ORIGINAL RESEARCH

The Gendered Division of Household Labor over Parenthood Transitions: A Longitudinal Study in South Korea

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Abstract

Recent research from the gender revolution perspective suggests that men's increasing involvement in the family domain accounts for the positive association between fertility and female labor force participation in developed Western countries. However, little relevant evidence exists on their Asian counterparts, where lowest-low fertility, low levels of women's employment, and traditional family values prevail. Using the 2007, 2008, and 2010 waves of the Korean Longitudinal Survey of Women and Families ($N = 10,263$ couple-waves), we examine how parenthood transitions affect wives' and husbands' provisions of household labor and how their employment status moderates this relationship. Focusing on comparisons between first and additional children, we estimate couple fixed-effects regressions. The dependent variables are the time that each spouse spends on household labor and the husband's share of the couple's total time spent on this labor. The key independent variables are the number of children and the number interacted with each spouse's employment status. The results show that household labor was gendered even prior to the birth of the first child. Inequality in household labor increased significantly further with first children, but not with additional children. This increase persisted regardless of women's employment status, thereby implying that first children might exacerbate the double burden on employed women. Policy lessons are drawn regarding how to raise fertility and female labor force participation in Korea and other countries where women have difficulty reconciling work and family life.

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Introduction

With regard to its lowest-low fertility, South Korea (Korea hereafter) has received considerable scholarly attention. Its total fertility rates (TFRs) fell below 2.1, the replacement level, for the first time in 1983 and have remained below 1.3 since 2001 (Statistics Korea 2016). Among developed countries, the correlation between fertility and female employment rates was negative until the 1980s (Rindfuss et al. 2003), which Goldscheider et al. (2015) associated with what they refer to as the first stage of the gender revolution—that is, when women's labor force participation increased. This correlation became positive after the 1980s, and the reversal was associated with the second stage of the revolution—that is, when men became more involved with the family. In keeping with these developments, Anderson and Kohler (2015) and Myrskylä et al. (2009) have referred to Korea as a notable case and have suggested men's increased involvement in the family domain and improved work–family balance as solutions to boost fertility in the country.

McDonald (2000a, b) initially introduced a gender perspective to understand lowest-low fertility in developed countries and attributed the phenomenon to improved gender equity outside the family and its conflict with lagging gender inequality at home. With the rapid economic development that occurred after World War II, Korean women's educational attainment and labor force participation increased substantially (Lee et al. 2011; Statistics Korea 2012). Owing to the compressed pace of these changes and the prevailing Confucian and patriarchal traditions, however, husbands, the government, and the workplace still expect women to be responsible for household labor, including housework, childcare, and eldercare (e.g., Hwang 2016; Suh et al. 2012). In the societal environment, employed women tend to become double-burdened with paid work and household labor, which may explain both low fertility and low female labor force participation (Kim and Cheung 2015). However, a systematic understanding of the complicated dynamics between parenthood transitions, household labor, and paid work is lacking in Korea.

In particular, little is known about the changes in the arrangement of household labor between wives and husbands over parenthood transitions and the moderating impact of each spouse's employment on the changes. While longitudinal studies are ideal for examining these questions, the available evidence on Asian countries is primarily from descriptive statistics or cross-sectional regression analysis (e.g., Kim 2017; Tsuya et al. 2000), which is partially due to the lack of longitudinal data. In contrast, within the last decade or so, several panel studies have documented evidence in the West: The general pattern that has been observed is that first children increased the amount of time that women spent on household labor, especially childcare, with far less or no impact on the time spent by men, thereby making the arrangement at home gender-unequal (Baxter et al. 2008; Gjerdingen and Center 2005; Hortaçsu 1999; Kühhirt 2011; Sanchez and Thomson 1997; Yavorsky et al. 2015). There was a simultaneous increase in the gender gap in paid labor, as women tended to drop out of the labor force or decrease their time

spent on paid work, while men's employment did not depend on the childbirth (Gjerdingen and Center 2005; Kühhirt 2011; Sanchez and Thomson 1997). Relative to the first child, current knowledge is much less and is more mixed regarding the impact of additional children.

To fill these gaps in the literature, we analyze recent longitudinal data from the Korean Longitudinal Survey of Women and Families (KLoWF) with couple fixed-effects (FEs) regressions to examine two research questions in Korea: how wives' and husbands' provisions of household labor and its division within the couple change over parenthood transitions, and how wives' and husbands' respective employment moderates the relationships between parenthood transitions and household labor arrangements. Given Korea's low-fertility context, we focus on examining transitions to the first child and comparing them with transitions to the second or subsequent child.

Literature on Household Labor and Parenthood Transitions

The literature on household labor commonly refers to time availability, relative resources, and gender norms as determinants of how wives and husbands provide this labor (Coltrane 2000). The theory on time availability posits that household labor is borne more by the spouse who has more time available to provide the labor at home due to spending less time on paid work (Becker 1981; Greenhaus and Beutell 1985; Jacobs and Gerson 2004). Household labor is also postulated to increase for those who have fewer economic resources outside the home because they have lower bargaining power to avoid the assumed-to-be undesirable labor (Blood and Wolfe 1960) and it would be better for them to specialize within the household rather than in the paid labor market (Becker 1981). If parenthood transitions reduce women's labor force participation without an analogous impact on men, women become more time-available for household labor and less economically capable, resulting in them taking greater responsibility for household labor.

Predictions about how employment moderates the impact of parenthood transitions can also be derived from the time-availability and relative-resource theories. Employment constrains workers' time for household labor and increases the economic resources they bring home; therefore, it could buffer the plausible increase in workers' household labor associated with parenthood transitions. Along the same line, compared to their counterparts with non-employed wives, couples with employed wives might expect a smaller increase in gender inequality at home due to parenthood transitions.

According to the gender-norm perspective, which may operate at both the macro level through societal gender culture and the micro level through individual gender role attitudes, women display their feminine selves through household labor, while men display their masculine selves by limiting their household labor and playing the role of male breadwinner instead (Berk 1985; Brines 1994; West and Zimmerman 1987). Therefore, if parenthood transitions reinforce the display of gender differences, the transitions lead women to contribute more and men to contribute less to household labor. Moreover, women's employment does not buffer the impact of

parenthood transitions on household labor, as taking care of children is normatively the woman's task regardless of employment status. Thus, concerning the second research question, the time-availability and relative-resource theories predict the moderating impact of women's employment, while the gender-norm perspective predicts no such impact. However, regarding the first research question, both lines of the theories predict that parenthood transitions make household labor gendered, although the suggested mechanisms differ.

