The Making of the Modern British Family:

The Transformation of Women's and Men's Lives in the Family Formation Process



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Abstract

BACKGROUND The improved economic position of women over the last few decades is likely to have altered gender relations within families. This dissertation presents three empirical chapters to examine the evolving role of families as an institution for gender display. The period covered is from 1991 to 2017, during which the total fertility rate in the United Kingdom experienced a re-growth and more women were in the labour force.

OBJECTIVE & METHODS This dissertation uses data from the *British Household Panel Survey* (BHPS) and the "*UK Household Longitudinal Study*" (UKHLS) and fixed-effect regressions. I investigate how women's gender-role attitudes are associated with different combinations of employment and motherhood statuses, the changing relationships between the within-couple division of labour and childrearing across periods, and the dynamics of women's and men's paid work time and housework time in the family formation and development process.

MAIN FINDINGS First, women's gender-role attitudes are associated with the changing conflict between employment and childcare responsibilities. Second, the positive, reciprocal relationship between a traditional division of labour and childrearing has substantially weakened. Couples with a traditional division of labour are no longer more likely to have a child. Third, women's time allocation had become less strongly dependent on their family roles over the last 25 years, whereas the relationship between men's time allocation and their roles as husbands and fathers remains unchanged.

CONTRIBUTIONS This dissertation highlights that the incompatibility between employment and family responsibilities plays a central role in shaping women's and men's lives when they form and maintain a family. The documented changing roles of marriage and parenthood in framing gender relations over the last 25 years reveal the latest consequences of the gender revolution on family lives. These findings also uncover the progress and the challenges of gender equality.

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CHAPTER 1: INTRODUCTION

1.1. Overview

Gender equality is a human right. No one should be discriminated against on the basis of sex, being labelled, defined, excluded, or restricted based on sex (United Nations 1979). Gender inequality impairs the utilization of full human potential and hinders the achievement of sustainable societies. Gender inequalities restrict women's and men's positions to their socially prescribed roles as caregivers and breadwinners, respectively, thus limiting people's ability and potential in all aspects of society, such as education, employment, political participation, and family life. These restrictions, limitations, and discriminations based on sex also contribute to high levels of stress and anxiety. Gender inequality has been identified as one of the most essential factors influencing economic and health development in a society (Shannon et al. 2019). Therefore, achieving greater gender equality has been an important political goal in many industrialized societies. A gender equality policy was included in the original Treaty of Rome in 1957, which led the creation of the European Economic Community (EEC), i.e., the predecessor of the European Union. Gender policies have been viewed as among the most developed social policies of the EU (Fagan and Rubery 2018), and gender equality is positioned as indispensable for reaching the Sustainable Development Goals set by the United Nations (United Nations 2017).

Since the 1950s, gender roles and relations have evolved in developed countries led by women's growing engagement in the labour market. Women are no longer confined to the private sphere of domestic and care work. Even as wives and mothers, many women are active in the labour market. Nonetheless, despite years of effort to improve gender equality, the gender wage gap persists, and the rate to close this gap has decelerated (England 2010). The improvement in women's position in the public sphere

does not match the rigidity of the gender roles in the private sphere (McDonald 2000, Sullivan, Gershuny, and Robinson 2018). Women remain the primary caregiver and shoulder the lion's share of housework, whereas men are reluctant to be involved in domestic work. Some scholars argue that the progress in achieving gender equality or the gender revolution has "stalled" since the 1990s and is highly "uneven" (Cotter, Hermsen, and Vanneman 2011, England 2010), whereas others perceive a more optimistic picture, arguing that the "second half" of the gender revolution, which underscores changes in men's family roles, is underway (Goldscheider, Bernhardt, and Lappegård 2015). Despite the debate regarding the progress of the gender revolution, the consensus is that changes in gender roles and relations have a major impact on families (Goldscheider 2000, England 2015), which have been viewed as institutions for traditional gender display and are at the root of gender inequality (Cherlin 1978, Polachek 2006, Aassve et al. 2006).

With women's growing significance in the labour market, what is the role of the contemporary family in shaping gender roles and relations? Answering this question provides important insight into whether the gender roles and relations within families have changed. Addressing this question could also enhance our understanding of the progress of the gender revolution and the greatest challenges of gender equality. Hopefully, after reading this dissertation, we could have better answers to where we have been, where we currently are, and how much progress is needed to reach greater gender equality.

Using the United Kingdom (UK) as an example, this dissertation presents three empirical chapters to investigate how, over the last three decades, women's and men's

lives transformed as they formed and maintained a family.[1] I utilize the high-quality, long-term, and most recent UK Household Longitudinal Study (UKHLS) (1991-2018) and employ fixed-effect regression models to document the dynamics of women's gender-role attitudes, the within-couple division of labour, and the gendered time allocation during the family formation process. The first empirical chapter provides an update regarding the nature of motherhood by evaluating how women's gender-role attitudes vary based on their employment status, childrearing experiences, and the intersection of the two. The second empirical chapter offers new evidence for a changing family equilibrium by documenting a time-varying relationship between the birth of a child and the gender division of labour over the last three decades. The final empirical chapter identifies the distinct processes of marriage and parenthood in fostering traditional gender roles by separately assessing the dynamics of paid work time and housework time among women and men as families form and develop. Overall, this dissertation sheds light on the consequences, progress, and significant challenges of the gender revolution.

The overall structure of this dissertation is as follows. In the first chapter, I introduce the backgrounds work-family context in the UK, research approach, and data. I also summarize the three empirical studies. Chapters 2 to 4 provide empirical investigations of the specific research questions. These chapters follow a typical journal article format, and each chapter includes an independent introduction, literature review, and conclusion. Because the three chapters were written for independent reading, some

1 The transition into parenthood is the focus, but I also examine the process when the children grow older, during the transition into marriage, and during the course of the marital tenure in the last empirical chapter.

overlap and repetition are inevitable. Finally, I conclude my findings and discuss the contributions, limitations, and their implications in the final chapter.

1.2. Gender and Family: Relations, Explanations, and Debates

My thesis covers the period from 1990s to 2010s in the UK. In this section, I briefly introduce the changes in gender relations and the accompanied fertility trend during the past three decades. I also review key theories that aiming to explain these changes in gender and family formation and the link between the two. Towards the end of this section, I discuss the new perspectives that I aim to provide in this thesis.

The past few decades have witnessed a convergence of women's and men's roles in the public sphere. Women's educational attainment has been comparable to or even superseded that of men in many developed societies (OECD 2014). During the 1980s and 1990s, the gender wage gap experienced a substantial decline, although this gap persists despite the remarkable improvement in women's educational attainment and career aspirations since then (Diprete and Buchmann 2006, Goldin 2006). More women are in paid jobs, and the shift away from the breadwinner-homemaker family to the dual-earner family is evident (Blossfeld and Drobnic 2001). For example, in the UK, 62 percent of families with children aged less than five years had both partners in employment in 2014 (Office for National Statistics 2014); this number was 56 percent in 2004 (Walling 2005). In many Western European countries, a gender-egalitarian family model of two workers and caregivers is also a political ambition, and this ambition seems to be on the way to being realized in Nordic countries (Esping-Andersen 2016, Gornick and Meyers 2005).

However, in contrast to women's substantial involvement in the labour market, the

extent of men's participation in domestic labour is still limited, and the experience of childbearing and childrearing still represent highly gendered processes. Large-scale nationally representative time-use survey data across 20 countries show that women still perform most routine housework and care work for family members (Kan, Sullivan, and Gershuny 2011). Furthermore, marriage and particularly parenthood have always been regarded as the primary sources of the construction of gender-differentiated roles. Within-gender comparisons consistently show that married men tend to have better performance than single men in the labour market, and mothers are less likely to be employed and earn less than women without children (Cooke 2014, Budig and England 2001, Kühhirt 2012, Gangl and Ziefle 2009).

The fact that women are still expected to and sacrifice their employment opportunities to meet family responsibilities also raises questions regarding whether women's significance in the labour market is transferred into a fundamental change in gender roles and identity within families. Feminist scholars argue that there is minimal change in the power structure in the private sphere and that the gender revolution is, thus, regarded as highly uneven or even stalled (England 2010, Hochschild and Machung 1989).

The negative consequences of being a wife and a mother on women's labour market performance would naturally lead to the expectation of a retreat from families as women currently have more and better alternatives in the public sphere than before. Indeed, we previously observed the following phenomenon: since the 1980s, many developed societies have demonstrated very low levels of fertility and a substantial postponement of childbearing (Caldwell and Schindlmayr 2003). Scholars and policymakers have raised concerns that a low fertility level could result in substantial labour shortages and

population ageing. The ageing population has become a central policy concern because of the growing cost of health expenditure and pension and the reduction in taxation income paid by a shrinking working population. Therefore, is gender equality, which offers women great opportunities outside the family, the culprit?

One perspective explaining the relationship between gender equality and family formation is the *second demographic transition* (SDT). The SDT attributes these demographic phenomena, such as increased marital instability and the ultra-low fertility level, to people's changed preferences, values, and views (Lesthaeghe 2010, Lesthaeghe and Meekers 1987, van de Kaa 2002). The SDT argues that marriage and family have become subsidiary to people's pursuit of individual and expressive needs rather than a necessity. The substantial improvement in women's education and economic positions provides personal goals and opportunities for self-actualization outside the family, and the importance and necessity of marriage and family are expected to decline. Alternatively, the classic *home economics model* proposes that women with greater earning powers incur higher opportunity costs due to family formation and, thus, are thus less likely to have children or have more children (Becker 1985, 1981).

However, people's preference for having children within a stable partnership remains stable, and a couple with two children is still considered an ideal family type (Gibson-Davis, Edin, and McLanahan 2005, OECD 2011). Most interestingly, in developed societies, a bifurcation in the fertility level has emerged since 2000 with one group with high female labour force participation maintaining a relatively high level of fertility and another group with low female labour force participation trapped in an ultra-low fertility level (Rindfuss, Choe, and Brauner-Otto 2016). The negative

relationship between women's education and fertility has started to diminish (Kravdal and Rindfuss 2008, Jalovaara et al. 2017, Brewster and Rindfuss 2000), and countries with the highest levels of female labour force participation and men's contribution to domestic labour have been observed to have the highest fertility rate (de Laat and Sevilla-Sanz 2011, Kravdal and Rindfuss 2008, Myrskylä, Kohler, and Billari 2009)

The heterogeneous pattern of fertility trends and the reversed association between fertility and female labour force participation across developed societies have sparked heated debate regarding the relationship between gender equality and family formation. The theories proposed in large-scale cross-country comparative studies argue that differences in family policies may explain the changing division of labour within families (Orloff 1993, Orloff 1996, Lewis 1992) and the recent bifurcation in the fertility level across different welfare regimes (Rindfuss, Choe, and Brauner-Otto 2016, Esping-Andersen 2009). Gender scholars refer to the diversified gender norms and values across societies (Brinton and Lee 2016, Sevilla-Sanz 2010). Other scholars are more proactive by proposing that men's involving family role can encourage their partners to combine employment with childrearing, eventually promoting family formation (de Laat and Sevilla-Sanz 2011, Goldscheider, Bernhardt, and Lappegård 2015, Seiz 2014). Despite the various explanations, the different levels of compatibility between employment and childrearing responsibilities across societies is regarded as a major reason underlying the recent bifurcation in fertility levels. In fact, childbirth per se may not be the actual reason for these gender-specific responses to parenthood. Instead, persistent gender inequality at both work and home, the devaluation of care work, and the institutional structures promoting separate gender roles are closely associated with the gender-specific family arrangements after childbirth (England 2010, Ridgeway and Correll 2004, Sullivan, Gershuny, and Robinson 2018).

Compared to cross-country studies, which have widely adopted the variability in the relationship between gender equality and family formation across societies with different social policies, gender norms, or labour market structures, research focusing on the micro-level mechanisms remains mostly confined to the convention that traditional gender roles are beneficial for the formation and stability of families. The dynamic nature of families and parenthood in shaping gender roles and relations has received limited attention. The convergence of gender roles, at least in the public sphere, implies that the conflict between the role of a devoted worker and the role of an involved parent is a major concern when forming a family. The level of this conflict is affected by many macro-level factors, such as the labour market, family policies, childcare provisions, and gender norms, all of which have substantially changed over the last three decades. Understanding the family and parenthood based on the dynamics of the incompatibility between employment and family responsibilities could offer new explanations and predictions of fertility behaviours and the consequences of parenthood. During the transitional stage, both gender roles and the nature of the family are evolving and in the process of reaching new equilibrium; instead of imposing any predisposition to a specific relationship between gender equality and fertility, this thesis aims to provide a dynamic, conflict-based, and fluid perspective for an understanding of how gender and family have recently developed hand-in-hand.

1.3. Work-Family Context in the UK

This dissertation focuses on families in the UK. The UK is among the few countries to

have experienced a re-growth in the total fertility rate (TFR). [2] **Figure 1-1** shows that the labour force participation rates of women continue to grow, especially for those with dependent children.[3] The proportion of women who usually work more than 30 hours per week remains mostly stable from the early 1990s, except from 2008 to 2012 when the economic recession was underway. Therefore, the increase in women's labour force participation rates among those with dependent children is not solely because of an increase in women's part-time employment rate. Meanwhile, the TFR reached its lowest (below 1.65) in the early 2010s. Since then, the TFR has grown to the level of 1.80 in most recent years. However, whether this TFR level is sustainable remains unknown given that a full-time job and the demand to care for young children remain highly incompatible.

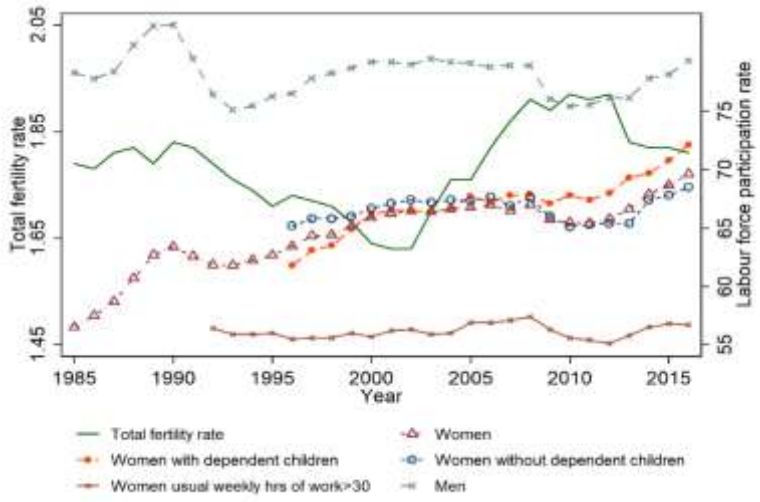


Figure 1-1. Total fertility rate and labour force participation rate in the UK, 1985-2015

[2] TFR refers to the number of children who would be born per woman if she was to progress through the childbearing years and bear children according to the current age-specific fertility rates (ASFRs), which is the number of live births to women in a specified age group divided by the number of women in the same age group times 1,000. To calculate the TFR, one sums these ASFRs.

[3] Dependent children are children aged under 16 years and those aged 16-18 years who have never married and are in full-time education. The labour force participation rates are from the Labour Force Survey, which is recorded in April to June in each year.

In the UK, it is still particularly difficult for women to be employed full-time when there are young children at home. The social and institutional contexts in the UK heavily contribute to the incompatibility between holding a full-time job and motherhood. For instance, the gender norms remain primarily traditional; women and men are expected to hold distinct roles in families. Even in 2012, almost 40 percent of British people still consider that it is for the best if mothers work part-time and fathers work full-time to care for young children (Scott and Elizabeth Clery 2013). In 2018, over half of the public reported that mothers should take more parental leave than fathers (British Social Attitudes 2018).

The UK family policy has also exhibited a strong preference for the family's, or more specifically, women's childrearing responsibilities. The UK has been regarded as the "main visible obstacle to the EU's legislative route to gender equality" in the 1980s and 1990s (Fagan and Rubery 2018). Maternity leave is quite generous, even by the European standard, with a maximum of 52 weeks currently permitted, of which up to 39 weeks are paid (Waldfogel 1998). Paid paternity leave for up to two weeks has been available only since 2003. Starting only in 2015, fathers and mothers can share their parental leave for children born or adopted.[4] However, it is estimated that only about two percent of fathers who are eligible for shared parental leave have used such leave each year since its introduction.[5]

[4] Mothers must still take the initial two weeks after birth.

[5] This is based on figures from a press release of the *Department for Business, Energy and Industrial Strategy*, published on 12 February 2018. Retrieved 8 August, 2018, from https://www.gov.uk/government/news/new-share-the-joy-campaign-promotes-shared-parental-leave-rights-for-parents

In addition, formal childcare services are predominantly private, inadequate, and costly (Schober 2013b, Connolly et al. 2016), posing a further barrier to the dual full-time earner family model. Based on a report issued by the Department of Education (Huskinson et al. 2016), in 2014-2015, one-third of parents in England found that the affordability of local childcare was poor; among those who used childcare, 22 percent found it difficult to pay.

