122 (0.0193)	0.0083 (0.0235)
Dummy for having debt	0.0032 (0.0138)	0.0128 (0.0193)	0.0003 (0.0239)

Table 4.2 (Continue)

	(1)	(2)	(3)
	All	14-19	20-24
Number of children 0-6	0.0194 (0.0891)	-0.1554 (0.1019)	0.4739* (0.1979)
Number of children 7-14	0.0594+ (0.0311)	0.0117 (0.0494)	0.0169 (0.0713)
Number of children 15-24	0.0099 (0.0201)	-0.0300 (0.0409)	0.0021 (0.0344)
Year dummies	Y	Y	Y
Industry dummies	Y	Y	Y
Occupation dummies	Y	Y	Y
Within R-squared	0.0178	0.0163	0.0219
Overall R-squared	0.0838	0.0681	0.0901
Number of observations	12,583	7,508	5,075
Number of individuals	3,466	2,640	2,121

Notes: Robust standard errors in parentheses; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

CAPTER 5

Conclusions and Policy Implications

In this study I examine the impacts of long working hours in Korea on a set of subjective well-being measures. In contrast to previous studies which generally explore the impact of working hours by grouping them, or only check the linear relations between working hours and outcome variables, in this study I allow for nonlinear relationships between working hours and subjective well-being measures, specifically, in most cases quadratic and in some cases cubic. I also check the consistency by considering categorical working hours. Moreover, I study several subjective well-being measures including domain satisfactions, going beyond satisfaction with life and job. The studies of domain satisfactions, which are potentially associated with working hours, tell us consistent stories, thus reinforcing confidence in the validity of subjective well-being measures.

In studying the impacts of working hours on subjective well-being measures for all employees, without considering cross-family-member spillover effects, I find that the optimal numbers for working hours differ a lot depending on which type of satisfaction is being measured. Specifically, the optimal working hours for satisfaction with household income, personal earnings, life, job, leisure activities, and working hours are 52.8, 51.9, 47.6, 42.4, 30.6, and 27.3 respectively. This means mild overtime working makes people more satisfied with their income, life and job, however, people are not mostly satisfied with their leisure activities and working hours even at the regular working hours (40). In other words, people are very sensitive to long working hours for hours-

related satisfaction, but much less so for income-related satisfaction. The regressions using categorical hours roughly confirm the results using nonlinear hours. Therefore the introduction of Five-Day working policy may have increased employees' satisfaction with leisure and working time, as shown in previous studies, but may have no impacts on other satisfactions.

I also study cross-partner spillover effects of working hours within married-couple families. I find that, as expected, generally there is no spillover effect for those satisfactions with personal issues, specifically satisfaction with job and satisfaction with personal earnings. However, for those satisfactions which are likely to depend on both partners' activities, such as satisfaction with life, satisfaction with household income, and satisfaction with working hours, I do find spillover effects of spouse's working hours, but mainly for husband. This might be consistent with the typical life pattern of married couples in Korea that women are likely to become housewives soon after getting married, especially after having children. Similar to those regressions with all employees, the regressions for married couples also show that working hours maximizing satisfaction with income, life, and job are higher than the hours maximizing satisfaction with leisure and working hours.

Lastly I examine the impact of parent's working hours on their children's subjective well-being. Though some papers argue that long working hours may not be good for their young children, it is not possible to examine the effect in this study due to lack of necessary information on very young children. Thus I check the impacts of parents' working hours on children's satisfaction with life for those aged 14 and above. The results suggest that mother's working hours have no impacts, but father's working hours have impacts on those people aged 20-24, with an inverted U-shape.

If we think life satisfaction is the most comprehensive measure of our life quality, the regressions with all employees show that the optimal hours should be 47.6. The regressions on the married couples show that the optimal hours should be 55.3 for husband and 44.8 for wife. Why the optimal working hours are bigger than the legislated 40 hours? It maybe because extra hours make them feel safe or feel they are important to the workplace, or extra hours may bring better working

performance which may potentially increase their income or future promotion chances. The traditional hard-working values may also play an important role there. However, analysis of categorical hours shows that the optimal hours might not be significantly different from the legislated working hours. Thus we may not conclude that the legislated working hour is not optimal.

However, we still can draw some clear conclusions. Note that there is still around a quarter of employees work more than 55 hours per week. Reduction of their working hours, holding other things constant, shall be good for them no matter which measures of subjective well-being we consider. Moreover, there are about 4% of employees who work less than 24 hours, while increasing their working hours might be good for their well-being enhancement. The varying impacts of working hours on different aspects of life for different groups of people found in this report provide a new angle to evaluate the current labor acts and regulations. Given the long tradition of hard working and long working hours, employees, especially men, and firms have adopted the preference over long working hours. Mild overtime working may bring utility instead of disutility. Thus reducing working hours from 44 to 40 (conditional on that other labor market conditions have not change much along the reduction) might not be a very important issue, if employees just work the official amount of hours. The most important issues shall be the very long working hours, such as more than 55 hours per week, or the very short working hours, such as lower than 24 hours per week. For an average worker, too many or too few hours both bring disutility. Therefore the focus of labor policies and regulations shall be curtailing the very high number of working hours, and help to provide more job opportunities to those who work part-time and desire to work more.