While the available empirical evidence on how parenthood transitions affect household labor arrangements is predominantly from cross-sectional or repeated cross-sectional studies, panel data are more suitable for examining the question. Most available longitudinal studies focus on the first birth. Kühhirt (2011) tracked German time-use data over 20 years. Compared to women who remained childless, women who became mothers experienced an increase in their time spent on housework and childcare, particularly the latter, and a decrease in their time spent on paid work. These changes, especially regarding childcare, declined over time. Although men who became fathers also experienced an increase in childcare hours, it was much smaller than that of their wives. Interestingly, for both men and women prior to the first birth, no major difference in their time use was observed between future parents and their counterparts.

Three studies in the United States (US) also found that household labor arrangements become gendered with the first child. Notably, the pre-birth division of housework within a couple was egalitarian, but men spent more hours on paid work (Gjerdingen and Center 2005; Yavorsky et al. 2015). However, with the first child, women spent more hours on childcare (Gjerdingen and Center 2005; Yavorsky et al. 2015). Regarding housework, Sanchez and Thomson (1997) found an increase in mothers' burden but no impact on fathers'. Contrastingly, Yavorsky et al. (2015) study on dual-earner couples showed that mothers' housework did not change, while fathers' declined. Regarding paid work, men's time was not affected, but women's declined [except in Yavorsky et al. (2015)], which found that women's paid labor hours did not change among dual-earner couples). Outside the Western context, the first child in Australia led to an increase in women's housework by about six hours per week, but no change for men (Baxter et al. 2008). Turkish women who became mothers increased their relative contribution to housework compared to their counterparts who remained childless (Hortaçsu 1999).

Relative to the first child, less longitudinal evidence exists regarding the impact of additional children, and the findings are not entirely consistent. Kühhirt (2011) found that for both men and women in Germany, the previously described effect of the first child's birth on all outcomes (housework, childcare, and paid labor) was similar to that of having two or more children, thereby arguing that what matters to the gendered division of household and paid labor is whether couples have at least one child rather than the number of children. Similarly, Sanchez and Thomson (1997) showed that in the US, although women's housework increased due to the first child's birth, no additional increases accompanied the birth of more children. Men's housework did not depend on the number of children born. First-time mothers' paid work hours declined even further with additional children, while men's paid work hours, which remained unchanged with the first

child, increased with more children. In contrast, in Australia, women's housework hours increased with both first and additional children, although the increase was larger with the former. Men's housework hours showed no change with the first child but decreased with additional children (Baxter et al. 2008).

As shown, longitudinal studies on this topic are based primarily on the US and Europe, with few exceptions. Related evidence on Asian countries is limited to a few cross-sectional studies. According to Kim's (2017) description of Korean women aged 40 or below, using the 2008 wave of the KLoWF—the same survey analyzed in the current study—Korean men at every parity did not contribute to household labor much in terms of absolute amount of time and relative to their wives. In contrast to the egalitarian division of the labor prior to the first birth in the US, inequality was evident among childless Korean couples: Wives spent 2.0 h and husbands spent 0.4 h daily on household labor. Moreover, gender inequality was much greater for couples with children. Comparing Korea, Japan, and the US, Tsuya et al. (2000) showed that having non-adult children, relative to adult children or no children, was positively associated with time spent on household labor for wives only in the two Asian countries, but for both spouses in the US.

Regarding the plausible moderating effect of employment, Kühhirt (2011) investigated whether the wife's relative income prior to the birth of the first child moderates the effect of parenthood transitions on household labor. The results provided only limited evidence of such moderation. Some of the aforementioned longitudinal studies examined the total hours of paid work and household labor over parenthood transitions, and these analyses are also relevant. Gjerdingen and Center (2005) and Yavorsky et al. (2015) found consistent patterns in the US: Before couples had their first child, the women's total hours were shorter than the men's due primarily to the latter spending longer hours on paid work. While both spouses experienced an increase in the total time, the change was significantly larger for women. Consequently, after the transition, mothers were more burdened than fathers in terms of the total hours.

In sum, using recent panel data from Korea, the current study adds evidence to the growing empirical literature on how parenthood transitions affect wives' and husbands' respective provisions of household labor and the division of the labor within couples, which is our first research question. Furthermore, the low fertility and female employment rates in Korea, described in the following section, lead to our second research question: How wives' and husbands' respective labor force participation moderate the relationships between parenthood transitions and household labor arrangements. Our study contributes to the literature by providing longitudinal evidence regarding these questions, examining first and additional births and adding a case study from Korea. Regarding the first question, Hypothesis 1 below is based on the time-availability and relative-resource theories, the gender-norm perspective, and the longitudinal evidence presented above. Due to Korea's gendered context, Hypothesis 2, which is related to the second question, is based on the gender-norm perspective, rather than the time-availability and relative-resource theories.

Hypothesis 1 Parenthood transitions are associated with a greater increase in household labor time for the wife than for the husband and, hence, with an increase in gender inequality in the labor division.

Hypothesis 2 Neither spouse's labor force participation moderates the impact of parenthood transitions on the time that the wife and the husband spend on household labor, nor on the division of labor.

The Korean Context

As the gender-norm perspective is a competing hypothesis of the current study, understanding Korea's gender context is critical. Korean men's lack of contribution to household labor originates partly from the Confucian and patriarchal traditions, under which gender roles are clearly divided into male breadwinners and female housekeepers. However, for several decades after World War II, Korea underwent rapid industrialization, the so-called economic miracle, during which women's socioeconomic status improved substantially, especially relative to men (Lee et al. 2011; Statistics Korea 2012). Due to the compressed pace of this modernization, many men still expect their wives to do housework and take care of children and elderly parents, as their mothers did, while their wives attained much higher educational levels and have more promising career opportunities outside the home than their mothers' generation (Hwang 2016).

The government and workplaces also tend to lag behind the women's advancement. Originating in part from the rapid economic development backed by labor-intensive industries, Korean society is highly work-oriented, with both men's and women's work hours being some of the longest among their respective peers in OECD countries (OECD 2017). The statutory maximum number of work hours per week is 68, which will be gradually reduced to 52 beginning in July 2018 (Korean Ministry of Employment and Labor 2018). Korean workplaces are also known as the most discriminatory against women within the developed region in terms of the gender wage gap and women's share of managerial positions (OECD 2012).