Unsurprisingly, mothers having young dependent children have the lowest employment rate of all adults (Office for National Statistics 2017a). Among those mothers, almost 60 percent worked part-time in 2017, and they are more likely to be in part-time work until their children reach 12 years (Office for National Statistics 2017a). Even among parents of children aged 5 or over, 41.7 percent stated that looking after the family/home is the reason for not working (Office for National Statistics 2014).

Nevertheless, there have been a number of new family and childcare policies that aim to promote gender equality or to alleviate the childcare burden for families with young children. the past few decades have witnessed important changes in gender norms, the values of parenthood, and attitudes towards maternal employment. The notion of working mothers has become more widely accepted. The proportion of people who agree that mothers should stay at home has declined from 64 percent in 1989 to 33 percent in 2012 (Scott and Elizabeth Clery 2013). The 2018 British Social Attitudes Survey shows that 72 percent dispute the view that a man's job is to earn money and that a woman's job is to look after the home. This number was 58 percent ten years ago.

There is more institutional support for early childcare provision. For instance, the National Childcare Strategy was introduced in 1998 and provided all 4-year-old to pre-school aged children access to free education for 12.5 hours per week for 33 weeks per

year. This free childcare entitlement was increased to 38 weeks per year and further included 3-year-old children. In September 2010, the Department for Education introduced 570 hours of free childcare per year for all 3- and 4-year-olds in England and, for two-year-olds from disadvantaged backgrounds since 2013 (National Audit Office 2016). At the beginning of September 2017, the government launched 30 hours of free childcare per week for working parents in England, although this programme was still only available to children aged between 3 and 4 years.

More women have returned to the labour market after the birth of a child, although many of them work part-time. The employment rate of mothers increased by approximately ten percent between 1996 and 2015 (**Figure 1-1**). The gender pay gap decreased from 27.5 percent to 18.4 percent from 1997 to 2017 based on median hourly earnings (Office for National Statistics 2017b).

Women's growing significance in the economy is also a result of growing economic uncertainties due to globalization and the economic recession around the year 2010. The labour market has become more unstable with increased competition, and women's contribution to the family income is critical. In summary, the gender revolution is still underway in the UK, although progress may be slow with women leading the change.

1.4. Research Approach

This study adopts a quantitative approach to analyse the role of family and, in particular, parenthood in shaping women's, men's, and couples' lives. The period covered in this study is from 1991 to 2017, during which great diversity has occurred in family structure. However, the gender and family theories employed in this study implicitly assume people's predominant expectation of forming a family with two opposite-sex

parents and children living in the same household. Based on this assumption, I derive the gender-differentiated meanings of marriage and parenthood.

A critical life event focused on in this dissertation is the transition into parenthood. "Parenthood" has many aspects and different meanings in various disciplines. Parenthood can be a representation of one's identity, a substitute for fertility regarding the timing of births and the numbers of children, a life stage with great childrearing responsibilities, or a particular relationship between parents and children. In this dissertation, "parenthood" concerns the specific life experience/stage of providing both care work and monetary support to children. In the second empirical chapter, parenthood also serves as a substitute for fertility when analysing people's subsequent childbearing behaviours.

Fixed-effect regression models are preferred and used throughout this dissertation. This approach fully utilizes the panel data in which the same individuals/couples are observed at multiple time points. These models compare the values of the dependent variable in the same individuals/couples as they have different statuses, such as marital status or parenthood status. The primary issue in comparing individuals with different marital or parenthood statuses is that people can be selected into these family statuses based on their personalities, lifestyle preferences, social class, physiological conditions, or other time-constant factors that may or may not be observable. These factors are likely correlated with both the dependent and independent variables. By considering only intra-person/intra-couple change in the fixed-effect regression analysis, the confounding effect exerted by these time-constant factors is eliminated. Moreover, regression models can be very simple because there is no need to include numerous time-constant characteristics.

In addition, fixed-effect regressions are particularly beneficial when the dependent variables may be subject to substantial measurement errors. For instance, the key variables in this study include gender-role attitudes and weekly hours spent on housework. People are highly likely to misreport their real views of traditional gender roles and actual hours spent on housework. Using a fixed-effect regression analysis can eliminate the measurement errors caused by person-fixed characteristics, e.g., men tend to over-report their time spent on housework (Kan 2008, Kan and Pudney 2008). Therefore, fixed-effect regression models have been widely used in research analysing how attitudes, well-being, income, and market and domestic labour are associated with people's family status (e.g., Kühhirt 2012, Killewald 2012, Baxter et al. 2015, Abendroth, Huffman, and Treas 2014, Schober 2013b).

1.5. Data and Sample

This study uses data from the *British Household Panel Survey* (BHPS) and the "*UK Household Longitudinal Study*" (UKHLS)[6]. As shown in **Table 1-1**, both surveys are longitudinal studies with nationally-representative households recruited during the first round of data collection (1991 and 2009/10) and visited each year thereafter. The interviews are typically carried out face-to-face in the respondents' homes. Both surveys follow the same individuals with frequent and repeated measurements of the family, employment, housework, and subjective measures. All adult household members (i.e., 16-year-olds and above) were interviewed each year unless they permanently left the panel.

[6] Also called "Understanding Society" study.

Table 1-1. Data summary

Two longitudinal studies conducted in the UK	
British Household Panel Survey (BHPS)	Understanding Society or UK Household Longitudinal Study (UKHLS)
Years 1991-2009 *18 waves* Started with 5,500 households in Great Britain; new samples of households were added in 1997, 1999, and 2001, eventually reaching approximately 10,000 households across the UK	Years 2009-2018 *8 waves* Started with 40,000 households in the UK; new samples of households were added in 2011/12 and 2013/14

The BHPS covers the 1991- 2009 period and has 18 waves. In 1991 (first wave), the BHPS recruited 5,500 households from Great Britain and conducted approximately 10,000 individual interviews. Extension samples from Scotland and Wales were included in 1999, and samples from Northern Ireland were included in 2001. The UKHLS builds upon the BHPS and extends its scope to include around 40,000 households in the UK in its first wave. The UKHLS study began in 2009 and currently has eight waves. Ever since the second wave, the UKHLS incorporated the BHPS sample and captured over 6,000 individuals in the original BHPS sample. Therefore, it is possible for a person to be included in both studies and observed since 1991. Although some previous BHPS participants are included in the UKHLS from the year 2010/12, given the relatively small number of these individuals among the total sample in the UKHLS, it is particularly difficult to capture changes occurring during the period of the recent economic recession in the same individuals.

Table 1-2 presents some basic descriptive statistics of the key variables used in the subsequent analyses across the two datasets of a selected sample with women aged 21 to 45 and men aged 21 to 55, who are of prime childbearing and working age.[7] All waves are separated into the following three periods: 1991 to 2000 (from the first wave of BHPS), 2001 to 2008, and 2009 to 2018 (from the 1st wave of UKHLS). The first and final periods correspond to the nationally representative samples[8] that are selected for the first time in 1991 and 2009/11, respectively, and both are followed for eight to nine years.

Comparing the sample in the year 1991 with the one in the years of 2009/11 (highlighted in grey in **Table 1-2**), there are slightly more women in the later years, the employment rate declined by approximately six percent, and the weekly working hours decreased from 40.4 hours to 38.1 hours, reflecting some impacts of the economic recession. More people are single in the years of 2009/11, but the number of children is stable across the two waves. Notably, questions regarding work and housework hours are asked consistently throughout all waves.

[7] The sample is weighted using cross-sectional weights generated from each wave and released by the data provider.

[8] I only selected samples from Great Britain. The samples from Northern Ireland are not included because it was not included in BHPS before 2001.

Table 1-2. Sample statistics of the key variables among women aged 21 to 45 years and men aged 21 to 55 years in Great Britain

		Wave number	**1**	2	3	4	5	6	7	8	9	10
Variable	Questions asked	Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Gender		Women	47.0	46.7	46.8	46.3	46.1	45.8	45.8	46.4	46.9	46.7
Whether employed	Derived variables	Employed	79.2	77.0	77.6	78.4	79.7	80.6	79.7	81.4	80.3	80.6
Weekly working hours (among employed)	Thinking about your (main) job, how many hours, excluding overtime and meal breaks, are you expected to work in a normal week? And how many hours overtime do you usually work in a normal week?	Mean (combined answers from the two questions)	40.4	40.2	40.4	40.4	40.5	40.4	40.6	40.3	39.8	40.0
Weekly housework hours	About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning and doing the laundry?	Mean	N.A.	11.6	11.8	10.9	10.7	10.4	10.4	10.2	10.2	10.1
Marital status	Derived variables	Single	17.9	19.1	19.4	20.2	19.8	20.4	20.7	19.6	19.2	19.8
		Cohabiting	9.6	10.5	11.4	12.1	13.6	14.7	15.1	17.5	17.3	17.4
		Married	64.9	62.4	61.2	59.7	58.9	57.5	55.8	55.2	55.1	54.6
		Divorced/separated/widowed	7.7	8.0	8.0	8.0	7.8	7.4	8.3	7.8	8.4	8.2
Parenthood status	Derived variables	No child	49.3	51.1	52.2	51.4	52.3	53.2	51.8	51.0	50.2	48.9
		One child	19.6	18.4	18.4	20.0	18.9	18.2	18.8	19.1	19.5	20.0
		Two children or more	31.1	30.5	29.4	28.6	28.9	28.7	29.4	29.9	30.3	31.1
Number of observations			5,429	5,213	4,993	5,000	4,834	5,041	5,732	5,562	7,902	7,849

Variable	Questions asked	Wave number Year	11 2001	12 2002	13 2003	14 2004	15 2005	16 2006	17 2007	18 2008
Gender		Women	46.4	45.6	46.2	46.5	46.4	45.8	45.8	45.8
Whether employed	Derived variables	Employed	81.4	83.1	82.9	83.6	83.4	83.4	84.2	83.6
Weekly working hours (among employed)	Thinking about your (main) job, how many hours, excluding overtime and meal breaks, are you expected to work in a normal week? And how many hours overtime do you usually work in a normal week?	Mean (combined answers from the two questions)	39.6	39.4	39.3	39.1	38.8	38.8	39.0	38.6
Weekly housework hours	About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning and doing the laundry?	Mean	9.8	9.5	9.5	9.4	9.6	9.4	9.1	9.3
Marital status	Derived variables	Single	20.2	20.0	20.2	20.4	21.2	21.5	21.2	21.5
		Cohabiting	19.0	19.4	20.0	20.9	20.9	22.1	22.4	22.5
		Married	53.3	53.0	52.1	51.3	50.6	49.7	50.0	49.9
		Divorced/separated/widowed	7.5	7.5	7.7	7.4	7.3	6.8	6.5	6.2
Parenthood status	Derived variables	No child	49.1	49.8	50.2	50.3	50.6	51.7	51.3	51.0
		One child	20.5	20.2	19.7	20.1	19.6	19.2	20.1	20.9
		Two children or more	30.5	30.1	30.1	29.6	29.8	29.1	28.6	28.1
Number of observations			7,692	6,748	6,490	6,290	6,099	6,001	5,727	5,487

Variable	Questions asked	Wave number Year	**19** 2009/11	20 2010/12	21 2011/13	22 2012/14	23 2013/15	24 2014/16	25 2015/17	26 2016/18
Gender		Women	49.2	48.4	48.0	47.5	46.9	47.0	46.9	46.4
Whether employed	Derived variables	Employed	72.6	76.4	76.8	78.1	79.6	78.5	79.7	79.9
Weekly working hours (among employed)	Thinking about your (main) job, how many hours, excluding overtime and meal breaks, are you expected to work in a normal week? And how many hours overtime do you usually work in a normal week?	Mean (combined answers from the two questions)	38.1	37.8	37.8	38.0	38.3	38.4	38.0	38.3
Weekly housework hours	About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning and doing the laundry?	Mean	10.0	10.1	N.A.	9.6	N.A.	8.9	N.A.	9.2
Marital status	Derived variables	Single	25.8	23.9	23.9	24.5	25.4	25.7	26.9	27.4
		Cohabiting	17.2	18.5	18.4	18.9	18.9	17.6	17.2	16.8
		Married	49.4	50.9	51.2	50.3	50.0	51.4	50.9	51.0
		Divorced/separated/widowed	7.6	6.7	6.4	6.3	5.8	5.3	5.1	4.8
Parenthood status	Derived variables	No child	48.8	47.7	47.4	48.1	48.6	50.2	49.5	50.1
		One child	21.0	21.2	20.8	20.3	19.5	18.5	18.8	18.7
		Two children or more	30.3	31.2	31.8	31.6	31.9	31.3	31.8	31.2
Number of observations			23,547	22,794	20,231	18,743	17,437	18,546	16,972	15,828

I also plot the mean weekly hours spent on paid work and housework across all waves among women and men separately (**Figure 1-2** and **Figure 1-3**). The decrease in men's working hours is clear, and there is a slight increase in women's paid work time over the past 25 years. Regarding the housework time, women experienced a sharp decrease of about seven hours per week, and there is only a one hour increase in the men's weekly housework time. I do not observe a sharp change in work or housework time due to the switch of the sample between the two surveys surrounding wave 19 (year 2009/11).

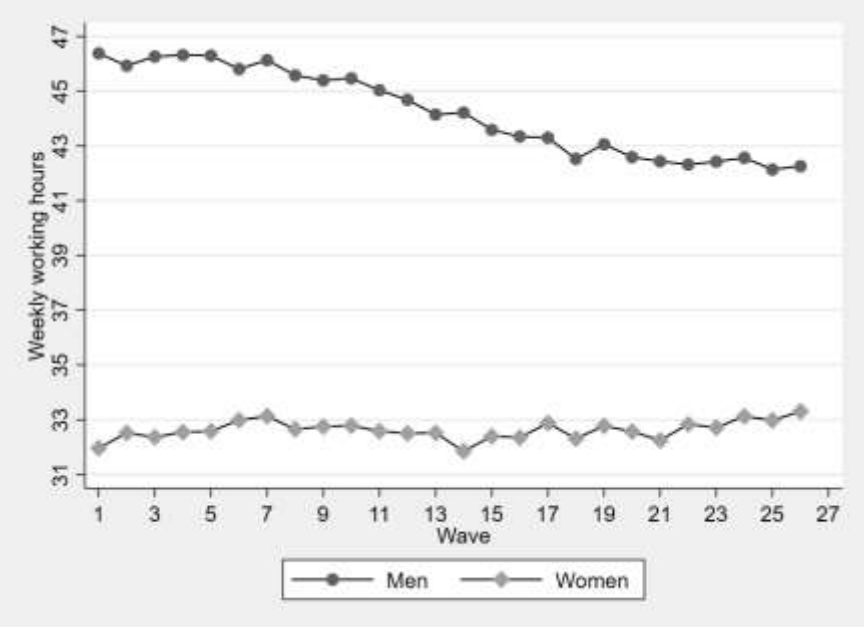


Figure 1-2. Weekly paid work hours among women and men in Great Britain from 1991 to 2018

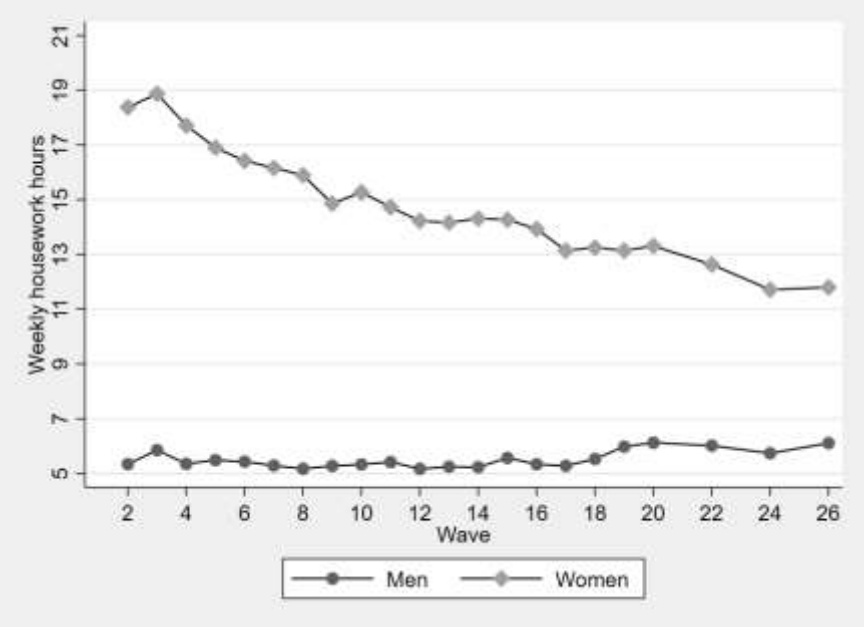


Figure 1-3. Weekly housework hours among women and men in Great Britain from 1992 to 2016

This dataset has three important advantages. First, its longitudinal nature makes the use of the fixed-effect regression approach possible. Therefore, I can analyse the changes in the dependent variable that are associated with changes in the independent variables in the same individuals or couples. Second, the long-term nature of the study enables an analysis of the changing relationships between gender and family over the years. For example, I can examine whether the reductions in women's paid work time associated with the birth of a child are the same in the 1990s, 2000s, and 2010s. Given that new samples are drawn in various waves of the two surveys and people younger than 16-year-old grow up and enter the adult sample, people observed in different periods are not necessarily the same individuals. Those changes in the relationships of interest could reflect how people observed in different periods behave differently and provide new insights into the cohort replacement process. Finally, the sample is particularly large and recent. A sufficient number of changes can occur within a short

observational period, thereby enabling a reliable estimation using fixed-effect regressions. Analysing this sample can determine the most recent development of gender roles and relations within families.