Intuitively, labor policies and regulations have other important objectives to reach, such as increasing employment, providing better working conditions, protecting the disadvantaged people's employment opportunities, and in the meantime not overburdening employers. Reducing the very high number of working hours, is generally not conflicting with these objectives. Moreover, there is evidence that lower working hours can reduce injury rates (Lee and Lee 2015), increase satisfaction with leisure time (Rudoff 2014), and increase productivity

(Golden 2011). Therefore the suggestion of reducing the very high working hours based on the angle of subjective well-being seems to be valid.

Under the current legal requirements, about 40% of employees report they are not paid for overtime work in 2012, according to KLIPS data. Moreover, among those who are paid for their overtime work, more than 15% of employees report being paid fixed amount regardless the actual extra hours worked or no clear rule of overtime payment. These facts may suggest that the current overtime working regulation is not strictly enforced. Before making other further movements, government should strengthen the enforcement of current labor regulations on working time. For the very long working hours, it might be desirable to design a progressive overtime payment scheme. Under current legislation, the overtime payment rate is flat, which may not be effective enough to reduce the long working hours.

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Appendix

Appendix Table 1 | Regressions for Subsample Who Worked both Before and After the Policy Change

	(1)	(2)
	Life Satisfaction	Job Satisfaction
Working hours	0.0035	0.0068
	(0.0010)	(0.0011)
Working hours squared/100	-0.0037	-0.0081
	(0.0010)	(0.0010)
Individual and household controls	Y	Y
Year dummies	Y	Y
Industry dummies	Y	Y
Occupation dummies	Y	Y
Within R-squared	0.0621	0.0427
Overall R-squared	0.1414	0.1522
Number of observations	52,733	49,359
Number of individuals	8,474	8,264

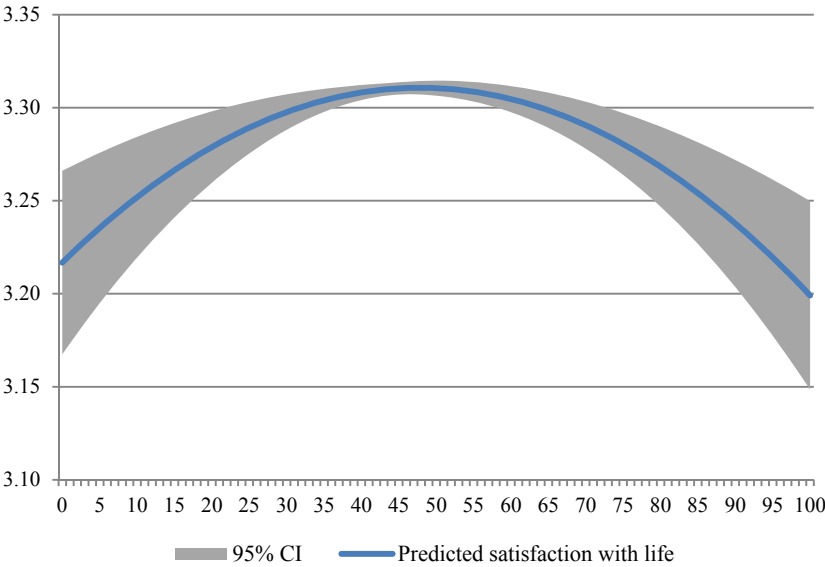
Notes: Individual and Household controls include ln household income, dummy for having additional real estate, dummy for having financial assets, dummy for having debt, marital status (married, separated or divorced, widowed), number of children aged 0-6, number of children aged 7-14, and number of children aged 15-24.

Appendix Table 2 Test of Reversal Causality

	Working Hours			
	(1)	(2)	(3)	(4)
Life satisfaction (1-year lagged)	0.0769			
	(0.0995)			
Life satisfaction (3-year lagged)		-0.0560		
		(0.1047)		
Job satisfaction (1-year lagged)			-0.0719	
			(0.1044)	
Job satisfaction (3-year lagged)				0.2151+
				(0.1186)
Individual and household controls	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y
Occupation dummies	Y	Y	Y	Y
Within R-squared	0.0529	0.0494	0.0531	0.0565
Overall R-squared	0.0770	0.0732	0.0848	0.0922
Number of observations	54,805	43,069	42,317	28,812
Number of individuals	10,726	9,224	8,992	6,928

Notes: Individual and Household controls include ln household income, dummy for having additional real estate, dummy for having financial assets, dummy for having debt, marital status (married, separated or divorced, widowed), number of children aged 0-6, number of children aged 7-14, and number of children aged 15-24.

Appendix Figure 1 | Predicted Satisfaction with Life and Working Hours



Appendix Figure 2 | Predicted Satisfaction with Job and Working Hours