Government policies for workers with young children are lacking, and the available policies are not strictly enforced. It is only in recent years that universal childcare that the government subsidizes has been expanding, and the queues for public childcare centers are still long (Suh et al. 2012). Due to the immature quality-assurance system for childcare services, evidence on child abuse and neglect by daycare center workers is not difficult to find (e.g., CNN 2018; The Chosunilbo 2018). Both the fathers and mothers of preschool children can take 1 year of childcare leave, which is paid at 40% of income (Yoon 2014). However, only 57% of eligible women took the leave, and the proportion of males among the beneficiaries fell below 3% in 2012. Workers often find cutting overtime or weekend work and taking up childcare leave difficult due to disadvantages regarding promotions and pressures from supervisors and colleagues (e.g., Chang 2017; The Federation of Korean Industries 2017).

In the societal context, when both spouses are employed, the woman is much more likely to work the second shift and is thereby double-burdened with household

labor and work commitments. Although the statistics are outdated, the gender gap in regard to time spent on household labor was approximately 20 h per week in 1994 (Tsuya et al. 2000). A substantial proportion of employed women leave the labor force in their 30s (around the time when women bear and rear children), but many return to work in their 40s (as their children start school), which is a pattern that is captured in the M-shaped curve between women's labor force participation rates and their age, as observed in Korea and Japan (Statistics Korea 2014). It has been suggested that the incompatibility between work and family life force women to choose between the *wife/mommy track* and the *career track*, resulting in both low fertility and low female labor force participation (Kim and Cheung 2015). Despite the increase in past decades, only about half (50.2%) of women participate in the labor force, which is one of the lowest rates among OECD countries (Statistics Korea 2014).

Despite the significant policy implications, other than the descriptive statistics above, empirical evidence is lacking on the complex dynamic relationships between parenthood transitions, household labor arrangements, and paid work in Korea. In case parenthood transitions increase women's household labor substantially and women's employment does not buffer the increase, parenthood transitions could make women's double burden much heavier. Using Korea as a case study, we draw implications regarding how to raise fertility and female labor force participation in Korea and other countries where women have difficulty combining work and family life.

Methods

Data and Analytic Sample

We use data from the KLoWF, a nationally representative longitudinal survey of Korean women. The first wave, which interviewed 9997 women aged between 19 and 64 in 2007, has been followed biannually from 2008 (Wave 2) to 2016 (Wave 6). We use data from the first three waves due to changes in the measures of household labor after Wave 3 and, thus, analyze changes over the three years between 2007 and 2010. The Korean Women's Development Institute conducts the survey through computer-assisted personal interviewing. The response rate was 83.6% at Wave 2 and 80.0% at Wave 3. (For further details on the KLoWF, please see Joo et al. (2017) available at http://klowf.kwdi.re.kr/main.do?sLang=EN.) In the KLoWF, the sampled women report information about both themselves and their husbands. Accordingly, the unit of observation is the couple, distinguished by a unique couple identification number, and each observation contains individual information about both the wife and the husband as separate variables in wide-form data (instead of long-form data, in which each observation contains information on only one spouse and the wife and husband are nested within the couple).

We restrict the analytic sample to couples who participated in all three waves, remained married over the three-year period, and the wives were aged 50 or below at Wave 3. The restrictions are because, first, this study's key independent variable

is parenthood transitions; hence, we set the age limit to involve women of childbearing age only. Second, the dependent variables are the household labor of married women and their husbands; therefore, we restrict the sample to women who remain married. The resulting sample contains 3421 couples for each of the three waves and 10,263 couple-waves in the pooled sample over the three waves.

The sample attrition rate between Waves 1 and 3 is 27.6%, which is comparable to some household panel surveys in Europe (Behr et al. 2005). Another approximately 1% were omitted from the sample due to separation or divorce between Waves 1 and 3. To account for potential bias associated with these sample selections, our regression analysis uses an inverse-probability of attrition weight method, which calculates attrition-adjusted weights based on the characteristics of respondents at Wave 1, predicting their probability of remaining in the analytic sample at the subsequent waves.

Main Analyses of Household Labor Arrangements: Dependent Variables

Wife's and Husband's Time Spent on Household Labor

First, we study the wife's and husband's respective time spent on household labor measured in minutes per day. The KLoWF asks for the total amount of time spent on housework and childcare, which we call household labor. The questionnaire suggests meal preparation, dishwashing, laundry, cleaning, and grocery shopping as examples of housework. The average time spent on household labor on weekdays, Saturdays, and Sundays is surveyed separately. Based on the three figures, we calculate the time on an average day of a week without distinguishing weekdays and weekends. Like all other KLoWF questions for couples, the wife reports both spouses' household labor.

Husband's Share of Household Labor

Next, to examine inequality in a couple's division of household labor, we examine the husband's share of household labor. We calculate the share by dividing his time spent on household labor by the couple's total time spent on the labor. Accordingly, the share ranges from 0.0 to 1.0, with 0.5 (or 50%) indicating a completely egalitarian division.

Main Analyses of Household Labor Arrangements: Analytic Strategy with Independent Variables

Descriptive Analysis

To examine how parenthood transitions affect household labor outcomes, first, we tabulate bivariate relationships between parenthood transitions and household labor outcomes. In this descriptive analysis, the unit of analysis is the couple. We describe the snapshot of the dependent variables at Waves 1 and 3 and the changes in the

variables over the waves, both descriptions across parenthood transitions. In Korea's low-fertility context, we divide couples into five categories based on their parenthood transitions between the two waves: "Remain childless," "Make transitions to the first child," "Remain with one child," "Make transitions to the second child" (indicating parity progression from, at most, one child to two or more children), and "Remain with two or more children" (meaning either no parity progression or further parity progression from at least two children). Among the 3421 couples in the analytic sample, 2.7% (94 couples) remained childless, 2.2% (76) made their transitions to the first child, 13.5% (461) remained with one child, 6.1% (208) made their transitions to the second child, and 75.5% (2582) remained with two or more children (those with no further parity progression account for 97.5% within this group).[1]

Regression Analysis

Next, we pool couples over the three waves, such that the unit of analysis is a couple-wave, and estimate multivariate FE regressions. By controlling for the binary indicators for every couple identification number, the FE regressions control for the time-invariant characteristics of not only couples but also individuals (because only one wife and one husband correspond to each identification number). Examples of the characteristics may involve the couple's traits, such as premarital dynamics in terms of affection and income, and individual traits, such as personality and family background.