1.6. Overview of the Three Empirical Chapters

This section summarizes the three empirical studies in this dissertation. An overview can be found in **Table 1-3**.

1. 6. 1 Chapter 2: Motherhood, employment, and the dynamics of women's gender-role attitudes

- **Background:** Mothers in the UK experience significant conflicts between employment and family responsibilities. Although gender-role attitudes have been argued to form during childhood or adolescence, many studies have shown that one's life experiences during adulthood are also associated with the construction of gender-role attitudes. I use gender-role attitudes, which reflect the perceptions of women's employment and childcare responsibilities and the division of labour between women and men, to represent the impact of the work-family incompatibility on women's lives.

- **Research Questions**: I examine whether changes in women's gender-role attitudes are independently or jointly dependent on the motherhood and employment statuses. Are women becoming more traditional as mothers in general, or is employment the dominant factor associated with women's gender-role attitudes?

- **Methods:** Using a sample of women who did not have children in their first observation but who may have had children in following interviews, I analyse changes in their attitudes when they enter and exit the labour market as well as

when they become mothers using various types of fixed-effect regressions.

- **Findings:** Employment and the birth of a child per se do not directly influence women's gender-role attitudes. Instead, the effect of employment on attitudes is dependent on women's motherhood status. Only women who become mothers and leave the labour market are more traditional than before, and those who become mothers but maintain a full-time job are less traditional than before.

- **Conclusions and Contributions:** This chapter offers a new explanation for the dynamics of women's gender-role attitudes during adulthood. Past studies and theories have discussed only the separate roles of employment and motherhood in attitude construction: working women are expected to be more liberal, and mothers are expected to be more traditional. I argue that in a context where women desire or are needed to do paid work but are also expected to be primarily responsible for care work, the conflicts between their employment and childcare responsibilities heavily reshape women's gender-role views.

1. 6. 2 Chapter 3: A new family equilibrium? Changing dynamics between the gender division of labour and fertility in Great Britain, 1991-2017

- **Background:** The growing opportunity cost of childbearing and childrearing with women's increased presence in the labour market is regarded as the primary reason for the low fertility level in advanced societies. However, since 2000, the relationship between the female labour force participation rate and the TFR in several developed societies, including the UK, has changed from negative to positive.

- **Research Questions**: In this chapter, I join in the current debate over an emerging

positive association between gender equality and fertility by evaluating the reciprocal relationship between fertility and a gender division of labour in marriage.

- **Methods:** I use a couple-level sample observed from 1991 to 2017 and latent class analysis to identify different division of labour types based on how market labour and domestic labour are allocated between spouses. Then, using fixed-effect logistic regressions, I establish the relationship between this gender division of labour and fertility, in both directions.

- **Findings:** The positive, reciprocal relationship between the traditional division of labour and fertility is waning over time. In particular, from 2009 onward, couples with the more traditional division of labour type are no longer more likely to have a child than the less traditional ones.

- **Conclusions and Contributions:** This chapter provides new evidence on the changing cost of parenthood. The traditional division of labour is losing its advantage in childrearing, which confirms the emergence of a new family equilibrium in the UK in the last 25 years.

1. 6. 3 Chapter 4: Time Allocation and Family Formation in Great Britain: 1992 to 2016

- **Background:** Although Chapter 3 reveals changing relationships between the gender division of labour and fertility, women's and men's respective contributions to these changes remain unknown. Understanding women's and men's changing behaviours surrounding family formation separately is particularly important when a "stalled" gender revolution has been argued to be taking place since the early 1990s. It is also critical to confirm whether men's roles as husbands and fathers

have changed because men's growing involvement in family life is viewed to alleviate the "uneven" nature of the gender revolution and signals the start of its "second half" (Goldscheider, Bernhardt, and Lappegård 2015).

- **Research Questions:** I examine how women's and men's time spent on paid work and housework changes when they enter marriage, as the marriage continues, when they have more children, and as the children grow older. This life course approach depicts how marriage and parenthood work to enhance traditional gender roles.

- **Methods and Findings:** The results of fixed-effect linear regressions show that both women and men barely change their paid work time immediately after getting married. However, as a marriage continues, women gradually reduce their paid work time, whereas men increase theirs. After an initial surge in housework time when entering marriage, women's housework time remains highly stable. Men's housework time barely change soon after getting married but decreases slightly as a marriage continues. Childrearing remains the most significant factor in shaping time allocation. Both women and men reduce their work time and increase their housework time soon after the birth of a child, although the changes are much more substantial for women. As children grow older, parents tend to recover their paid work time and reduce their housework time. However, women fail to achieve their pre-birth time allocation even when the youngest child reaches ten years old. Over the years, women's time allocation is less dependent on their family responsibilities. In contrast, there is little change in the association between men's time allocation and their family status over the last 25 years.

- **Conclusions and Contributions:** Different patterns of changes in paid work time and housework time demonstrate the distinct processes of gender roles formation

over the family formation and development process. Although women and men gradually adopt their gender roles over the course of marriage, their time allocation patterns remain the most traditional only temporarily and when necessary. Moreover, the time-varying changes in these relationships among women but not among men indicate a continuation of an “uneven” gender revolution.

Table 1-3. Overview of the three empirical chapters (Chapters 2-4)

Research topic	Method	Sample	Key variables	Main findings
Chapter 2: Motherhood, Employment, and the Dynamics of Women's Gender-role Attitudes	Fixed-effect linear regression models Dynamic panel data modelling within a structural equation modelling (SEM) framework	Women aged 21 to 45 who were childless in the first interview; if having children in later waves, youngest child is younger than six years old in each wave	***Dependent variables:*** Gender-role attitude ***Independent variables:*** Motherhood status (childless/mothers) Employment status (full-time/ part-time/ non-working)	No association between attitude adjustments and the change in employment status for childless women. Mothers have substantial attitude adjustments with different employment status.
Chapter 3: A New Family Equilibrium? Changing Dynamics between the Gender Division of Labour and Fertility in Great Britain, 1991-2017	Latent class analysis Fixed-effect logistic regression models	Married or cohabiting couples with a female partner between 20 and 44 years old and a male partner between 20 and 59 years old in each wave.	***Dependent variables:*** 1. Whether there is a new-born in the next wave 2. Division of labour typology ***Independent variables:*** 1. Current division of labour typology 2. Number of children	The positive, reciprocal association between the traditional gender division of labour and fertility has been significantly weakening over the last 25 years. Couples with a male-breadwinner and female-homemaker are no longer more likely to have a subsequent childbirth from 2009 onward.

Research topic	Method	Sample	Key variables	Main findings
Chapter 4: Marriage, Parenthood, and Gendered Time Allocation in Great Britain: 1992-2017	Fixed-effect linear regression models	Women aged between 20 and 45 years and men aged between 20 and 55 years in each wave; if they are couples, the female partner is between 20 and 45 years old and the male partner is between 20 and 55 years old.	***Dependent variables:*** Weekly working hours Weekly housework hours ***Independent variables:*** Marital status Duration of partnership Number of children Age of the youngest child	Women's and men's time use slightly and gradually conform to traditional patterns as their marriage continues, but their housework time is primarily set at the start of marriage. Both women and men reduce their paid work time and increase their housework time soon after the birth of a child, although women experience a much larger change than do men. Over the years, women's time allocation is less dependent on their family status, whereas there is no change in the association between men's time allocation and their family status.

CHAPTER 2: MOTHERHOOD, EMPLOYMENT, AND THE DYNAMICS OF WOMEN'S GENDER-ROLE ATTITUDES

Motherhood, Employment, and the Dynamics of Women's Gender-role Attitudes

Abstract

This chapter discusses the dynamics of women's attitudes towards traditional gender-role views from the perspective of conflicting employment and childrearing responsibilities. I use data from the BHPS and the UKHLS (1991-2013) and fixed-effect regressions to analyse the independent and joint effects of employment and motherhood on women's gender-role attitudes. I find that neither motherhood nor employment has a direct influence on women's gender-role attitudes. Attitude and employment status are not associated for childless women. However, substantial attitude differences are observed among full-time, part-time, and non-working mothers. Women are less traditional after the transition to motherhood than before if motherhood is combined with full-time employment. By contrast, women are more traditional after the transition to motherhood than before only if motherhood coincides with their withdrawal from the labour force. These associations remain robust after considering feedback from earlier attitudes. All these findings support that the emergence and realization of incompatibility between employment and childrearing responsibilities reshape women's gender attitudes. This chapter etablishes a novel explanation to changes in women's gender-role attitudes and is the first work to consider both time-invariant confounders and feedback from attitudes to assess the factors associated with gender-role attitudes.

Keywords: attitude, gender, motherhood, employment

For a published version, please refer to Zhou, Muzhi. 2017. "Motherhood, Employment, and the Dynamics of Women's Gender Attitudes." Gender & Society 31 (6):751-776. doi: 10.1177/0891243217732320.

2.1. Introduction

Women's growing participation in the labour market and the transformation of gender norms have inspired numerous studies to examine people's views of the relationship between women and men and attitudes towards a gendered division of labour (Davis and Greenstein 2009). Views or attitudes regarding women and men's relative positions in the private and public spheres, usually referred to as gender-role attitudes, work as important indicators of one's identity and are correlated with individuals' family formation process, labour market performance, and participation in civic activities (Paxton and Kunovich 2003, Guetto, Luijkx, and Scherer 2015, Hakim 2000, Kan 2007, Kaufman 2000).

Recent research has documented that one's gender-role attitudes are not constant over the life course. Women's gender-role attitudes, for example, are correlated with their employment and motherhood statuses. Specifically, transition in and out of employment is associated with changes in women's gender-role attitudes, but this relationship is only observed among women after early adulthood (Cunningham et al. 2005, Fan and Marini 2000). Studies also find that women adjust their gender-role views during the transition to motherhood, but the association between motherhood and gender-role attitudes remains inconclusive. Both positive (Corrigall and Konrad 2007, Baxter et al. 2015, Fan and Marini 2000, Davis 2007, Morgan and Waite 1987) and negative (Bolzendahl and Myers 2004, Kroska and Elman 2009) associations as well as no association (Morgan and Walker 1983, Cunningham et al. 2005, Davis and Moore 2010, Tallichet and Willits 1986, Kaufman, Bernhardt, and Goldscheider 2016) between motherhood and gender-role attitudes have been documented. Given that women's employment and their motherhood statuses are highly dependent on each other, the interaction of the two statuses should play a critical role in shaping women's gender-role attitudes, which may shed lights on the earlier

complicated and inconsistent findings of the dynamics of women's gender-role attitudes during adulthood.

This article proposes that the conflicts between women's employment and childrearing responsibilities are a primary driver for women's gender-role attitudes reconstruction during adulthood. As modern welfare states liberate women from their traditional caregiver roles, women have increasingly endorsed the significance of their economic role but remained constrained by gender norms and institutional contexts (McDonald 2000). The conflict between the significance of women's roles in paid employment and their primary caring role as mothers generates remarkable dynamics in people's attitudes towards maternal employment and the traditional division of labour and substantial variations in women's decisions about work and family (Sjöberg 2010, Fogli and Veldkamp 2011, Knight and Brinton 2017). Accordingly, women's motherhood experience based on how they combine employment and family responsibilities should induce considerable heterogeneity and generate various changes in their gender-role attitudes (Johnston and Swanson 2006, Kanji and Cahusac 2015).

Surprisingly, little quantitative research has examined the role of the intersection or interaction between women's motherhood and employment statuses: employment is either treated as an additive statistically control (Kroska and Elman 2009, Cunningham et al. 2005, Bolzendahl and Myers 2004) or not included in modelling (Baxter et al. 2015, Kaufman, Bernhardt, and Goldscheider 2016). A few studies that examine the effect of maternal employment, however, attribute the changes in attitudes to the inconsistency between prenatal attitudes and postnatal economic activities rather than to the incompatibility between employment and childrearing responsibilities that women would generally face (Schober and Scott 2012, Kroska and Elman 2009). Furthermore, studies

focusing on the construction of gender-role attitudes remain vague about the extent to which motherhood experience affects attitudes rather than vice versa. Without a clear understanding of the independent and joint effects of motherhood and employment, the critical mechanism that guides the construction of women's gender-role attitudes tends to be ignored, thereby increasing the risk of misrepresenting variations in gender attitude during adulthood.

Using combined longitudinal data from the BHPS and UKHLS covering the period from 1991 to 2013, I examine *within-individual* changes in gender-role attitudes using a *fixed effects* regression method. First, I examine whether the effect of motherhood is a result of changes in women's employment characteristics before and after childbirth. Second, in addition to the independent association of gender-role attitudes with motherhood and employment, the relationship between attitudes and the interaction between motherhood and employment is analysed. Finally, I assess whether the observed effects of the combined status of motherhood and employment are sensitive to models that account for sorting mothers into different employment conditions and the reciprocal relationship between attitudes and behaviours.

This paper offers a novel explanation to the dynamics of women's gender-role attitudes during adulthood. Methodologically, this is the first study to consider both time-invariant confounders and feedback from attitudes to assess the effect of the combined status of motherhood and employment on gender-role attitudes. Together, this study provides a rigorous and updated assessment of the independent and joint effects of motherhood and employment on women's gender-role attitudes.

2.2. Theoretical Framework

In this section, I first review related theories and summarise previous empirical work on the independent role of motherhood and employment in shaping gender-role attitudes. I then explain the need to consider the joint effects of motherhood and employment on women's gender-role attitudes. Before doing so, it is necessary to clarify the concepts of attitudes as well as the gender-role attitudes upon which later discussions and analyses are founded.

2. 2. 1 Gender-role attitudes: concepts and measurements

Attitude is a social psychological concept. Although there are many versions of the concept of attitude, scholars have agreed that *evaluation* lies at the core of attitude (Bohner and Dickel 2011). A widely endorsed version is Eagly and Chaiken's (1993) straightforward and intuitive illustration of the concept of attitude. According to their definition, attitude is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour", where "psychological tendency refers to a state that is internal to the person, and evaluating refers to all classes of evaluative responding, whether overt or covert, cognitive, affective, or behavioural" (Eagly and Chaiken 1993, 1). In short, attitude is a summary evaluation of an object, and the dimensions that can be captured by such an evaluation include "good-bad, harmful-beneficial, pleasant-unpleasant, and likeable-dislikeable" (Ajzen 2001, 28).

Although many scholars regard attitudes as stable entities stored in memory, experimental studies have found that attitudes are malleable (Ferguson and Bargh 2004, Ferguson, Bargh, and Nayak 2005, Seibt, Häfner, and Deutsch 2007, Lowery, Hardin, and Sinclair 2001). These findings support the constructionist view raised by Schwarz and

Bohner (2001), who argue that attitudes are evaluations that "are formed when needed, rather than enduring personal dispositions" (Schwarz 2007, 39). In summary, attitude, representing people's favourable or unfavourable evaluation of an entity, can be built and modified in response to contextual demands.

As a more specific type of attitude, *gender-role attitudes* reflect people's beliefs about what women and men usually do and what they should do (Wood and Eagly 2010). These attitudes indicate people's perceptions regarding specific gender roles in the workplace, family, or society. Compared with the construct of gender-role attitudes in the field of social psychology, which focuses more on people's views on prescribed gender features, such as masculinity or femininity, the term gender-role attitude in *sociology* highlights perceptions of the relationship between women and men (Davis and Greenstein 2009). Typically, the construct of gender-role attitudes in the sociological literature is built on the notion of separate spheres, and it measures people's level of support for a division of paid work and unpaid family labour between women and men (Davis and Greenstein 2009). These attitudes reflect beliefs about the traditional roles of women as caregivers and men as breadwinners. Throughout this chapter, the term "gender-role attitudes" is used only with this particular understanding.

Attitudes are difficult to measure because they are inferred rather than observed. Accordingly, researchers have developed various methods to collect attitude information, among which the most popular ones are questionnaires, scheduled interviews, or other direct measurements that ask respondents to provide their views or level of agreement/disagreement with a certain idea, object, or situation. With respect to more specific gender-role attitudes, the widely adopted method of gathering attitude information involves asking respondents to rate their level of agreement with a series of statements

regarding the division of paid employment and unpaid family labour between women and men (Davis and Greenstein 2009). For example, respondents are asked to rate their level of agreement, ranging from "strongly disagree" to "strongly agree", with several statements, such as "a wife's most important task is caring for her children" or "a preschool child is likely to suffer if his or her mother works".

Although the measures of gender-role attitudes are found to be valid and reliable, there are some critiques about the narrow and possibly outdated focus on women's and men's differentiated roles in paid and unpaid labour (Kroska 2000, Bath 2015, Behr et al. 2013, Thornton and Binstock 2001). Additionally, not only are the data subject to considerable measurement errors, but other types of problems also arise since respondents are not always willing or able to accurately report their attitudes (Bohner and Dickel 2011). For instance, the elicited verbal attitudes given by respondents during face-to-face interviews are likely to reflect general social attitudes rather than individual preferences or goals. In particular, people may express strong support for gender equality, but they may not link this general preference to their personal lives. Accordingly, over the past two decades, literature in social psychology has introduced a variety of measures to overcome these problems, and these measures have begun to dominate how attitude information is collected in social psychology (Bohner and Dickel 2011). However, as these innovative ways of measuring gender-related attitudes have not yet been applied to large-scale social surveys, it is still necessary to rely on the current measures of gender-role attitudes. Besides, in order to connect with and clarify findings from the prior studies, comparable measures of gender-role attitudes are also preferred. The items used in this study closely correspond to those employed in prior studies (please refer to section 4.2 Gender-role attitudes for more details).

2. 2. 2 Motherhood and gender-role attitudes

Identity theory predicts that the creation of the mother identity leads to more traditional gender-role attitudes. Rooted in symbolic interactionism, this theory depicts how people create identities that correspond to their social positions. By interacting with others, individuals receive, interpret, and internalise the behavioural expectations that are attached to the social positions they occupy and construct their identities accordingly (Stryker and Burke 2000, Stryker 1968, 1980). This theory illustrates how individuals project the self into social categories and actively construct the self to unify and create stability between the self and society.

The dominant social expectation of mothering overlaps with the traditional norms of the gendered division of labour. Good mothering, for example, is often characterised by "full-time stay-home mothering" (Boris 1994). Although such expectations have been weakened in recent decades, the ideology of intensive mothering that embodies middle-class, child-centred, expert-guided, time-consuming, and financially demanding values is gaining momentum (Hays 1996, 46, Johnston and Swanson 2006). These expectations of motherhood echo the permanence of the normative assumption of men as primary providers and women as caregivers (Breen and Cooke 2005, Hays 1996).

As mothers, women internalise the values and expectations of motherhood to prioritise the need of children and acknowledge the necessity of holding the primary responsibility for children (Hays 1996, Garey 1999, Mercer 2004). Myriad studies document that women increase their time and effort directed toward childcare and housework and lower their work commitment and career aspirations after childbirth (Kühhirt 2012, Yavorsky, Kamp Dush, and Schoppe-Sullivan 2015, Evertsson 2013, Johnstone, Lucke, and Lee 2011). We expect that women who are mothers will exhibit a more traditional gender ideation than

women who do not have children (***hypothesis 1)***.

2. 2. 3 Employment and gender-role attitudes

Interest- and *exposure-based* explanations are commonly applied to illustrate why the gender-role attitudes of working women are less traditional than those of non-working women. The interest-based approach argues that when one's interest can benefit from certain gender-role attitudes, he or she is likely to maintain those attitudes (Bolzendahl and Myers 2004, Kroska and Elman 2009). Therefore, women in the labour market are inclined to be supportive of gender equality because this idea benefits their employment gain in terms of increased earning, more promotion opportunities, and less workplace discrimination and harassment.

The exposure-based approach argues that exposure to views or situations that are consonant with gender-egalitarian ideas inspires more egalitarian gender-role attitudes (Bolzendahl and Myers 2004). The workplace provides additional non-traditional role models, offers an environment that welcomes new ideas and people, and increases women's confidence in and expectations for financial independence (Kroska and Elman 2009, Klein 1984, Davis and Robinson 1991). Thus, exposure to such an environment is conducive for the development of more egalitarian gender-role attitudes among working women. In summary, both the interest- and exposure-based explanations predict that employment liberalises women's gender-role attitudes. Non-working women are expected to be more traditional than working women (***hypothesis 2)***.

Although empirical evidence broadly supports the liberalising effect of employment, the findings are not always consistent. The association between employment and gender-role attitudes is dependent on the age when the relationship is measured: employed women

become less traditional only after early adulthood, and the corresponding effect is not observed for men (Cunningham et al. 2005, Fan and Marini 2000, Davis and Greenstein 2009, Bolzendahl and Myers 2004, Corrigall and Konrad 2007). These age- and gender-specific effects of employment imply that certain life course event such as childbirth may interact with women's labour market activity and generate the observed association between employment and gender-role attitudes.

2.2.4 The joint effect of motherhood and employment on gender-role attitudes

Analysing the association of women's gender-role attitudes with motherhood and employment independently bears the risk of ignoring the key mechanism through which women construct their gender-role attitudes during adulthood. In developed societies, the growing opportunities and the improved gender equality in the labour market offer apparent gains and attract women's participation (Goldin 2014). However, along with women's growing interest in paid employment, substantial demands on time and effort remain inevitable with the arrival of a new child, given women's primary caregiving role under the current gender norms and institutional designs (Sjöberg 2010). Motherhood is identified to be a critical factor underlying the persistent gender wage gap and the different employment patterns between genders (Aassve et al. 2006, Miller 2011, Polachek 2006, Kahn, García-Manglano, and Bianchi 2014). The inextricably intertwined relationship between motherhood and employment is likely to lie at the root of the construction of gender-role attitudes.

The significance of women's conflicting roles as mothers and workers is particularly relevant to the institutional context in the UK. The UK family policies have historically exhibited a strong emphasis on family's, or more specifically, women's child caring

responsibilities. Maternity leave is quite generous, even by the European standard, with a maximum of 52 weeks currently permitted and up to 39 weeks of which are paid, whereas formal childcare services are inadequate and costly (Waldfogel 1998, Schober 2013b). Under this context with little institutional support for combining employment and childrearing responsibilities, women's employment decisions are bound to their childrearing responsibilities. In 2013, the employment rates for women and men without dependent children were similar, but the rate was much lower for women with dependent children (Office for National Statistics 2013). In 2014, 60.9 percent of women with dependent children aged under five were working, among which 57.7 percent were mothers working part-time (Office for National Statistics 2014). Thus, the level of the conflicts between women's roles as mothers and workers is prominent.

The "coming together" of women's economic and caregiver roles places women in novel conditions during the transition into motherhood. The emerging conflict between women's work and childrearing responsibilities may challenge women's previous views about women and men's relative positions in the private and public spheres and provoke adjustments in gender-role attitudes through several psychological processes. For example, women can rationalise their decisions and behaviours by minimising the cognitive dissonance that results from inconsistency between their prenatal gender-role attitudes and their maternal employment and childrearing arrangements (Baxter et al. 2015, Festinger 1962). They may mentally discount the desirability of the unachieved alternative (Elster 2016) or reframe available options (Baxter and Montgomery 1996). Thus, the reconstruction of women's gender-role attitudes during the transition to motherhood is dependent on how women organise, combine, or differentiate their dual roles as caregiver and worker. It is necessary to consider how employment alters the experience of

motherhood as well as how motherhood reshapes the meaning of employment.

The experience and meaning of employment differ substantially for childless women and mothers. For childless women, the degree of conflict between employment and family responsibilities is much lower than that for mothers. Changes in employment status arise most likely from reasons other than the need to fulfil the traditional caregiver role and thus are less likely to prompt a re-evaluation of gender-role attitudes.

By contrast, full-time employment makes mothers particularly susceptible to both work-family conflict and workplace discrimination (Chatterji, Markowitz, and Brooks-Gunn 2013). Full-time employment is likely to constrain women's role as the primary caregiver. It is, therefore, necessary to maintain an intensified interest and belief in gender equality both at work and at home to counteract the demand to reduce women's labour market attachment. Working mothers are found to value highly the benefits of employment and to underestimate its costs. They also are more likely to mention parenting rather than mothering when describing mothering experiences (Johnston and Swanson 2006, Uttal 1996, Boyd et al. 2016). These findings reveal how women reframe the meaning of employment as mothers. Therefore, full-time working mothers are more likely to have enhanced support for gender equality.

Conversely, for stay-at-home mothers, the negative aspects of leaving the labour market, such as the loss of income, identity as a worker, and power at home, are substantial (Kanji and Cahusac 2015, Crompton and Lyonette 2005, Schober and Scott 2012). Similarly, the importance of the worker role for part-time working mothers is undermined to care for the family. These women may have to adjust their preference to favour the traditional gendered division of labour and thus justify the reality of taking on the primary

family responsibilities. Berrington and her colleagues (2008) and Schober and Scott (2012) found that women's attitudes become more traditional when they reduced their hours of work after childbirth, and that this effect is particularly prominent among women who were strongly liberal before childbirth. These authors explained this result from a cognitive dissonance perspective. Therefore, non-working and part-time working motherhood should have a traditionalizing effect on women's attitudes.

The above analysis predicts that women's gender-role attitudes are dependent on the combined status of motherhood and employment. Full-time working and non-working mothers adapt their gender-role attitudes in opposite directions, but a change in employment status for childless women is less likely to be associated with a change in gender-role attitudes. The liberalising effect of employment thus depends on women's motherhood status, and this effect should be more significant for mothers than for childless women (***hypothesis 3***). Moreover, the effect of motherhood is dependent on women's maternal employment decisions. Specifically, full-time working mothers are expected to be less traditional than full-time working childless women (***hypothesis 4a***), whereas non-working and part-time working mothers are the most traditional groups (***hypothesis 4b***).

2.3. Data and Methods

2. 3. 1 Data and sample

The data are obtained by combining all the 18 waves of BHPS and the first four waves of UKHLS that incorporates the BHPS sample (University of Essex 2010, 2016).[9] In 1991 (first wave), BHPS recruited 5,500 households from Great Britain and conducted

[9] Only the 2nd and the 4th waves of the UKHLS data included questions about gender-role attitudes.

approximately 10,000 individual interviews. Extension samples in Scotland and Wales and in Northern Ireland were included in 1999 and 2001, respectively. Both surveys follow the same individual with frequent and repeated measures of gender-role attitudes, childbirth history, and employment status from 1991 to 2013. From the year of entry, household members aged 16 or older were interviewed and then re-interviewed in successive years. Gender-role attitudes were measured in *alternate* waves starting in 1991 for individuals who completed a face-to-face interview (95 percent of all interviews). This design offers a precious opportunity to capture changes in attitudes over the life course.

In each wave, I select women aged 21 to 45 who are most likely to have completed education and to have children. Waves without gender attitude information are excluded. There are 32,740 person-year observations for 8,724 women. To capture the period with the highest level of incompatibility between women's employment and childrearing responsibilities, observations of women with a youngest child older than five are excluded.[10] This procedure leaves 22,938 person-year observations for 7,538 women. After removing observations with missing information, 7,337 individuals remain. Of these, 66.7 percent have repeated observations, and I analysed these observations. Because the transition to motherhood is the key event, I also excluded individuals who already had a child at the time of their first interview. Ultimately, there are 12,440 person-year observations and 2,687 individuals who either remained childless or experienced the transition to motherhood (1,125 women) during the observational period.

[10] I also used a sample including mothers with children younger than age 15. The results remained unchanged. Considering the existence of many unobservable factors and the significance of attrition during such a long time-period, I take the relatively prudential approach by limiting the sample to childless women and mothers with young children.

In longitudinal studies, attrition is a common concern, as it can result in sample bias. I investigated the correlation between wave non-response and the key explanatory variables and noticed a very low wave non-response for mothers with young children. In addition, employed individuals are more likely to be retained in the sample. To test the significance of the issue of selective non-response, I used a less restrictive sample including individuals with one or more observations and did the analysis using random effects regression models. The estimated coefficients are similar, but they do not pass the Hausman test. Therefore, the results based on fixed effects models are preferred and reported. Similar to other studies using the same data (Schober 2013c, Uhrig 2008), it is unlikely that the selection into wave non-response would substantially bias the analysis using samples of individuals with repeated observations.

2. 3. 2 Gender-role attitudes

Gender-role attitude is measured by a score indicating the level of support for a traditional gendered division of labour. Higher scores refer to attitudes that are more traditional. Respondents selected their levels of agreement or disagreement with several statements on a five-point Likert scale: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree (**Table 2-1**). These statements have been widely used in other nationally representative surveys and studies to construct gender-role attitudes (for a review, please refer to Davis and Greenstein 2009).

Table 2-1. Results of principal factor analysis for items measuring gender-role attitudes

Items	Description	Surveys	Factor Loadings	
			Factor 1	Factor 2
1	Preschool child suffers if mother works	Both	**0.810**	-0.070
2	Family suffers if woman works	Both	**0.839**	0.049
3	Women and family are happier if she works	BHPS only	0.097	**0.549**
4	Husband and wife should both contribute to income	Both	0.024	**0.621**
5	Full-time job makes women independent	BHPS only	-0.069	**0.667**
6	Husband should earn, wife stay at home	Both	**0.601**	0.051
	Eigenvalue		2.043	0.860
	% of Variance		0.791	0.571

Note: Factor loading over 0.500 are in bold type.

Six statements are used in BHPS, and UKHLS retains four of them (items 1, 2, 4, and 6). I first evaluated all six items using principal factor analysis to determine whether I could treat all six items equally (**Table 2-1**). This analysis identifies two factors: items 1, 2, and 6 in one group and items 3, 4, and 5 in the other group. Factor 1 is superior because of its higher eigenvalue than that of Factor 2, which measures the variance of that factor. The eigenvalue for Factor 2 is smaller than one, indicating that Factor 2 accounts for a smaller amount of variance as a single variable and does not constitute a good factor based on the Kaiser criterion (Kaiser 1958). The internal reliability measured by Cronbach's α for items 3, 4, and 5 is also lower (ranging from 0.606 to 0.677) than for items 1, 2, and 6 (0.745 to 0.808). Several studies also report that items such as those in Factor 2 that measure attitudes toward gender egalitarian statements are insufficient to differentiate traditional and non-traditional respondents (Knight and Brinton 2017, Barth 2016, Braun 2008).

The final score, which is the summed score of the responses for items 1, 2, and 6, ranges from three to 15 (see also Schober and Scott 2012, Lersch 2016). It has an un-weighted mean value of 7.065, a between-individual standard deviation of 2.081, and a within-individual standard deviation of 1.391.[11] I standardised this traditional attitude score to have a mean of zero and a standard deviation of one. The effects of the explanatory variables reported in the following results are expressed in standard deviation units.

2. 3. 3 Independent variables

Motherhood Status

A binary variable indicating whether an individual has any children at the time of interview represents motherhood status. Childless status is the reference group. Because mothers of children older than age five are excluded, those whose motherhood status is assigned the value of one are mothers of children under age six.[12] The pre- and post-natal attitude difference regarding the shift from childless women and mothers is assessed exclusively because women are expected to make most adjustments in behaviour and identity when becoming mothers for the first time (Baxter et al. 2015). It is also because the conflicts between employment and family responsibilities emerge once women have any child.

Employment Status

Women's employment status is classified into full-time employment (working 30 hours or

[11] Disregarding the results from the factor analysis and the Cronbach's α value, I used a summed score of all the six items as the dependent variable to analyse a sample from the BHPS, although the internal reliability of the dependent variable is substantially reduced. The results remain unchanged except that the effect of motherhood is slightly stronger.

[12] I also included the age and number of children in the models, but neither estimate is statistically significant. Thus, the age and number of children are not included in the final model to maintain model simplicity.

more per week) (reference group), part-time employment (working less than 30 hours per week), and non-working.

Interaction between Motherhood and Employment Statuses

The combined status of motherhood and employment is considered by including interactions between motherhood and employment statuses. The non-working status for mothers is further divided into mothers on maternity leave and non-working mothers. Thus, there are four categories for mothers: full-time working mothers, part-time working mothers, mothers on maternity leave, and non-working mothers. There are three employment categories for childless women: full-time working childless women (reference group), part-time working childless women, and non-working childless women.

Control variables

Age, marital status, and educational attainment are likely to correlate with gender-role attitudes and the having children as well as labour force participation (Fan and Marini 2000, Guetto, Luijkx, and Scherer 2015). Marital status is classified into single and never married, living as a couple, married, and divorced/separated/widowed.[13] Educational level is coded as first degree or above, some higher qualifications, and General Certificate of Secondary Education (GCSE) level or lower.[14] Wave numbers are included as dummy

[13] Partners' employment status and women's gender attitudes may be associated, which may also correlate with women's motherhood and employment statuses. Therefore, I included partners' employment status in the model. The estimates are small and not statistically significant. Partners' employment status is not included for model simplicity.

[14] Excluding educational variables did not alter the results.

variables to control for period-specific factors.[15]

2. 3. 4 Analysis plan

One key challenge to study the relationship between gender-role attitudes and parenthood is to distinguish the effect of parenthood on gender-role attitudes from selectivity associated with both. For example, people who stay childless and those who have children are likely to have different gender-role attitudes. Egalitarian women are less likely to have a child (Kaufman 2000, Holland and Keizer 2015). The same applies to women's employment behaviour. Women holding less traditional attitudes may be more likely to participate in the labour market (Hakim 2000, Corrigall and Konrad 2007, Hakim 2002). Thus, time-constant characteristics such as personality, lifestyle preferences, and overall attitude toward the gendered division of labour may confound the observed relationship between women's fertility and/or employment behaviours and attitudes.