The key independent variable in the FE regressions is the number of children, which we categorize into "No child," "One child," and "Two or more children," indicated by three dummy variables. We use "No child" as the reference category and can, therefore, associate the coefficient of "One child" with the transitions from no child to the first child and the coefficient of "Two or more children" with the transition from any parity to the second or subsequent child. We call the model described thus far a main-effect model to distinguish it from an interaction-effect model introduced below.

Wife's and Husband's Employment as Moderators

To examine whether and, if so, to what extent the wife's and husband's respective employment statuses, indicative of lower time availability and greater relative resources, moderates the effect of parenthood transitions on household labor, we estimate an interaction-effect model. This model adds to the main-effect model interaction terms between each spouse's employment status and the three dummy

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[1] Accordingly, 44.7% (i.e., $76 \times 100/(94+76)$) of childless women made their transition to the first child. Assuming *transitions to the second child* indicates *parity progression from one child to two children* only (not the progression from, at most, one child to two or more children), 31.1% (i.e., $208 \times 100/(461+208)$) of women with one child made the progression. As shown, the majority of women with at least two children did not make further parity progression beyond two children. These numbers are consistent with statistics on Korea's low fertility rates among married women of reproductive age [e.g., Kim (2017)].

variables for the number of children, and we use "No child" interacted with the employment status, as the reference category.

Covariates

The main-effect and interaction-effect models contain the same set of covariates. First, as additional measures of time availability and relative resources, we control for the wife's and husband's respective employment statuses (0/1), the wife's income (logged), and the husband's share in the couple's total income (in %). Next, as a measure of individuals' gender norms, we control for the wife's gender role attitudes (ranging from 1 to 4, with the higher score reflecting more egalitarian attitudes). Third, we control for basic sociodemographic characteristics, including the wife's age and its square, the wife's and husband's respective education (in years), and whether the couple has at least one son (0/1). Finally, as additional factors that are plausibly associated with childcare and eldercare, we include the age of the youngest child (0 for childless couples) and whether the couple co-resides with the wife's parents (0/1) or the husband's (0/1). Online Resource 1 provides the descriptive statistics of all the variables used in this study.

Supplementary Analyses of Employment Status

To further comprehend the dynamics between parenthood transitions, household labor, and paid work, we examine how parenthood transitions are associated with each spouse's employment status (coded as 1 if employed and 0 otherwise). First, we conduct a descriptive analysis, which is analogous to that of household labor, by tabulating employment status at Waves 1 and 3 and changes therein against parenthood transitions, which are grouped into the five categories. Next, using logistic regression, we regress each spouse's employment status at Wave 3 on the parenthood transitions in the five categories. The covariates remain the same as those in the regressions of household labor; however, this time, we use the covariates measured at Wave 1. For employment status, we use this lagged-variable approach instead of the FE regression design because the latter excludes all respondents with no change in their status. Accordingly, in both the descriptive and regression analyses of employment status, the unit of analysis is the couple.

Results

Descriptive Results

The top three panels in Table 1 describe household labor at Waves 1 and 3 and over-wave changes in the labor across parenthood transitions. First, regarding the snapshot in Wave 1, among women, those who made their transition to the second child spent the longest time on household labor (420 min per day). The wife's time at Wave 1 was the lowest (130 min per day) among women who became first-time mothers

Table 1 Household labor and employment across parenthood transitions: Unadjusted means ($N = 3421$)

	(N)	Household labor and employment		
		Wave 1	Wave 3	% Change
Wife's time spent on household labor (in minutes/day)				
Remain childless	(94)	162	157	− 3.1
Make transition to the first child	(76)	130	404	210.8
Remain with one child	(461)	308	237	− 23.1
Make transition to the second child	(208)	420	430	2.4
Remain with two or more children	(2582)	292	225	− 22.9
Husband's time spent on household labor (in minutes/day)				
Remain childless	(94)	23	23	− 0.0
Make transition to the first child	(76)	35	37	5.7
Remain with one child	(461)	36	28	− 22.2
Make transition to the second child	(208)	63	59	− 6.3
Remain with two or more children	(2582)	28	21	− 25.0
Husband's share of couple's total time spent on household labor				
Remain childless	(94)	15.9%	14.9%	− 6.3
Make transition to the first child	(76)	21.1%	10.1%	− 52.1
Remain with one child	(461)	10.4%	10.5%	1.0
Make transition to the second child	(208)	15.6%	12.4%	− 20.5
Remain with two or more children	(2582)	9.5%	8.9%	− 6.3
Wife's employment status				
Remain childless	(94)	41.5%	44.7%	7.7
Make transition to the first child	(76)	38.2%	25.0%	− 34.6
Remain with one child	(461)	29.9%	43.0%	43.8
Make transition to the second child	(208)	19.7%	21.6%	9.6
Remain with two or more children	(2582)	36.6%	48.2%	31.7
Husband's employment status				
Remain childless	(94)	92.6%	79.8%	− 13.8
Make transition to the first child	(76)	92.1%	77.6%	− 15.7
Remain with one child	(461)	93.9%	80.3%	− 14.5
Make transition to the second child	(208)	92.8%	82.2%	− 11.4
Remain with two or more children	(2582)	95.2%	84.4%	− 11.3

Source KLoWF (Waves 1, 2, and 3)