I used fixed effects linear regressions to estimate the effects of motherhood, employment, and the combined status of motherhood and employment on gender-role attitudes. This method utilises multiple observations of the same individual and identifies the effect of motherhood and/or employment on gender-role attitudes by comparing the attitude scores of the same individual with different motherhood and/or employment statuses. Because this method consider only *intra-person* change, there is no need to control for person-specific time-invariant factors that may correlate with women's gender role attitudes and fertility as well as employment behaviours. A few examples of these time-invariant factors are an individual's race, class background, or stable features and

[15] Including wave as a continuous variable is meaningless because it is treated as the deviation from the mean value of this variable under fixed effects regression models. Wave also correlates strongly with age. Therefore, each wave numbers are included in the models as dummy variables.

preferences such as the overall gender-role attitude. Previous studies have used this method to study the association between gender-role attitudes and specific life events, such as getting married or having children (Baxter et al. 2015, Kim and Cheung 2015, Vespa 2009).

I estimate a series of regression models to relate the attitude score to the set of variables previously described. Let the basic model be

$$Attitude_{it} = \beta Motherhood_{it} + \gamma Employment_{it} + \theta Age_{it} + \theta' Age_{it}^2 + \mu W_{it} + \delta Z_{it} + \vartheta_i + \varepsilon_{it} \quad \textbf{(Equation 2-1)}$$

where index *it* denotes person i at time point *t*, $Attitude_{it}$ is the (standardised) attitude score observed for person i at time point *t* , $Motherhood_{it}$ is the motherhood status for a given person-wave observation with β as its coefficient, and $Employment_{it}$ is the employment status for a given person-wave observation with γ as its coefficient. This equation also accounts for ageing effects by including Age_{it} and Age_{it}^2 as well as period-specific factors by including W_{it} as the wave dummy variables. Other time-varying factors Z_{it} include marital status and educational levels for each person-wave observation. ϑ_i and ε_{it} are the two error terms: ϑ_i represents the person-specific fixed effect, simultaneously capturing the time-invariant characteristics associated with the dependent and independent variables; and ε_{it} is the random variation for each person-wave observation.

FEM uses within-individual variations by demeaning the dependent and independent variables from person-specific means, thus deleting ϑ_i. By doing so, FEM estimator controls for observed and unobserved time-invariant factors correlated with attitudes and the variables of interest. FEM also cancels out measurement errors caused by the situation that people persistently misreport their attitudes.

Note that the decision to enter a specific type of partnership may correlate with fertility

behaviour as well as gender-role attitudes (Willoughby 2010). For instance, cohabiting couples may get married because the female partner is pregnant or because they have had children (Steele et al. 2005), and they may thus adjusting their gender-role attitudes accordingly. Therefore, controlling for marital status may mask the gross association between motherhood and gender-role attitudes. Models with and without marital status are used to examine this over-control issue. The estimated coefficients for the variables of interest are almost the same. Therefore, marital status is unlikely to be on the causal pathway between motherhood and attitude. The final models retain the marital status to avoid it confounding the association between a combined status of motherhood and employment and gender-role attitudes.

The primary focus in Equation 2-1 is the estimate for β. Without the covariate $Employment$, β represents the gross change in attitudes associated with different motherhood status. After including the covariate $Employment$ in Equation 2-1, β then represents the mean difference in the score of traditional gender-role attitudes associated with motherhood when the effects of changes in employment status are removed. The estimate for γ represents the mean differences in the attitude score for women with different employment statuses compared to when they work full time (reference group). The interaction between motherhood and employment will also be included in Equation 2-1 to evaluate the conditional effect of motherhood on gender-role attitudes when motherhood is combined with various employment statuses. Alternatively, the interaction term also evaluates the conditional effect of employment for childless women and mothers. The estimates for the interaction terms indicate the difference in attitude scores when women are with different combined statuses of motherhood and employment.

I also performed random-effects models to examine whether it is necessary to select

the less efficient FEM that uses within-individual variances only. The signs of the estimated coefficients from the two approaches are largely the same, but the sizes of the coefficients from the random-effects models are generally larger. The Hausman test indicates that the coefficient estimates from the two approaches are significantly different. Therefore, unobserved time-invariant variables are correlated with both gender-role attitudes and the explanatory variables. Accordingly, the results from the FEM are preferred and reported.

2.4. Results

2. 4. 1 Descriptive statistics

Table 2-2 presents the weighted descriptive statistics of the selected sample.[16] During the observational period, 1,125 of 2,687 women have became mothers for the first time. Of the childless women, 90.1 percent worked full time at some point, 19.5 percent had part-time working experience, and 23 percent did not work at some point. Among mothers, 41.2 percent had full-time working experience, more than half worked part-time at some point, and 38.8 percent did not work at some point. With respect to the person-wave observations, mothers have more traditional gender-role views than childless women. Of the childless person-wave observations, 81.9 percent reflected full-time working status, whereas approximately one-quarter of the observations for mothers recorded full-time employment.

[16] A longitudinal analysis weight for individual self-completion interviews from the year 2001 is used. In 2001, the BHPS sample included 1,900 additional households from Northern Ireland. The summary statistics represent the selected population of women aged 21 to 45 who continuously lived in the UK from 2001 until the last interview in 2013/2014.

Table 2-2. Descriptive statistics for individuals and for person-wave observations of women aged 21 to 45

	Childless	Mothers	Overall
Individuals			
Employment status			
Full-time	90.1%	41.2%	90.8%
Part-time	19.5%	54.7%	39.7%
Non-working			
Maternity	N/A	22.3%	35.1%
Other non-working	23.0%	38.8%	
Number of individuals	2,687	1,125	2,687
Person-waves (weighted)			
Traditional gender-role attitude score	6.556 (2.400)	7.284 (2.683)	6.734 (2.485)
Employment status			
Full-time	81.9%	26.0%	69.5%
Part-time	8.3%	38.4%	17.1%
Non-working			
Maternity	N/A	10.4%	13.4%
Other non-working	9.9%	25.2%	
Age	27.630 (6.526)	33.070 (4.864)	28.960 (6.318)
Marital Status			
Single and never married	52.2%	7.1%	41.2%
Cohabiting	27.5%	16.1%	24.7%
Married	17.2%	74.0%	31.1%
Separated/divorced/widowed	3.1%	2.8%	3.0%
Education			
GCSE level or lower	20.9%	21.2%	21.0%
Some higher qualifications	47.7%	40.6%	45.9%
First degrees or above	31.5%	38.2%	33.1%
Number of person-wave observations	9,060	3,380	12,440

Notes: The number of women in the sample is 2,687. Because there are 1,125 transitions to motherhood for the first time. 1,125 women are included in both the childless and the mother records. Sums of percentages for discrete variables may differ slightly from 100% because of rounding.

Table 2-3 presents the mean of the traditional gender-role attitude score by motherhood and employment statuses for women who have experienced the transition to motherhood. Differences in the mean attitude score across groups are evaluated using t-tests. Women have higher scores or held attitudes that are more traditional after the

transition to motherhood than before (last column). Moreover, there is substantial heterogeneity across cells where motherhood and employment statuses are jointly considered. Mothers who work full-time have the lowest score. Mothers in other employment groups hold more traditional attitudes than childless women who work full time. Non-working mothers show the most support for the traditional gendered division of labour, with a score of 8.850. In summary, the overall increase in traditional gender-role attitudes after the transition to motherhood obscures the true variation in attitudes across groups in which motherhood and employment statuses intersect differently.

Table 2-3. Traditional gender-role attitude score by motherhood and employment statuses

	Employment Status				
			Non-working		
	Full-time Working	*Part-time Working*	*Maternity Leave*	*Other Non-working*	*Overall*
Motherhood Status					
Childless	6.876	6.951	N/A	7.199	6.907
	(2.402)	(2.427)		(2.487)	(2.412)
Mothers	5.812[a]	7.297[a]	6.923	8.850[a]	7.316[b]
	(2.287)	(2.404)	(2.581)	(2.560)	(2.683)
Overall	6.591	7.290[c]	8.533[c]		7.127
	(2.422)	(2.424)	(2.634)		(2.569)

Notes: This sample only includes 1,125 women who become mothers for the first time. Means and standard deviations of traditional gender-role attitude scores reported are not weighted. Standard deviations are in parentheses. A five percent level of significance is used.

[a]Indicates that the mean differs statistically significantly from childless full-time workers.

[b]Indicates that the mean differs statistically significantly from childless women.

[c]Indicates that the mean differs statistically significantly from full-time workers.

2. 4. 2 Results from the linear fixed effects regression models

Table 2-4 reports the estimated coefficients of the variables of interest from the linear fixed effects regression analysis. A list of all coefficients is available in Appendix (**Table A 1**). The fixed effects models attribute approximately 63 percent of the variance in the attitude score to the fixed effects, which are the combined effect of all time-constant variables. That is, women's gender-role attitudes are largely stable over time; however, a substantial part of the variation in attitude score is associated with variables that change over time.

Model 1 reports the gross difference in the traditional gender-role attitude scores between childless women and mothers (Equation 2-1 without $Employment_{it}$). The coefficient estimate of 0.045 can be interpreted as an increase of 0.045 standard deviations (SDs) on average in the traditional gender-role attitude score comparing after the same women have had children. The size of this estimate is small but nevertheless statistically significant at the 0.05 level (p = .045). Without considering changes in employment status, motherhood seems to have an *overall* weak traditionalizing effect on gender-role attitudes.

Because motherhood usually coincides with a decline in women's labour market attachment, the modest but positive association between motherhood and traditional gender-role attitudes may be driven by changes in employment status after childbirth. Model 2 evaluates changes in attitudes associated with the transition to motherhood by removing any effects from changes in employment status (Equation 2-1).

Table 2-4. Change in the standardized score of the traditional gender-role attitudes associated with changes in motherhood status, employment status, and the interaction between motherhood status and employment status

	Model 1	Model 2	Model 3	Model 4
Motherhood status				
Childless (reference)				
Mother	0.045*	0.004	-0.176***	
	(0.022)	(0.024)	(0.029)	
Employment status				
Full-time working (reference)				
Part-time working		0.011	-0.066*	
		(0.022)	(0.032)	
Non-working		0.181***	-0.042	
		(0.025)	(0.031)	
Interaction between motherhood & employment				
Mother * Part-time working			0.279***	
			(0.044)	
Mother * Non-working			0.572***	
			(0.047)	
Refined interaction between motherhood & employment				
Childless & Full-time working (reference)				
Childless & Part-time working				-0.067*
				(0.032)
Childless & Non-working				-0.041
				(0.031)
Mother & Full-time working				-0.200***
				(0.031)
Mother & Part-time working				0.020
				(0.029)
Mother & Maternity leave				-0.002
				(0.045)
Mother & Non-working				0.350***
				(0.032)
Person-wave observations		12,440		
Individuals		2,687		

Notes: All models include education, marital status, age, its square term, and wave dummies. Standard errors are in parentheses.

*p< .05 **p< .01 ***p< .001

The estimate for motherhood status is now close to zero in Model 2. Employment status completely mediates the association between motherhood and traditional gender-role attitudes. Thus, the traditionalizing effect of motherhood per se as predicted by **hypothesis 1** is not supported. Model 2 also reports that a change from full-time employment to non-working status is associated with a 0.181 SD increase in the traditional gender attitude score ($p < .001$). This result seems to support **hypothesis 2**.

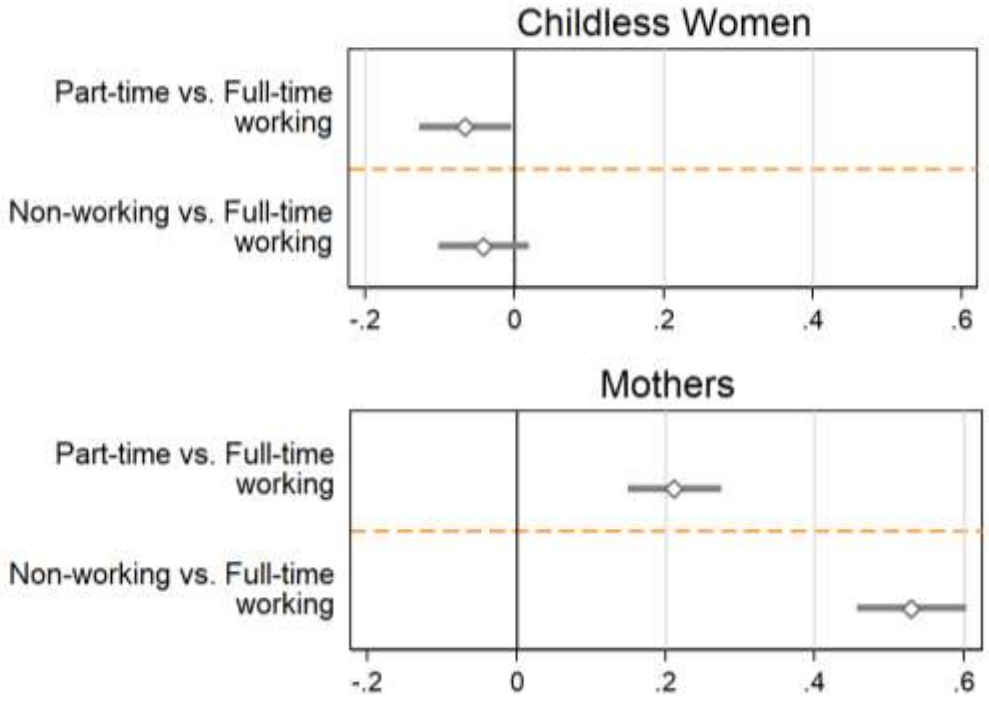
However, the previous discussions suggest that motherhood and employment may not additively affect women's gender-role attitudes. To evaluate whether the liberalising effect of employment is dependent on motherhood status, Model 3 includes the interaction terms of motherhood status and employment status. First, the main effect of motherhood (when employment status is full-time) is significantly negative, which contradicts **hypothesis 1**. Second, the main effect of employment (when motherhood status is childless) is limited because the liberalising effect of employment is not observed for childless women. Rather, the sign of the estimate of childless part-time employment is negative. This estimate is statistically significant at the 0.05 level, although its magnitude is small. In other words, childless women who work part-time exhibit slightly less traditional attitudes compared to working full time. Further analysis (not shown here) revealed that this result is driven by full-time students who are classified as part-time workers. Thus, no evidence suggests that employment per se has a liberalising effect on gender-role attitudes for childless women, which contradicts **hypothesis 2**.

A comparison of Models 2 and 3 suggests that the liberalising effect of employment is driven by its effect among mothers. The shifts from full-time working motherhood to part-time working motherhood and non-working motherhood are associated with a 0.212 SD ($0.279 - 0.067$) and a 0.531 SD ($0.572 - 0.041$) increase in the traditional gender-

role attitude score (both $p < .001$). The Wald test shows that the estimate of part-time working motherhood is statistically significantly different from that of non-working motherhood ($p < .001$).

To further demonstrate the varying effect of employment for childless women and mothers, I plotted the estimated coefficients and their confidence intervals for women of different employment statuses when they are childless or mothers—see **Figure 2-1**. This figure indicates that childless women's gender-role attitudes change only slightly with a change in employment status. However, as mothers enter or exit the labour market, their attitudes vary substantially. The considerably more significant differences in gender-role attitudes across employment groups for mothers than for childless women support **hypothesis 3**.

Figure 2-1. Comparison of the effect sizes of employment status for childless women and mothers



Source: Model 3 of Table 2-4

Given that most women work full time before having children, and given that there is no substantial difference in gender-role attitudes across employment groups among childless women, Model 4 uses full-time working status as the reference group to represent a common status among the childless women. In addition, maternity leave, which is previously grouped into the non-working status, is now separated as an independent category because women on maternity leave have not yet experienced the great role conflicts. This model provides a realistic picture of the dynamics of women's gender-role attitudes during the transition to motherhood.

Women as full-time working mothers score 0.200 SDs lower than when they are childless full-time workers. **Hypothesis 4a** is thus supported. For the same woman, she scores 0.350 SDs higher when she moves from a childless full-time working status to a non-working mother. There is no statistically significant change in the attitude score when women become part-time working mothers. **Hypothesis 4b** is supported except for the prediction concerning part-time working motherhood. In addition, women do not change their traditional gender-role attitudes when they are on maternity leave. This result again confirms that childbirth per se is not associated with changes in gender-role attitudes.

2. 4. 3 Testing Alternative Explanations and Reciprocal Effects

Because fixed effects models do not account for unmeasured time-varying covariates, time-varying confounders could be responsible for the observed associations. This section discusses issues that may challenge the above findings and presents two tests to examine the robustness of the results.

First, the negative association between full-time working motherhood and traditional gender-role attitudes may result from changes in women's employment characteristics

after childbirth. Gangl and Ziefle (2009) found that British mothers are more likely to be employed in the public sector or to move to occupations with a higher proportion of female workers. Compared with the private sector, the public sector usually provides a more supportive family-work culture, better-implemented family-friendly policies, and more flexible time schedules (Wayne et al. 2013). From an exposure-based perspective, this type of environment is more likely to alleviate the work-family conflict and enhance employee commitment, thereby inspiring less traditional attitudes.