Note Mean values are unadjusted for covariates, including the age of the youngest child

by Wave 3, and it was not much different from 162 min per day for women who remained childless. For all five categories, men's contribution was much smaller, ranging from 23 min per day among childless men to 63 min among men who made their transition to the second child. Accordingly, in all the groups, the labor division was unequal, with the husband's share falling significantly below 50.0%. Notably, even before the arrival of the first child, the inequality was substantial: At Wave
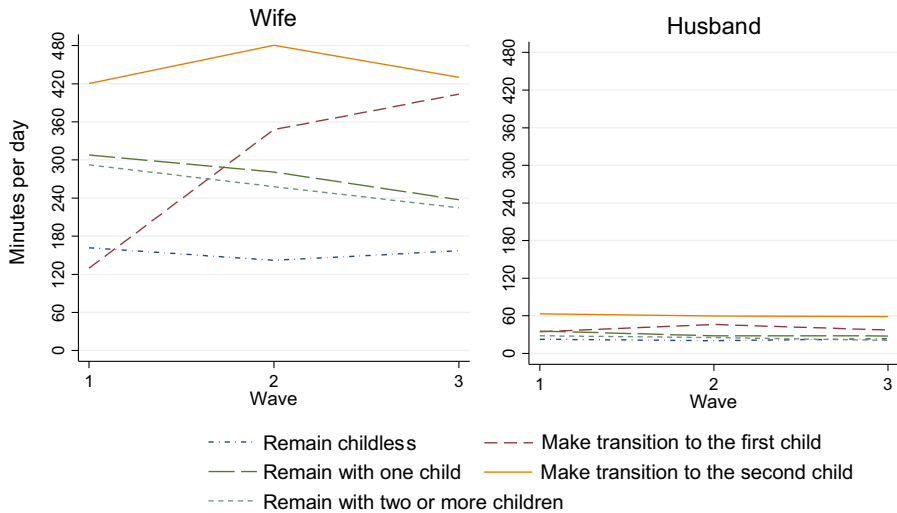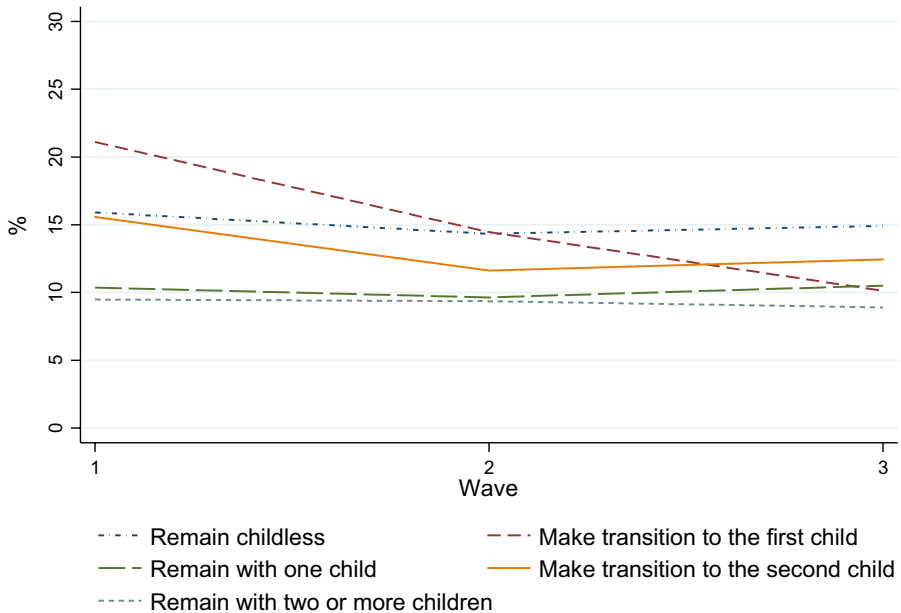
Fig. 1 Wife's and husband's time spent on household labor across parenthood transitions: Unadjusted means. *Note* Mean values are unadjusted for covariates, including the age of the youngest child

1, the husband's share was 21.1% for couples who made their transition to the first child and 15.6% for couples who remained childless. Among the five categories, husbands who remained with two or more children recorded the lowest contribution, 9.5%.

Next, regarding changes between Waves 1 and 3, the labor burden for women who made their transition to the first child showed a 210.8% increase up to 404 min per day. In contrast, with the same transition, the husband experienced a much smaller increase of 5.7%, from 35 to 37 min per day. With the unequal increases, the gender gap in household labor became substantially larger, with a 52.1% decrease in the husband's share. Relatively, the associations between household labor and the transition to the second child were much weaker. Household labor increased slightly for wives (2.4% increase from 420 to 430 min per day) and decreased slightly for husbands (6.3% decrease from 63 to 59 min per day). The changes led to a 20.5% decrease in men's share.

Household labor tended to decline over time for parents who remained with one child and with two or more children. While both mothers' and fathers' time declined by about a quarter, the decline in terms of absolute amount of time was much larger for women, who spent far more time on household labor (–71 min per day for women who remained with one child, and –67 min for women who remained with two or more children). The reduced time for mothers might be because they became more experienced with the labor, thus saving time on the tasks, and because the workload decreased as their children grew older. Figures 1 and 2 also illustrate the trends above.

With regard to employment status, the proportion of employed women decreased by 34.6% among those who made their transition to the first child. In contrast, the proportion among women who remained with one child increased by 43.8%, and among women who remained with two or more children, this figure increased by

Fig. 2 Husband's share of couple's total time spent on household labor across parenthood transitions: Unadjusted means. *Note* Mean values are unadjusted for covariates, including the age of the youngest child

31.7%. Relative to their wives, men's employment status remained much more stable in all five groups.

Results of FE Regression Analysis of Household Labor

Table 2 presents the FE regressions of the three household labor outcomes on the number of children. For each dependent variable, the first column reports the result from the main-effect model, and the second reports the result from the interaction-effect model. According to the estimation from the main-effect model, transitions to the first child increased women's household labor by 376 min per day ($p < 0.001$). In comparison, husbands' household labor increased by 23 min per day ($p < 0.001$). The coefficient on the husband's share is -0.094, meaning a 9.4 percentage point (%p) ($p < 0.001$) reduction in the share.

The transition to the second or subsequent child was associated with an increase in household labor by 382 min per day ($p < 0.001$) for wives and 26 min per day ($p < 0.001$) for husbands and a decrease in husbands' share by 9.9%p ($p < 0.001$). For all three dependent variables, the difference in the coefficients between "One child" and "Two or more children" was not statistically significant at the 0.05 level, indicating that the transitions to the first child and the transitions to the second or subsequent child have comparable impacts on the provision and division of household labor. Because we controlled for the age of the youngest child, the above coefficients

Table 2 Fixed-effect regressions of household labor on number of children

	Wife's time on household labor (in minutes/day)		Husband's time on household labor (in minutes/day)		Husband's share of couple's total time on household labor (in 0–1)	
W's age	−80.255***	−80.389***	−11.643***	−11.765***	−0.012	−0.012
W's age (squared)	1.155***	1.151***	0.138***	0.140***	0.000	0.000
W's education (in years)	5.672	2.414	6.118	5.944	0.014	0.013
H's education (in years)	6.869	7.045	−2.318	−2.311	−0.007	−0.007
W employed	−36.987**	23.885	1.965	4.775	−0.005	0.023
H employed	10.587	−52.492	−3.885*	−2.132	−0.008	0.003
W's income (logged)	−2.736	−2.759	0.979	0.949	0.005**	0.005**
H's share of couple's income (in %)	29.877	29.791	−3.302	−3.593	−0.050**	−0.050**
Number of children						
No child	Ref	Ref	Ref	Ref	Ref	Ref
One child	376.294***	346.811***	23.029***	32.064***	−0.094***	−0.064*
Two or more children	381.645***	344.409***	26.446***	26.852**	−0.099***	−0.083**
Number of children × W employed						
No child × W employed	–	Ref	–	Ref	–	Ref
One child × W employed	–	−94.109***	–	−5.955	–	−0.024
Two or more children × W employed	–	−57.225*	–	−2.232	–	−0.031
Number of children × H employed						
No child × H employed	–	Ref	–	Ref	–	Ref
One child × H employed	–	63.760	–	−8.944	–	−0.026
Two or more children × H employed	–	65.774*	–	0.073	–	−0.008
Couple has at least one son	−14.104	−10.018	5.615	5.965	0.034*	0.035*
Age of the youngest child	−33.959***	−33.364***	−2.349**	−2.356**	0.004	0.004
W's liberal gender role attitude	1.155	0.849	0.822	0.838	0.004	0.004

Table 2 (continued)

	Wife's time on household labor (in minutes/day)		Husband's time on household labor (in minutes/day)		Husband's share of couple's total time on household labor (in 0–1)	
Couple lives with W's parents	15.733	13.427	−2.451	−2.395	−0.009	−0.009
Couple lives with H's parents	−34.676	−35.301	−3.961	−4.033	−0.021	−0.021
Constant	1370.349***	1447.894***	211.777**	213.960**	0.448	0.445
Number of couple-waves	10,263	10,263	10,263	10,263	10,263	10,263

Source KLoWF (Waves 1, 2, and 3)

Notes The regressions control for fixed effects at the couple level. W indicates the wife, and H indicates the husband. With control for the age of the youngest child, the coefficients of the number of children capture the impact of parenthood transitions when the youngest child is aged 0. Weight applied for attrition and sample selection (due to divorce and separation in subsequent waves). ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$ (two-tailed)

captured the change in household labor arrangements over the parenthood transitions when the youngest child was aged 0. As the coefficient of the youngest child suggested and as Online Resource 2 presented, when he or she became older by one year, the change in household labor declined by more than half an hour per day for mothers ($p < 0.001$) and by 2 min per day for fathers ($p < 0.01$), with no significant change in the latter's share. The additional burden of the transitions declined and disappeared for both spouses when the youngest child became approximately 10 years old.

In the interaction-effect model, the coefficients of the non-interaction terms on the number of children estimate the effects of parenthood transitions when neither spouse was employed, while the interaction terms between the number of children and a spouse's employment status estimate how the effects of the transitions differ when the spouse is employed. The results show that, for non-employed women, the transition to the first child was associated with an increase in women's household labor by 347 min per day ($p < 0.001$) and the transition to the second or subsequent child with an increase by 344 min per day ($p < 0.001$). For employed women, the increases were smaller by 94 min per day ($p < 0.01$) with the first child and 57 min per day ($p < 0.05$) with the second or subsequent child. Because these moderating effects of women's employment were much smaller in absolute size than the effects for non-employed women, the overall household labor burden of employed women increased by 253 min per day (i.e., 347–94, $p < 0.001$) with the first child and 287 min per day (i.e., 344–57, $p < 0.001$) with the second or subsequent child. Moreover, men's employment status interacted with the second or subsequent child to increase women's household labor by 66 min per day ($p < 0.05$).

Regarding men's household labor, their time increased by 32 min per day ($p < 0.001$) with the first child and 27 min per day ($p < 0.01$) with the second or subsequent child. These effects depended neither on men's own employment status nor on their wives'. Finally, the husband's share of the couple's household labor decreased by 6.4%p with the first child ($p < 0.05$) and 8.3%p ($p < 0.01$) with the second or subsequent child, and neither spouse's employment status moderated these effects.

As for the other covariates, the findings were consistent between the main-effect and interaction-effect models. The husband's share of household labor was positively associated with women's income ($\beta = 0.005$, $p < 0.01$) and negatively with the husband's share of the couple's total income ($\beta = -0.050$, $p < 0.01$). Women's gender role attitudes showed no significant relationship with any of the dependent variables. Having a son increased the husband's share by about 3.4%p ($p < 0.05$), lowering gender inequality in household labor. Living with parents and parents-in-law had no significant association with any of the outcome variables. Controlling for all other independent variables, the coefficients of the wife's age and its squared term were significant ($p < 0.001$) for the time that both her and her husband spent on household labor, indicating a U-shaped curve between the age and the outcome variables. The wife's time declined with age, from 40 min at age 19 to 0.6 min per day at age 35, after which she spent increasing time on household labor, up to 34 min per day at age 50. For the husband's household labor, the turning point was the wife's reaching age 42.

Table 3 Logistic regressions of employment status on parenthood transitions

	Wife's employment status at Wave 3	Husband's employment status at Wave 3
Independent variables at Wave 1		
W's age	0.235*	0.077
W's age (squared)	− 0.004**	− 0.001
W's education (in years)	− 0.017	0.027
H's education (in years)	− 0.039	− 0.010
W employed	3.541***	0.368
H employed	− 0.141	0.855***
W's income (logged)	− 0.317***	0.026
H's share in couple's income (in %)	− 3.902***	0.564
Parenthood transitions (from Wave 1 to 3)		
Remain childless	Ref	Ref
Make transitions to the first child	− 1.242*	− 0.337
Remain with one child	− 0.176	− 0.089
Make transitions to the second child	− 0.940*	− 0.044
Remain with two or more children	− 0.063	0.188
Couple has at least one son	0.091	− 0.008
Age of the youngest child	0.053***	0.015
W's liberal gender role attitude	0.186***	− 0.034
Couple lives with W's parents	0.182	− 0.160
Couple lives with H's parents	0.115	− 0.244
Constant	− 0.531	− 1.101
Number of couples	3421	3421