To test this explanation, I selected person-wave observations recording full-time employment status and created three job characteristic indicators. The first indicator is the employment sector, which includes the private sector and others. Following Gangl and Ziefle's work (2009), the percentage of female workers in a current occupation at the three-digit level of the International Standard Classification of Occupations (ISCO-88) is used to represent female occupation. The third indicator is a binary variable representing whether women are self-employed. The control variables are the same as those specified in the previous models.

The results from **Table 2-5** show that none of the three employment indicators is statistically significant (**Model 2**). The size and significance level of the estimated coefficient of motherhood among full-time workers remain unchanged after considering job characteristics. Thus, changes in job characteristics cannot account for the observed association between full-time working motherhood and traditional gender-role attitudes.

Table 2-5. Changes in the standardized scores of the traditional gender-role attitudes associated with changes in motherhood status and working conditions for full-time workers

	Model 1	Model 2
Motherhood status		
Childless (reference group)		
Mother	-0.190***	-0.192***
	(0.032)	(0.032)
Employment sector		
Private sector (reference group)		
Non-private sector		-0.027
		(0.034)
Female occupation		0.021
		(0.051)
Self-employment		0.083
		(0.063)
Constant	-0.134	-0.175
	(0.611)	(0.613)
R^2 within	0.014	0.015
R^2 between	0.031	0.035
Overall R^2	0.027	0.030
Variance in the dependent variable due to fixed effects	0.668	
Person-Wave Observations	7,831	
Individuals	2,346	

Notes: This sample only includes observations of women in full-time working status. All models include age, its square term, wave dummies, education, and marital status. Standard errors are in parentheses.

* p< .05 ** p< .01 *** p< .001

A more serious challenge is that the observed associations between the combined status of motherhood and employment and attitudes may be driven by the influence of gender-role attitudes on women's maternal employment behaviours. For example, women can make a particular decision about labour market participation following changes in gender-role attitudes (Guetto, Luijkx, and Scherer 2015, Cunningham et al. 2005). In other words, changes in attitudes lead to the transition into a specific combined status of motherhood and employment, not the other way around.

This reciprocal relationship is particularly troubling because it makes the direction of the causal relationships between gender-role attitudes and women's fertility and employment behaviours extremely hard to determine. Past research using conventional linear fixed effects models suffers from the issue of the reciprocal effects between attitudes and the observed parenthood or employment status (e.g., Vespa 2009, Baxter et al. 2015, Kim and Cheung 2015).

To infer the causal direction between attitudes and the combined status of motherhood and employment, I re-evaluated Model 4 in **Table 2-4** using dynamic panel data modelling within a structural equation framework as proposed by Paul Allison, Richard Williams, and Enrique Moral-Benito (Allison 2009b, Williams, Allison, and Moral-Benito 2015). Their work is a recent development of Arellano and Bond's estimation (1991) that has been widely used by researchers in applied economics concerning reciprocal effects between the two variables of interest. A great advantage of structural equation modelling (SEM) is that it is flexible and can relax strict exogeneity assumptions by allowing correlations between the current independent variables and error terms from earlier points in time.

The basic logic to formulate *a dynamic, fixed effects regression model within the SEM framework* is to treat the gender-role attitudes at time *t* a function of the same attitudes at $t-1$ as modified by some new information, such as the specific motherhood experience represented by full-time working motherhood or non-working motherhood. Accordingly, I rewrite **Equation 2-1** by including a lagged dependent variable in the regressors and replacing motherhood status and employment status with the combined status of motherhood and employment. Let the model be

$$Attitude_{it} = \alpha Attitude_{i(t-1)} + \lambda(Motherhood * Employment)_{it} + \theta Age_{it} + \theta' Age_{it}^2 + \delta Z_{it} + \vartheta_i + \varepsilon_{it} \quad \textbf{(Equation 2-2)}$$

Equation 2-2 can be viewed as specifying a separate equation for each point in time with the coefficients constrained to be the same across waves; thus, the wave dummies W_{it} in **Equation 2-1** are dropped. The error terms or the random components, ϑ_i and ε_{it} in **Equation 2-2**, are treated as latent variables. ϑ_i is set to be common to all time periods, and the error variances of ε_{it} for each time point are set to be equal. The lagged dependent variable $Attitude_{i(t-1)}$ is included as one of the regressors, thus enabling feedback from the lagged attitudes to the current attitudes.

Furthermore, I allow the error terms ε from earlier points in time to correlate with the current combined status of motherhood and employment, thereby accounting for feedback from lagged values of attitudes to the current combined status of motherhood and employment. Thus, the final estimate of λ is the effect of the combined status of motherhood and employment on attitudes *after* controlling for person-specific fixed effects as well as feedback from earlier attitudes. Unfortunately, estimation using SEM software, e.g., Mplus in this case, requires the use of a relatively well-balanced sample. As an example, I select 1,236 women interviewed for five waves or more from the sample and apply this model to the first five waves of observations.[17] **Table 2-6** reports the key estimates from the conventional fixed effects model using the demeaning method (the method to produce the results in **Table 2-4**), the maximum likelihood estimates of the fixed effects model using SEM (without accounting for feedback from earlier attitudes), and the maximum likelihood estimates of the dynamic, fixed effects model using SEM.

Table 2-6. Change in the standardized score of the traditional gender-role attitudes

[17] The estimates remain stable when including people interviewed for different numbers of waves, but the standard errors are smaller if individuals who are observed for more waves are selected because fewer individuals would be retained.

associated with changes in the combined status of motherhood and employment

	Conventional linear fixed effects (5 waves)	Fixed effects within SEM framework - maximum likelihood estimation (5 waves)	Dynamic, fixed effects with lagged dependent variable within SEM framework (5 waves)
Lagged Dependent Variable			0.188***
			(0.020)
Refined Interaction Between Motherhood & Employment			
Childless & Full-time Working (reference)			
Childless & Part-time Working	-0.069	-0.061	-0.044
	(0.044)	(0.050)	(0.057)
Childless & Non-working	-0.033	-0.019	-0.033
	(0.044)	(0.052)	(0.060)
Mother & Full-time Working	-0.221***	-0.204***	-0.157*
	(0.045)	(0.045)	(0.071)
Mother & Part-time Working	-0.011	-0.001	0.038
	(0.041)	(0.041)	(0.113)
Mother & Maternity Leave	-0.043	-0.052	-0.077
	(0.062)	(0.061)	(0.102)
Mother & Non-working	0.362***	0.359***	0.260*
	(0.045)	(0.045)	(0.114)
Person-Wave Observations		6,180	
Individuals		1,236	

Notes: All models include age, its square term, wave dummies, education, and marital status. Standard errors are in parentheses.

* p< .05 ** p< .01 *** p< .001

First, the estimated coefficients of the first two models are almost identical when using the conventional demeaning method and when using the SEM. They are also similar to those estimates of Model 4 in **Table 2-4**. In fact, fixed effects models estimated with the more conventional demeaning method yield the same results as those obtained using SEM software (Allison 2009b).

Second, after taking into account feedback from the lagged values of attitudes using

the SEM, the estimated coefficients of full-time working motherhood and non-working motherhood change from 0.204 ($p < .001$) to 0.157 ($p = .026$) and from 0.359 ($p < .001$) to 0.260 ($p = .023$), respectively. The reductions in the size of the estimates imply changes in attitudes prior to the transition to a combined status of motherhood and employment. Therefore, attitudes do shape subsequent beliefs, preferences, and behaviour.

Nevertheless, the effects of full-time working motherhood and non-working motherhood persist after considering the feedback from earlier attitudes. The reduced statistical significance is partly due to the enlarged standard error. Other studies, using earlier waves of the BHPS data and the SEM without controlling for the fixed effects, also note that feedback from attitudes would not substantially bias the estimates of maternal working hours (Berrington et al. 2008, Schober and Scott 2012). I also used lagged independent variables to predict the traditional gender attitude scores using Model 4 in **Table 2-4**. The results are similar to the coefficients reported in the final model of **Table 2-6** (see **Appendix Table A2**). In summary, no evidence indicates that the selection of changes in attitude would preclude the role of full-time working motherhood and non-working motherhood.

In addition, if the conflict between employment and childcaring responsibilities is the main driver of these adjustments in gender attitudes, the changes in attitudes should be larger if the conflict experienced by mothers are more significant. Accordingly, it is expected that for mothers with more children, their attitude experience larger change. The previous analyses (e.g., **Table 2-4**) grouped mothers with different numbers of children in one broad category as mothers. Here, I replicate Model 4 in **Table 2-4** using separate samples of childless women and mothers of different numbers of children and report the results in **Table 2-7**. The magnitudes of attitude change for mothers with one and two

children are similar. However, mothers with three or more children do have the most considerable attitude adjustment compared to those who have no child. This result further collaborates the argument that the conflict between work and childcaring responsibilities is the primary driver of women's gender attitudes adjustment.

Table 2-7. Change in the standardized score of traditional gender attitudes associated with changes in motherhood status, employment status, and the interaction between motherhood status and employment status by birth parity

	1 child vs. 0 child	2 children vs. 0 child	>=3 children
Refined interaction between motherhood & employment			
Childless & Full-time working (reference)			
Childless & Part-time working	-0.062	-0.054	-0.045
	(0.032)	(0.032)	(0.033)
Childless & Non-working	-0.025	-0.036	-0.030
	(0.031)	(0.031)	(0.032)
Mother & Full-time working	-0.216***	-0.185***	-0.329**
	(0.036)	(0.050)	(0.119)
Mother & Part-time working	0.020	0.000	-0.013
	(0.035)	(0.039)	(0.081)
Mother & Maternity leave	-0.031	0.003	0.374*
	(0.059)	(0.072)	(0.171)
Mother & Non-working	0.352***	0.389***	0.515***
	(0.043)	(0.043)	(0.079)
Constant	-0.377	-0.117	-0.757
	(0.489)	(0.494)	(0.518)
R^2 within	0.025	0.027	0.020
R^2 between	0.032	0.037	0.018
Overall R^2	0.026	0.033	0.018
Person-wave observations	10,729	10,449	9,382
Individuals	2,687	2,687	2,687

Notes: All models include age, its square term, wave dummies, education, and marital status. There are 2,687 transitions into 1st birth, 1,122 transitions into 2nd birth, and 671 transitions into 3rd births.

Number of individuals are the same across the 3 models because all selected individuals are retained as they all experience changes in age, which are included as a control variable in all models. Therefore, all individuals are used in all models disregarding whether they experienced the birth of the 1st, the 2nd, or the 3rd child or not.

Standard errors in parentheses. * p< .05 ** p< .01 *** p< .001

2.5. Discussion and Conclusion

In the current gender and social context of a high level of incompatibility between women's employment and childrearing responsibilities, this study theoretically and empirically contributes to the literature by evaluating various explanations for the dynamics of women's gender-role attitudes during adulthood. It proposes and demonstrates that conflicts between women's roles as mothers and workers are primary factors in women's gender-role attitude construction during adulthood.

I do not find that there is a direct influence of either motherhood or employment on women's attitudes toward the traditional division of labour. Other studies also note that childbirth per se is unlikely to influence women's gender-role attitudes (Youngblut 1995, Berrington et al. 2008). Therefore, the internalization of traditional expectations of motherhood may not be sufficiently powerful to alter women's gender-role attitudes. Similarly, employment itself is unlikely to impose a significant impact on these attitudes. In my work, the liberalizing effect of employment is only found among mothers rather than among childless women. Thus, the prediction of a liberalizing effect of employment that is independent of women's motherhood status based on the interest- and exposure-based explanations is not well supported.

Gender-role attitudes tend to change only if motherhood and employment statuses are considered jointly. A move to less traditional gender-role attitudes is associated with a full-time maternal employment, whereas a move to more traditional views is associated with a non-working motherhood status. These findings highlight the adaptive psychological process experienced by women to rationalise their decisions about work and family. More importantly, the findings lend strong support to an understudied reason for gender-role

attitude adjustment: conflicts between women's economic and caregiver roles.

Nevertheless, I find that women as part-time working mothers hold similar attitudes before and after the transition to motherhood. When women remain the primary caregivers, and when a cost-effective childcare substitute is absent, as in the United Kingdom, part-time employment is regarded as the most feasible way to reconcile employment and family responsibilities (Hakim 2000, Lewis et al. 2008), and the perceived level of work-family conflict resulting from part-time working motherhood may be minimal. In summary, the gross association between motherhood and gender-role attitudes is the net outcome of all of the above changes in attitudes.

This study has several limitations. First, the findings of this study may be country-specific (i.e., specific to U.K. contexts), or they may be applicable to social contexts characterized by extensive maternity leave, insufficient and expensive formal childcare, and widespread part-time working opportunities. Motherhood, employment, and the combination of motherhood and employment may be associated with women's gender-role attitudes in different ways across countries with different gender norms and institutional settings. A related issue is that these findings may vary across periods. The shift into more traditional attitudes may be more extensive for those who withdraw from the labour market for childcare if fewer women take this option, whereas mothers who remain employed full-time but have young children may be less likely to adjust their attitudes if the work-family conflict is less severe. I do find this time-varying pattern when doing the same analysis across different periods. However, the estimated coefficients are not statistically significantly different from each other given the large standard error due to the relatively small sample size in each period.

Second, the conclusions of this study are limited to women's attitudes toward the traditional division of labour. The attitude items used in this study, although highly reliable, impede a comprehensive understanding of people's attitudes toward gender. Research that utilises other reliable measurement items or methods, such as the implicit association test or the evaluative priming task that is widely applied in social psychology (Bohner and Dickel 2011), can extend our knowledge of the complexity of gender attitudes. Nevertheless, the items selected and analysed in this study are valid and reliable measures of an important dimension of gender attitudes, and they are highly comparable to prior studies.

Furthermore, this study focuses on women. Men's gender-role attitudes also may change during the transition into parenthood when couples negotiate and experience different work and family arrangements (Baxter et al. 2015, Buchler, Perales, and Baxter 2017). However, one study about men in the UK finds little change in their gender-role attitudes when they become fathers (Grinza et al. 2017). This finding lends support to the argument that the conflicts between employment and family responsibilities are the most substantial for mothers that they even have to adjust their gender-role attitudes to justify their employment decision.

Because one key argument is that the effects of employment on attitudes differ for women with and without the responsibilities to care for a child, this study focuses on childless women and mothers, disregarding the number of children they have. Future work could investigate changes in gender-role attitudes across birth order to inform us more details about the impact brought by the birth of a child.

Notwithstanding the above limitations, this study advances our understanding of the

dynamics of women's gender-role attitudes. The finding of a crossover effect of full-time working motherhood and non-working motherhood clarifies the association between motherhood and gender-role attitudes, as well as the association between employment and gender-role attitudes. These findings highlight the critical role of the emergence and realization of incompatibility between women's employment and childrearing responsibilities in shaping gender-role attitudes. In fact, women's primary caring responsibilities as mothers, the desire or need to work, and the lack of adequate help for childcare ultimately create a dilemma for women that is likely to trigger the reformulation of their attitudes. The break in women's lives before and after childbirth, particularly the significant transformation of women's economic and family roles, merits further attention to increasing compatibility between women's employment and family responsibilities, which in turn could lead to greater gender equality.

CHAPTER 3: A NEW FAMILY EQUILIBRIUM? CHANGING DYNAMICS BETWEEN THE GENDER DIVISION OF LABOUR AND FERTILITY IN GREAT BRITAIN, 1991-2017

A New Family Equilibrium?
Changing Dynamics between the Gender Division of Labour and Fertility in Great Britain, 1991-2017

Abstract

The macro-level relationship between female labour force participation and fertility has recently changed from negative to positive. A traditional gender role setting might not be conducive to fertility. Using 25-year data from the harmonized BHPS and UKHLS, we ask how the relationship between the within-couple gender division of labour and fertility has changed in Great Britain. We first identify different levels of traditionalism in the division of labour by using latent class analysis. We then employ couple-level fixed-effect logistic regressions to analyse the reciprocal relationship between the gender division of labour and fertility. We find that the positive association between the traditional division of labour and fertility has been significantly weakening from 1991 to 2017. Traditional couples are no longer more likely to have a subsequent childbirth from 2009 onward, and the traditionalizing effect of parenthood has been diminishing. The time-varying relationship between the gender division of labour and fertility identified provides new evidence of a changing family equilibrium in Britain.

Keywords: gender, division of labour, fertility, parenthood

This work is co-authored with Dr. Man Yee Kan and has been published in *Demographic Research* 2019 (Zhou and Kan 2019). Muzhi Zhou conducted literature review, analysed data, and did the writing work. Dr Man Yee Kan guaranteed data availability, oversaw the research, and reviewed drafts produced as a supervisor.