Source KLoWF (Waves 1, 2, and 3)

Notes W indicates the wife, and H indicates the husband. Weight applied for attrition and sample selection (due to divorce and separation in subsequent waves). ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$ (two-tailed)

Results of Logistic Regression Analysis of Employment Status

Table 3 presents the results of the logistic regressions. While men's employment status did not change with parenthood transitions, women who made their transition to the first child became less likely to participate in the labor force ($\beta = -1.242$, $p < 0.05$). While such a pattern has also been documented in the Western literature (Gjerdingen and Center 2005; Kühhirt 2011; Sanchez and Thomson 1997), the absolute size of the effects is large in Korea. When all other covariates are assumed to be at their mean values, the marginal effect of the first child on women's probability of being employed was –18%p. For comparison, 41.5% of childless women in the analytic sample participated in the labor force at Wave 1. The results also indicate that mothers', but not fathers', labor force participation increased as their youngest child grew older ($\beta = 0.053$, $p < 0.001$).

Among first-time mothers, the high rate of withdrawal from the labor force might be partially attributable to an increase, or the anticipation of an increase, in the double burden associated with the first child. The plausibility becomes more compelling because the impact of the transition to the first child was not smaller in absolute size than, but comparable with, that of the transition to the second child. The marginal effect of the latter was a 14.4%p decrease in the probability of being employed ($\beta = -0.940$, $p < 0.05$), and the difference in the two coefficients was not statistically significant.

As for other predictors of women's employment at Wave 3, their Wave 1 employment status ($\beta = 3.541$, $p < 0.001$) and liberal gender role attitude ($\beta = 0.186$, $p < 0.001$) were positive factors, while their logged income ($\beta = -0.317$, $p < 0.001$) and their husbands' shares in the couple's income ($\beta = -3.902$, $p < 0.001$) were negative factors. Women's employment was related to their age in a curvilinear way (β of wife's age $= 0.235$, $p < 0.05$; β of wife's age squared $= -0.004$, $p < 0.01$): Women were more likely to work until the age of 30, after which they were less likely to work as they became older. For the husbands' employment status, the only significant predictor was their employment status at Wave 1 ($\beta = 0.855$, $p < 0.001$).

Robustness Checks of the FE Regression Analysis

We conducted the following robustness checks regarding our main analyses in Table 2. The findings remained largely robust with regard to the effects of parenthood transitions on the three dependent variables. First, some covariates might be determined jointly with household labor arrangements in response to parenthood transitions. For example, for women, dropping out of the labor force or reducing their work hours due to parenthood transitions might have increased their household labor burden even further. In view of this possibility, one alternative specification excluded couples' employment status and income, and the other stratified the analytic sample according to women's employment status at Wave 1 and conducted the FE regressions separately for the two subsamples (Online Resource 3). We also conducted the main analyses without other plausibly endogenous covariates—that is, co-residence status with parents and the wife's gender role attitudes. Second, a substantial proportion of the couples who experienced no parenthood transitions within the study period already had a child at Wave 1. In case they experienced larger changes in household labor compared to the couples who remained childless over the three waves, including them in the FE regressions might have made the impacts of parenthood transitions appear smaller. When we restricted the FE regressions to couples who were childless at Wave 1, the main findings still held, with some evidence that the absolute size of the effects indeed became larger for all three dependent variables (Online Resource 4). Finally, regarding the concern that our results could have been driven by the effects in the reverse direction (i.e., from household labor arrangements to parenthood transitions), ordinary least squares regressions estimated the effect of parenthood transitions on household labor arrangements using the lagged-variable approach, which is the approach used for the analyses of employment status. (Online Resource 5). Compared with remaining childless,

making transitions to the first child was associated with an increase in the wife's, but not the husband's, household labor time and with a reduced share for the husband. Transitions to the second child increased both spouses' household labor, but to a much lesser extent for the latter.

Conclusion

Using the recent longitudinal data and FE regressions, we examined the dynamic relationships between parenthood transitions, household labor, and paid work among Korean couples. The division of household labor between wives and husbands was highly unequal even before they had the first child, showing a stark contrast with the egalitarian pre-parenthood pattern in the US (Gjerdingen and Center 2005; Yavorsky et al. 2015). Moreover, according to the FE regressions based on the main-effect model, the arrival of the first child increased wives' household labor by more than 6 h a day ($p < 0.001$) and husbands' by less than 30 min a day ($p < 0.001$). Consequently, the inequality in the labor division grew further with a 9.4%p ($p < 0.001$) decline in the husband's share. Thus, these results support Hypothesis 1 and are in line with the time-availability and relative-resource theories (Becker 1981; Greenhaus and Beutell 1985; Jacobs and Gerson 2004) and the gender-norm perspective (Berk 1985; Brines 1994; West and Zimmerman 1987). While our findings on the effects of the first child coincide with the available longitudinal evidence (Baxter et al. 2008; Gjerdingen and Center 2005; Hortaçsu 1999; Kühhirt 2011; Sanchez and Thomson 1997; Yavorsky et al. 2015), the preexisting inequality prior to the child's birth makes the labor particularly burdensome for first-time mothers in Korea.

The transitions to the first child and the transitions to the second or subsequent child are shown to have comparable impacts on household labor arrangements. This observation is consistent with the patterns found in Germany (Kühhirt 2011) and the US (Sanchez and Thomson 1997) but contrasts with the pattern observed in Australia (Baxter et al. 2008). Accordingly, having a second child in Korea neither created an extra burden nor worsened gender inequality, suggesting that the first child is the life-course transition which is critical to couples' household labor arrangements. Another plausible explanation would be selection into the transition to the second or subsequent birth: The transition beyond the first child might be a careful selection made by couples with a husband who contributes to household labor. In fact, Kim (2017) in Korea and Nagase and Brinton (2017) in Japan showed that couples were more likely to have second children if husbands spent more time taking care of first children and sharing housework, as found in Germany (Cooke 2004) and Italy (Cooke 2009). Such selection may be weaker for the transition to the first child because the demand for household labor tends to increase significantly after the child's arrival, and couples may deem having the first child necessary but having the second child optional in a low-fertility context.