3.1. Introduction

The recently reversed relationship between female labour force participation rates and fertility levels has ignited heated debate about a changing relationship between gender roles and family formation. Between the 1960s and the mid-1990s, fertility levels have sharply fallen in almost all industrialized countries and reached low or extremely low levels (Kohler, Billari, and Ortega 2002).[18] Women's increased educational attainment, their rising economic autonomy and strive for self-fulfilment outside the family, were believed to be a critical factor according to the New Home Economics model and the Second Demographic Transition framework (Becker 1981, Van De Kaa 1987, Lesthaeghe and Meekers 1987, Becker 1976). However, since the beginning of the 21st century, the TFRs have stopped declining and even started to increase in many OECD countries including the UK, despite the continual growth in female labour force participation rates (Rindfuss, Choe, and Brauner-Otto 2016, OECD 2017). Since then, many studies have found a positive relationship between female labour force participation rates and fertility levels in developed societies, especially among the Northern European and English-speaking countries and France (Luci-Greulich and Thévenon 2014, Siegel 2017). Meanwhile, the gender gap in domestic work time, continues shrinking, reflecting a slow convergence of women and men's roles in the private sphere (Kan, Sullivan, and Gershuny 2011, Altintas and Sullivan 2016).

Inspired by those changes, scholars have proposed a new relationship between gender equality and family formation. They argue that the positive association between a

[18] Low fertility levels refer to a TFR below the replacement level of 2.1 children per woman.

traditional gender role setting and fertility is likely to diminish as the gender revolution progresses. Based on the "Gender Revolution" framework, when women and men's roles keep on converging, eventually, there will be a new family equilibrium where an egalitarian family model can even promote fertility (Esping-Andersen and Billari 2015, Goldscheider, Bernhardt, and Lappegård 2015, Esping-Andersen 2016).

Nevertheless, evidence that supports this prediction has been limited or mixed. First, many findings remain confined at macro-level cross-country analyses, and discussions have largely turned to cross-cultural variations (e.g., de Laat and Sevilla-Sanz 2011, Arpino, Esping-Andersen, and Pessin 2015, Brinton and Lee 2016, Esping-Andersen et al. 2013). In addition, cross-country and cross-sectional analyses are subject to the risk of spurious findings, and analyses of changes within countries over time are necessary (Kolk 2019). Second, micro-level empirical studies usually use the division of housework per se to represent the level of gender equality within couples and to predict fertility (e.g., Cooke 2009, Schober 2013a). Findings are mixed and inconclusive, leading to a question of whether fertility decisions are dependent on the gendered division of labour.

We ask whether the micro-level relationship between gender equality and fertility has changed in the past few decades. In other words, we would like to know how the macro-level societal context, which has changed over time, could moderate the micro-level relationship between gender equality and fertility. Gender inequality has many dimensions. One of the most important ways that gender roles are enacted is through the division of household labour among heterosexual couples. In particular, the division of labour exhibits the couples' *actual* gender practices in the public and private spheres. In this paper, we use the couple-level gendered division of labour to represent the gender (in)equality level at a micro-level.

We adopt a comprehensive couple-level analysis and consider how fertility behaviour is associated with the division of market labour, the division of domestic labour, and the combinations of the two spheres between spouses. This couple-level, holistic approach differs from earlier studies. Past studies either make within-gender comparisons by separately analysing women's or men's behaviours during the transition into parenthood (e.g., Kühhirt 2012, Schober 2013c), or they only attempt to predict the likelihood of having a child using the couples' employment status match (e.g., Baizán 2007) or the division of domestic labour additively (e.g., Schober 2013a, Dommermuth, Hohmann-Marriott, and Lappegård 2015, Neyer, Lappegård, and Vignoli 2013). These studies provide important insights to the relationship between gender inequality and parenthood, but they tend to neglect that the birth of a child was often a couple's joint decision or ignore that people's behaviours in both the public and the private spheres can be jointly influential to fertility decisions. It is also questionable that whether a couples' gender equality level could be correctly reflected through a single indicator when combinations of the two spheres offer an important dimension of gender equality. We will provide more discussions in the following sections. Most importantly, no research has examined how the relationship between the couple-level division of labour and fertility behaviours might have changed from the 2000s, despite the reverse of the macro-level relationship between gender equality and fertility and the new predictions based on the "Gender Revolution" framework. This study will fill this gap in the research agenda.

Analysing how the relationship between gender equality and fertility evolves over time is important. The time-varying pattern provides novel insights into competing theories that guide people's family formation behaviours. For instance, while the traditional gender division of labour is expected to be positively correlated with

childbearing and childrearing through specialization, an egalitarian family with dual earners is regarded to enjoy higher marital quality and to be more capable of affording the long-term cost of childrearing. By validating the applicability of these distinct family models along with the changing societal contexts, this time-varying relationship between the division of labour and fertility can provide valuable evidence about the existence of the new family equilibrium at a micro-level, thereby informing the stage and process of the gender revolution.

We use long-term harmonized panel data from the BHPS and UKHLS to document a time-varying relationship between the gender division of labour and fertility. The classification of division of labour is achieved by the Latent Class Analysis, including information about how spouses (married and cohabiting partners) allocate market and domestic labour between them. We examine the effect of the division of labour on the birth of a child, as well as the effect of childrearing on the division of labour, by using fixed-effect models. We document changes in this reciprocal relationship from 1991 to 2017 and take account of potential selection due to couples' unobserved time-constant characteristics. This approach enables a rigorous evaluation of how micro-level family dynamics between gender inequality and fertility evolve with the changing social context over time.

3.2. Division of Labour in a Partnership

We first clarify the meaning of the division of labour in this study with the help of two theories, which are commonly applied to illustrate the division of labour between spouses. Both theories have pointed out the determining role of relative economic resources. First, the *specialization perspective* suggests that the allocation of effort to market labour or

domestic labour between spouses depends on their economic comparative advantages (Becker 1981, 1985). Within a family, the spouse who earns higher wages would take primary responsibility for paid labour, and the other is primarily responsible for childcare and housework.

Alternatively, the intra-household *bargaining perspective* argues that spouses allocate resources by bargaining with each other (Lundberg and Pollak 1993, Manser and Brown 1980). The one who controls more resources, particularly economic resources, is better able to negotiate his or her preferred outcomes (e.g., minimizing own housework time), and thus the undesirable responsibilities are allocated to the one with fewer resources. These two perspectives highlight the significance of the division of market labour in determining the overall patterns of the division of labour.

Although the above perspectives both indicate that one's larger share of market labour is usually accompanied with his/her smaller share of domestic labour (Sullivan and Gershuny 2016, Evertsson and Nermo 2007), they do not give details on the level of the match between the two spheres. The division of labour in the public sphere and that in the private sphere are matched in various ways, which also provides indispensable information on the level of gender equality among couples. For example, if the husband contributes 80% of the household income, does he contribute zero percent, 20%, or even 40% of domestic labour? The division of labour is less traditional if he shoulders a larger share of the domestic burden. Similarly, among dual-earner couples who have similar market labour arrangements, those with a wife doing most of the housework are regarded to be more traditional than those with a more even share of domestic labour (Kitterød and Lappegård 2012, Hall and MacDermid 2009). A more extreme example is that it is questionable to conclude that a dual-earner couple with a wife doing 60% of housework is

more gender equal than those with a part-time working wife sharing the same amount of housework. In this case, the wife in the latter setting shows stronger bargaining power than the one in the earlier setting. Accordingly, a single indicator could not accurately represent gender relations among couples. To determine the level of traditionalism in the division of labour, it is important to simultaneously consider the division of both market and domestic labour and how the two are combined.

We classify different levels of traditionalism in the division of labour based on three elements: the division of market labour, the division of domestic labour, and the match of the two spheres. Specifically, the most traditional type should reflect the wife and husband's most traditional gender practices in both spheres, vice versa for the least traditional type. In between them, there are those who follow traditional gender roles in either the public or the private spheres, and there is also an egalitarian division of labour type, where a gender equal division of both market and domestic labour is observed.

3.3. Division of Labour and Fertility

Parenthood influences women and men in different ways and derives gender-specific cost, which would reciprocally influence the fertility decision for couples with different traditionalism in the division of labour. In this section, we first explain why parenthood influences women and men differently so that specialization is conducive to childbearing and childrearing. We then introduce the economic uncertainty and the gender equity perspectives to see how an egalitarian family model could trump a traditional one in promoting fertility.

3. 3. 1 The Specialization Family Model and Fertility

The cost of parenthood is gendered. Childrearing has a traditionalizing effect on the gender division of labour based on the *specialization* and *bargaining* perspectives, especially when the husband has the comparative advantage in paid employment or more economic resources than does the wife. Nowadays, the gender wage gap persists, and women still prefer and are more likely to marry men with higher incomes (Qian 2017, Greenwood et al. 2014, Blossfeld 2009). Therefore, the new childcare and housework duties following the birth of a child are more likely to be allocated to the wife. Meanwhile, she usually has to reduce her investment in market labour in order to cope with the new family responsibilities. Studies have consistently documented that, on average, women increase their housework time, reduce their employment hours, and experience a wage loss during the transition into motherhood (Gangl and Ziefle 2009, Schober 2013c). By contrast, men's behaviours are much less affected by childrearing (Killewald and García-Manglano 2016, Argyrous, Craig, and Rahman 2016, Kan and Gershuny 2009, 2010). These single-sex analyses imply that for couples, the division of labour would be more traditional after the transition to parenthood, especially when the husband earns more than the wife.

The traditionalizing effect of parenthood is translated into a lower *opportunity cost* for couples with a more traditional division of labour. The idea of the opportunity cost of childrearing was originally proposed to explain why women with greater earning power are less likely to have children (Becker 1981, Willis 1973). This economic perspective argues that women's education, income, and employment increase the opportunity cost of childrearing and suppress family formation. It implies that women's disadvantage in the labour market is conducive to childbearing and childrearing. Empirical studies about the UK and other countries have shown that non-working women are more likely to have

children (Schmidt et al. 2012, Baizán 2007, Inanc 2015, Ukil 2015, Wood and Neels 2016). At a couple-level, the cost of childrearing such as the reduction in the household income and living quality due to women's lowered economic activity to care for children is expected to be smaller for couples whose wife's share of income is lower. Accordingly, couples with a traditional division of labour should be more likely to have children than couples with an egalitarian division of labour.

3. 3. 2 The Egalitarian Family Model and Fertility

An alternative prediction is that the egalitarian family model is more beneficial for family formation than a traditional or specialization one. This prediction is derived from two perspectives. One has an economic concern and another focuses on equity or fairness in a relationship.

First, the *economic uncertainty* perspective argues that a secure economic foundation is necessary for childrearing (Oppenheimer 1988, Malthus 1803). Compared to couples with a single earner, such as those with the most traditional division of labour, dual-earner couples have lower uncertainty regarding future household income, are more capable of affording the long-term cost of childrearing, and are thereby more likely to have more children (Vignoli, Drefahl, and De Santis 2012, Lundström and Andersson 2012, Jalovaara and Miettinen 2013). The economic uncertainty would also discourage families to maintain a long-term traditional male-breadwinner model following the birth of a child (Langner 2015, Ruggles 2015). This economic perspective highlights the importance of the female partner's economic resources. In a societal context where there is substantial economic uncertainty and women can have strong economic autonomy, this perspective predicts a positive relationship between the dual-earner family model and fertility.

The aforementioned economic perspective overlooks the fact that the division of market between spouses and that of domestic labour are associated with fertility jointly and simultaneously. From a *gender equity* perspective, simply a gender equal division of market labour represented by the dual-earner couples does not necessarily benefit family formation. It argues that the combination of a wife's significant economic role and her disproportionately large share of family responsibilities lead to severe work-family conflicts, a perception of unfairness, or low satisfaction in marriage. Therefore, this combination instead can deter childbearing, and it is also is also unpractical for childrearing (McDonald 2000, Neyer, Lappegård, and Vignoli 2013). Prior studies have evaluated whether an unequal division of housework has a negative effect on fertility intentions or the likelihood of childbearing, but the findings are inconsistent, or only weak associations are noted (Mills et al. 2008, Schober 2013a, Neyer, Lappegård, and Vignoli 2013, Miettinen, Lainiala, and Rotkirch 2015). A few studies focus on the impact of the mismatch or the conflicts between women's employment and family responsibilities on fertility. For example, Torr (2004) analyses the effect of the division of housework on a second birth among American dual-earner couples but finds a U-shaped relationship – couples where wives share housework equally or do almost the whole load are most likely to have a second birth. Cooke (2009) uses data from Italy and Spain to test the interaction effects of the husband's share of childcare and the wife's employment status. She finds out that when wives spend longer hours on market labour, the likelihood of having a second child will drop if the husband's share of childcare does not increase accordingly. This line of work shows the importance of considering the combination of paid and unpaid work among coupes in the case of the birth of a second child. However, findings are mixed. It is not certain as to whether the findings could be generalized to first and other births. Furthermore, the method employed in these studies could not rule out selection bias due

to the couples' shared long-term values or preferences about children and families, which influence both the couples' division of labour arrangement and fertility outcome. Therefore, we need better measures of the gendered division of labour and regression analyses that could minimize the confounding effects due to unmeasurable lifestyle preferences or values to tackle the predictive power of the division of labour on fertility.

Taking both of the aforementioned perspectives into account, only couples who have a non-traditional division of market labour as well a relatively gender equal division of domestic labour should be considered as a true egalitarian family model; only these couples will be more likely to have children than couples who have the traditional male breadwinner and female homemaker arrangement.

3.4. Changing Contexts, Changing Relationships

The micro-level relationship between the division of labour and fertility is inevitably influenced by macro-level societal contexts, such as the gender norms, institutional settings, and the labour market condition. The "doing gender" perspective argues that women and men internalize and perform their expected gender roles imposed by gender norms regardless of the partners' relative earning power or resources (West and Zimmerman 1987, Stryker 1968, Kühhirt 2012, Brines 1994, Kolpashnikova 2018). Gender norms assign gender-specific meanings to the roles of mothers and fathers and reward women and men differently (Hays 1996, Fahlén 2017, Kühhirt 2012). The "good father" roles are consistent with a "good provider model", which rewards men's market commitment and wage earning ability (West and Zimmerman 1987). In contrast, the values and expectations of motherhood are to prioritize the needs of children, whereas the necessity to support the household financially becomes "secondary" (Hays 1996, Garey

1999, Mercer 2004). Therefore, the cost of parenthood is more gender-specific when gender norms are more traditional. The positive relationship between the traditional division of labour and fertility would be particularly stronger when women and men adopt the gender-specific expectations of parents and "do gender".

Male-breadwinner families should still be more conducive to childrearing in the UK, where social attitudes and institutional settings largely retain the traditional gender settings. For instance, in 2012, almost 40% British people considered it the best for young children to have mothers work part-time and fathers work full-time (Scott and Elizabeth Clery 2013). In 2018, over half of the public considers that mothers should take more parental leave than fathers (British Social Attitudes 2018). With respect to the institutional settings, the UK's family policy has displayed a strong preference for women's childrearing responsibilities: a maximum of 52 weeks of maternity leave is permitted, now up to 39 weeks are paid. Paid paternity leave for up to two weeks has been available only since 2003. Starting only in 2015, fathers and mothers can share their parental leave for children born or adopted.[19] However, it is estimated that only about two percent of fathers who are eligible for shared parental leave have used it each year since its introduction.[20] In addition, formal childcare services are predominantly private, inadequate, and costly (Connolly et al. 2016), posing a further barrier to the dual-earner model. In summary, both the social attitudes and the institutional setting imply that it is women's responsibility to take care of family, and alternative childcare options are often unfeasible. Compared to a gender

[19] Mothers must still take the initial two weeks after birth.

[20] This is based on figures from a press release of the *Department for Business, Energy and Industrial Strategy*, published on 12 February 2018. Retrieved 11 December, 2018, from https://www.gov.uk/government/news/new-share-the-joy-campaign-promotes-shared-parental-leave-rights-for-parents

egalitarian model, a male-breadwinner female-housekeeper model better fits the institutional setting and the socially expected roles of mothers and fathers and should be conducive for childbearing and childrearing.

Nevertheless, the relationship between the gendered division of labour and fertility may have changed with changing gender norms and institutional settings, though the gender revolution has far from completion. For example, people have increased their support for maternal employment. The proportion of people who agreed that mothers should stay at home declined from 64% in 1989 to 33% in 2012 (Scott and Elizabeth Clery 2013). The 2018 British Social Attitudes Survey shows that 72% dispute the view that a man's job is to earn money and that a woman's job is to look after the home. This number was 58% ten years ago. Therefore, women and men are less likely to specialize in partnerships by following the "traditional" expectations.

The gender gap in earning power is also shrinking. In almost all the OECD countries, the gender gap in education has been eliminated or even reversed (OECD 2015), and the husband's economic advantage is less prominent when the wife is less likely to marry "up" in terms of education or income (De Hauw, Grow, and Van Bavel 2017, Zhou, Wu, and He 2017). The gender pay gap also keeps closing: it decreases from 27.5% in 1997 to 21.9% 2007 and finally to 18.4% in 2017 based on median hourly earnings (Office for National Statistics 2017b). In addition to these improvements in gender equality in the public sphere, the substantial economic uncertainty, exampled by the economic recession around 2010, further enhances the economic advantage of the dual-earner family model. Women's economic position has been critical when globalization has increased the rate of economic and social change, intensified competition, and increased sensitivity of domestic economy to random shocks occurring in the international market (Blossfeld et al. 2008). In summary,

the differentiated earning capabilities or the gap in economic resources between spouses, upon which the economic specialization and bargaining theories are rested, are increasingly less likely to hold over the years.