According to the results based on the interaction-effect model, women's employment moderated the effects of parenthood transitions on their own household labor only slightly, with no moderating impact on their husbands' labor; therefore, these results largely support Hypothesis 2. Consequently, regardless of women's

employment status, parenthood transitions increased their household labor substantially and made the labor division more gendered. Given that employment makes women less time-available at home and more economically capable, these results contradict the time-availability and relative-resource hypotheses and instead support the gender-norm perspective. Our findings are consistent with the finding of no moderating effect for German women's relative income on how parenthood transitions affect household labor (Kühhirt 2011), and with the finding of a larger increase in total hours of paid and unpaid work over parenthood transitions for American women than for their husbands (Gjerdingen and Center 2005; Yavorsky et al. 2015). In gendered Korean society, childcare responsibilities fall primarily on the mother, and the arrangement is almost as gender-unequal for employed women as for non-employed women. Unless employed mothers' paid work hours decrease as much as the increase in their household labor (which is unlikely in Korea's work-oriented, family-unfriendly corporate culture), employed women's total hours of work increase, and, consequently, the second shift becomes more burdensome with parenthood transitions.

The results of parenthood transition and paid labor in this study are in line with what Kühhirt (2011) showed in Germany—that the effect on paid labor of having the first child was similar to that of having two or more children, but contrary to what Sanchez and Thomson (1997) found in the US—that women's paid work hours with the first child declined further with additional children.

To explain our findings altogether in Korea's gendered context, we propose that Korean women with one child might be situated to choose between the *return-to-work track*—women stop at parity one to return to the labor force—and the *second-child track*—women make further parity progression beyond the first child. Compared to having only one child, having more children has no additional effect on women's employment; this is probably because some women who made their transition to the second or subsequent child have already left their jobs with the birth of the first (i.e., women on the second-child track). In contrast, other women who wish to return to the labor force may have needed to give up further parity progression (i.e., women on the return-to-work track). This proposition is convincing in conjunction with other findings on Korea. Women's employment decreased the likelihood of the second childbirth (Kim 2014; Ma 2016) but not the first (Kim 2014), with the birth of the first child being taken as normative for married women. Our examination of household and paid labor together in relation to parenthood transitions implies that the M-shaped curve between women's age and employment in Korea is not only cross-sectional but also within-individual longitudinal associations, and that this phenomenon could be partially attributable to women becoming double-burdened after the first child in particular.

This study has limitations. First, further caution is required for the causal interpretation of our results. While we stated earlier that the FE models control for the time-invariant characteristics of couples and individuals, this holds under the parallel trends assumption (Best and Wolf 2015). When applied to our study, if the couples who made their parenthood transitions had, in fact, experienced no transitions, their household labor arrangements should have developed parallel to the arrangements of couples who remained childless. Although the counterfactual assumption

is not verifiable, recall that the time spent on household labor at Wave 1 was not much different between women who made their transition to the first child and those who remained childless between Waves 1 and 3. Moreover, when we further restrict the former group to women who became first-time mothers at Wave 3, their household labor time and that of the latter group were comparable at both Waves 1 and 2 (Online Resource 6).

Even when the assumption holds, our estimations remain vulnerable to the bias associated with omitting the time-varying characteristics of couples and individuals. Men's gender role attitudes, which we could not include due to their unavailability in the KLoWF, may be one example if the attitudes change over time like those of women (e.g., Baxter et al. 2015). Husbands might not necessarily have similar attitudes to their wives'; moreover, the ways in which the two attitudes relate to parenthood transitions and affect household labor arrangements might differ, necessitating future research involving the attitudes of both spouses.

Second, the measurements of household labor are not ideal. Rather than time diaries, we use survey data, which might not capture multitasking precisely, while childcare is often provided concurrently with other household labor (see Coltrane (2000) for further discussion). Survey data have also been found to underestimate the increase in gender inequality in household labor after the first birth (Yavorsky et al. 2015), which might counteract the overestimation of the increase for the following two reasons: (a) the time that both women and their husbands spent on household labor is reported by women, who might overreport their own contributions (Coltrane 2000), and (b) the examples of housework suggested by the KLoWF questionnaire are mostly routine tasks that are often categorized as traditionally female-typed (although Korean men's contribution to occasional, traditionally male-typed household labor also tends to be significantly less than that of men in Western countries [Statistics Korea (2015) available at https://mdis.kostat.go.kr/index.do]).

Third, we studied employment status, rather than time spent on paid work. It would be desirable for future research to examine the time as well as total hours of paid work and household labor, thereby investigating the extent to which employed women become double-burdened over parenthood transitions. Finally, this study tracks household labor division over a three-year period; the question of whether the inequality triggered by parenthood transitions decreases over a longer time span, as observed in Kühhirt (2011), remains interesting.

Despite these limitations, this study provides important geographic and cultural extensions of the empirical literature on household labor arrangements over the life course. Within the gendered context, our findings facilitate comprehension of the lowest-low fertility in Korea and sheds light on government policies to tackle the problem. With the unequal division of household labor prior to first births and the additional growth in the inequality after the first births, Korea appears to remain stagnant in the first stage of the gender revolution. For the country's fertility rate to reach the replacement level, it is crucial for couples with one child to have a second child; however, only select women make this transition after careful consideration of the ramifications for their household labor and employment. The husband's contribution to housework and the care of the first child increases the couple's chances of having a second child (Kim 2017), and men's gender ideology becoming less

traditional would be helpful, to some extent, by shifting some responsibilities for household labor from women to their husbands. However, the redistribution of labor within the couple would be insufficient, given the family-unfriendly environment outside the home.

More importantly, the government and employers should relieve the workload of parents with young children both at home and in the workplace by increasing the utilization of childcare leave, expanding childcare services, and reducing work hours. Above all, acknowledging that gender norms and corporate culture hardly change, the government should monitor employers closely to prevent them from penalizing workers for taking leave or reducing their overtime work. The government may also consider introducing strong financial disincentives to employers and employees when parents, especially fathers, do not take leave, as is the case in Sweden (Stanfors and Goldscheider 2017). The expansion of childcare services under a rigorous quality-assurance system would reduce women's childrearing burden and make the outsourcing of that traditional family function more acceptable to society. With the reduction to the 52 statutory work hours per week, the question of how this change would affect the dynamics between parenthood transitions, household labor, and paid work within the couple remains an interesting one. Such government actions would contribute to raising not only fertility but also female labor force participation, thereby helping the government cope with imminent challenges due to its aging population.

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