In addition, there is more institutional support for early childcare provision to encourage more families to maintain an egalitarian model. In September 2010, for example, the Department for Education introduced 570 hours of free childcare per year for all three- and four-year-old in England, as well as for two-year-old from disadvantaged backgrounds since 2013 (National Audit Office 2016). Women with young children have increased time availability for paid work when they could easily outsource childcare.

In summary, the societal context of substantial gender inequality, which empowers the prevalence of the specialization family model, is waning. Over the years, the cost of parenthood should be less gender-specific. Against this background, we expect that the association between the traditional gender division of labour and fertility would be still positive, however, this positive association should decline over the recent years.

3.5. Data and Method

3. 5. 1 Data and Sample

We use the harmonized BHPS and UKHLS data last from 1991 to 2017. A national representative sample of 5,500 households from Great Britain was recruited for the first wave of BHPS, and there were approximately 10,000 individual interviews. BHPS later included extension samples in Scotland and Wales and Northern Ireland in 1999 and 2001, respectively. Building on the work of BHPS, a national representative sample of over 40,000 households was collected during 2009 and 2010 across the UK, forming the first

wave of *the UKHLS* data. The old BHPS sample was included in *the UKHLS* data from wave 2 (2010/2011). Beginning with the year of entry, household members aged 16 and older are interviewed, and the same individuals are re-interviewed in successive years.

We restrict the sample to those who are currently living with their married or cohabiting partners for a couple-level analysis. Samples from Northern Ireland are excluded because they are not included in the BHPS sample before 2001 and may disrupt the time trend. In each wave, we select couples where the female partner is the main respondent, aged between 20 and 44 years, and is currently living with a male partner aged between 20 and 59 years. Observations entering this sample in subsequent waves are predominantly new samples collected in BHPS or UKHLS.[21] Observations in which either the wife or the husband is a full-time student are dropped. The selected couples are at their prime childbearing and working age and are most likely to experience a competing demand from employment and family. We have 14,451 couples with 63,819 couple-wave records of self-interviews.[22] After dropping observations with missing values, we ultimately have a sample of 12,888 couples and 60,548 couple-wave observations for cross-sectional analyses. 70.6% of the couples have repeated observations and are used for fixed-effect regression analyses. We do not find that wave non-response is correlated with the division

[21] For example, couples from the 1,000 low-income households are collected from 1997 to 2001 in BHPS. UKHLS included completely new samples in the first wave (2009/2010).

[22] The 1st wave (1991) of the BHPS and the 3rd, 5th, and 7th waves of the UKHLS do not include questions about housework time. Notably, in the first wave of the UKHLS, the housework question was asked only of individuals interviewed between January and June 2009. All individuals in these waves were included in later regression analyses because the LCA allows missing information in the LCA indicators, and this approach could enlarge the sample size. Excluding individuals from these waves does not alter the results, though.

of labour or the birth of a child, and potential bias due to the selection of sample, if any, does not alter our conclusions.[23]

3. 5. 2 Measures

First, we need indicators that directly capture the couple-level division of labour in both the public and private spheres. These indicators will be included in the later latent class analysis to help generating a division of labour typology.

Division of Labour Indicators

We select 1) employment status match, 2) wife's share of income, and 3) wife's share of time spent on housework as indicators.

We first identify the employment status for the wife and the husband separately so that how the couple combine their labour market performance can be determined. Employment status for the wife is classified into three categories: full-time employment (working 30 hours or more per week), part-time employment (working fewer than 30 hours per week), and non-working. For the husband, the categories are either full-time employment or other (part-time employment and non-working) because only 4.4% of men in our sample are working part-time. Accordingly, there are six employment status matches between the wife and the husband.

[23] A variable indicating whether a respondent is observed in the following wave was included in later models. The estimates for this variable were not statistically significant. We further included more samples to check the potential sample selection bias. For example, we used Cox proportional hazard models to predict the birth of a child. We employed random effects models when analysing the effect of childrearing on the division of labour, although the estimates differ from the fixed-effect estimates. Nonetheless, the conclusions from all models are consistent with the currently reported conclusions from the fixed-effect models.

Another division of labour indicator is the wife's share of income. It is calculated by dividing the wife's monthly personal income over the sum of the monthly personal income of both spouses. This share of income is further classified into four categories with similar numbers of observations in each category: women's share below 20%, women's share of 20 to 40%, women's share of 40 to 60%, and women's share above 60%.[24] This indicator can differentiate couples with similar employment arrangements but different earnings.

The third indicator is the division of housework. Information on housework is collected by asking "About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning, and doing the laundry?" Respondents are more likely to report routine housework time by asking questions in this way. Although the stylized or questionnaire-based estimates is less accurate compared to diary-based estimates of housework time, the main source of error for the stylized measures does not differ from that for the questionnaire-based measures, and most of the errors are random rather than systematic (Kan and Pudney 2008). Moreover, the panel nature of the surveys enables us to track changes in housework time for the same couple. Therefore, we prefer the stylized measures of housework time. Wife's share of housework is calculated by dividing the housework hours reported by the wife over the total housework hours, which is the sum of the housework hours reported by both spouses. This share of housework is further classified into four categories, with similar numbers of observations in each category: women's share below 50%, women's share of 50 to 75%, women's share of 75 to 90%, and women's share above 90%.

[24] 90 couples with the wife or the husband reporting zero or negative monthly personal income are grouped into the 50 percent category.

Division of childcare is not included because it is only available for parents with young children and is closely related to ideals of parenthood and the intergenerational transfer of human and cultural capital. Compared to the division of labour in housework, which works as an indicator of the gender role settings among couples, the division of labour in childcare is less ideal. The domestic division of labour literature also treats housework and childcare as distinct categories because the micro gender theories apply well to housework but not childcare (Sullivan 2013). Nevertheless, we have conducted alternative analyses by including childcare as an indicator, and the conclusion remains unchanged.[25]

The goal is to identify a couple-level division of labour type and then evaluate their relationships with the birth of a child. Earlier discussions indicate that the relationship between the division of labour and fertility is not necessarily linear. Using these categorical indicators can identify a typology of the division of labour through latent class analysis, which is useful to capture its non-linear relationship with the birth of a child.

Next, we introduce key variables that are correlated with the couple-level division of labour and several control variables to be included in regression models.

Parenthood

[25] We also included the division of childcare (mainly the wife, shared by both, others) as an additional indicator to construct the division of labour for parents. First, the classification of the division of labour for parents remains largely unchanged. Second, using this division of labour in regressions predicting the birth of a child generate the same conclusion. Lastly, this information about the division of childcare is not collected in four waves and for families with the youngest children older than age 12 (BHPS) or age 15 (*Understanding Society* study). Therefore, the current approach using employment, income, and housework as indicators are valid and sufficient, and it also maximizes the sample size.

A key relationship we are interested is whether couples are more likely to have a child if they follow the male-breadwinner female-housekeeper family model. To predict the birth of a child, for each couple-wave record, parenthood status works as a dependent variable and is firstly set as zero (no change in the number of children) but is recoded to one (a new child) if, in the next couple-wave record, there is both an increase in the number of children and the age of the youngest child is younger than four.[26]

The second relationship we are interested is to what extent the couples adapt a specialization model in order to care for children. When predicting the division of labour type, parenthood status works as a key independent variable and is represented by the number of children aged 15 years or younger in the household. It has three categories: zero (reference), one, two or more.[27]

Periods

The specific historical period is another important indicator because we would like to evaluate whether the above two relationships of interest vary in different periods. The year when the couple-wave observation is recorded is grouped into three categories.[28] The reference group covers the period of 1991 to 2000, the second category is from 2001 to 2008, and the last category is from 2009 to 2017 (from the first wave of the *UKHLS*). There are similar durations in each period. This classification also differentiates and

[26] In this sample used for fixed-effect regressions in predicting birth outcome, 22.3% are followed within one year, 63.5% are followed up between one to two years, and 14.2% are followed up after two years.

[27] The age of the youngest child is not included to make the models easier to understand. The results thus represent a general relationship between the division of labour and the parenthood status, disregarding the age of the youngest child. Including the age of the youngest child does not alter our conclusions.

[28] Years of interview are treated as categorical variables in fixed effect regressions to avoid multicollinearity with partnership duration, which is included in the models as a control variable.

compares samples who started in BHPS and those who entered the UKHLS. The first and final periods correspond to the nationally representative samples that are selected for the first time in 1991 and 2009/11, respectively, and followed for eight to nine years. This classification can, therefore, lower the sample bias due to different attrition patterns of individuals being followed for different numbers of years.

Others

In fixed-effect regressions, we further include marital status, which is classified as whether currently married (reference) or cohabiting. The age, and its square term, of both spouses are included. We also include the duration of the partnership. For cohabitating observations, it is the number of years from the year of cohabitation. For married observations, it includes the number of years of cohabitation if they marry after the same cohabitation. We also include numbers of years till the next observation in the fixed-effect models when predicting the birth of a child.

For cross-sectional analysis, we also include education, health, religiosity, race, and residence information, which are largely stable over time, as controls. Educational attainments of both spouses are coded as first degree or above, some high qualifications, and General Certificate of Secondary Education (GCSE) level or lower (reference). The health condition of both spouses is a self-rated score on a scale of "Excellent" (reference), "Good", "Fair", and "Poor". Respondents' religiosity is coded as not religious (reference) if the answer is "no religion" to the question "Do you regard yourself as belonging to any particular religion?". Respondents' race is classified as "White" (reference), "Black", "Asian", and "Others". The place of residence category includes England (reference), Wales, and Scotland.

3. 5. 3 Analytical Strategy

The analytical strategy contains four parts.

1. First, we use the three selected indicators to construct a holistic couple-level division of labour typology through the latent class analysis. This step would enable us to identify different division of labour types. In addition, each couple-wave record will be assigned a single measure indicating its division of labour type.

2. We then provide a detailed description of the division of labour types. We use a multinomial logistic regression model to predict the division of labour outcome with key cross-sectional predictors to provide an overall understanding of the division of labour types and how the distribution of the division of labour types may vary over time.

3. Back to the association between gender inequality and fertility, we use the division of labour type to predict a couple's fertility behaviours. Using fixed-effect logistic regressions, we test that if a couple adopt a specialization family model rather than an egalitarian one, whether the likelihood of having a child increases and whether this relationship changes in different time periods.

4. In the last step, we investigate the reversed direction of the relationship between the gender inequality and fertility. We examine that if a couple have more children, whether the division of labour type becomes more specialized and whether this traditionalizing effect of parenthood changes in different periods, using fixed-effect logistic regression.

Now, we introduce each method in detail.

We first use latent class analysis (LCA) to determine the division of labour type for each couple-wave observation. LCA is a method used to cluster observations into different unmeasured classes based on their patterns of response across a set of defined indicators (Bakk, Tekle, and Vermunt 2013). It is a model-based clustering method using maximum likelihood to estimate the parameters of the distributions of classes such as class numbers, sizes, and probabilities of the observations being members of a given class. This feature enables researchers to focus on the set of classes identified rather than consider each of the observed indicators separately or all of the possible combinations of the indicators (McCutcheon 1987). In our case, there are 96 combinations of the three indicators (6 categories of employment match x 4 categories of share of income x 4 categories of share of housework). It is thus extremely helpful when we would like to construct a typology of the division of labour that contains information on (1) the division of market labour, (2) the division of domestic labour, and 3) the interactions between (1) and (2), when it is neither realistic nor necessary to consider all the possible interactions of the indicators.

Furthermore, the outputs of LCA are several classes of the division of labour (rather than a continuous measure such as the output of factor analysis). The categorical outputs are desirable because the relationship between the division of labour and fertility is unlikely to be linear and varies across periods from the earlier theoretical discussions. Therefore, we can apply the division of labour as a categorical variable directly in later regression analyses without assuming a specific, and most likely incorrect, relationship between the division of labour and fertility.

We build a simple latent class model using only the three indicators discussed above

to identify the typology of the division of labour. We select the appropriate number of latent classes with the lowest value of BIC.[29] LCA also assigns each observation to the latent class with the best match based on the probability of membership into each class generated from models with the help of the STATA LCA plugin (version 1.3.2).

After we have assigned the division of labour type to each couple-wave observation, in the next part, we provide a descriptive overview of factors associated with different division of labour types. We use a multinomial logistic regression model to predict the division of labour outcome and apply population-equilibrated cross-sectional weights.[30] Clustered standard errors are used because many couples are observed repeatedly.

Then, we aim to establish the relationship between the different division of labour types and fertility and examine whether this relationship varies over the years. Given that our sample follows the same individuals with their matched spouses over time, we conduct couple-level fixed-effect logistic analyses in the third and fourth parts. The use of fixed-effect model is particularly desirable because both the division of labour and fertility behaviours are expected to be strongly correlated with the couples' own gender and family values (Hakim 2000, 2003, Kaufman 2000, Zhou 2017). Fixed-effect model uses the same couple as its own control and removes confounding effect due to unobserved time-constant features that are correlated with both the dependent and independent variables, such as the couples' stable lifestyle preferences, family values, and long-term physical conditions. This approach lowers the vulnerability of our models to omitted-variable bias and creates

[29] BIC is commonly used for model comparisons. It assesses goodness of fit while penalizing additional parameters.

[30] The population-equilibrated weight reweights the data such that each period has the same number of observations.

great confidence in the robustness of the conclusions. The fixed-effect approach also lowers reporting errors that people constantly misreport their information (e.g., time on housework) due to time-constant features.

Using the fixed-effect model, in the third part, we evaluate whether the odds of having a child differs if a couple has different arrangements in the division of labour (e.g., job loss, promotion, house-moving, etc.). In our sample, the division of labour varies substantively for the same couple (see Note 17). We use variables measured at different time points to infer a direction of the association. The model is as follows:

$$Log\left(\frac{P_{it+1}}{1-P_{it+1}}\right) = \beta Coupledom_{it} + \gamma Period_{it} + \delta Z_{it} + \theta\vartheta_i + \varepsilon_i \qquad \textbf{(Equation 3-1)}$$

where index *it* denotes couple i at time point *t*. P_{it+1} is the probability of having a new child in the next record, at time *t+1*. $Coupledom_{it}$ is the division of labour observed for couple *i* at time *t*, with β as the coefficient. $Period_{it}$ is the period category for couple *i* at time *t*, with γ as its coefficient. Z_{it} represents other time-variant control variables, including the number of children, age of the youngest child, whether cohabiting, partnership duration, the couples' age and age squared terms, and the number of months till the next observation. ϑ_i is a vector of time-invariant predictors. ε_i is the combined effects of all time-constant unobservable factors, with a fixed value for each couple.

Because fixed-effect analysis only uses within-couple variations, couples who do not have a change in outcome during the entire observation period are not used, and ϑ_i and ε_i are dropped out of the equation (Allison 2009a, 29). Coefficients are estimated using conditional maximum likelihood, which is achieved by conditioning the likelihood function on the total number of birth events observed for each couple. For example, if a couple has been observed for five times, the question asked in order to determine each

couple's contribution to the likelihood function is the following: given that the couple has a new child in two out of the five records, what is the probability that this event happened when it actually occurred rather than in one of the other possible pair of records (Allison 2009a, 32). This model reports that if a couple experienced a change in the division of labour type, whether the likelihood of having a child change. We then interact different division of labour types with the period variable to examine how the association between the division of labour and fertility varies with time. In the interaction model, the main effect is the effect of the division of labour on the birth of a child in the reference period, which is 1991 to 2000. Combining the main effect and results from the interaction terms reveal the effects of the division of labour in 2001 to 2008 and in 2009 to 2017. This interaction model illustrates how the effect of the division of labour on the birth of a child, after considering time-constant confounders in each period, varies with time.

In the fourth analytical part, we then predict, using the same fixed-effect approach, the odds of belonging to a specific division of labour type if a couple has different numbers of children. The basic model is as follows:

$$Log\left(\frac{P_{it}}{1-P_{it}}\right) = \beta Parenthood_{it} + \gamma Period_{it} + \delta Z_{it} + \theta\vartheta_i + \varepsilon_i \qquad \textbf{(Equation 3-2)}$$

where P_{it} is the probability of falling into a specific type of the division of labour for couple *i* at time *t*. $Parenthood_{it}$ is the number of children in the household for couple *i* at time *t*, with no child being the reference group. $Period_{it}$ is the period category for couple *i* at time *t*. Z_{it} represents other time-variant control variables, including whether cohabiting, partnership duration, and the couples' age and age squared terms. ϑ_i and ε_i are the same as in Equation 3-1. This model predicts whether a change in the number of children is associated with a change in the division of labour type. We then *interact* the

parenthood status with the period variable to examine how the effect of parenthood on the division of labour varies in different periods.

3.6. Results

3. 6. 1 Descriptive Statistics of the Sample

Table 3-1 presents the weighted summary statistics of variables used for cross-sectional and fixed-effect regressions. In our sample, 41.8% of the couples are composed of two full-time workers. The second largest category, accounting for 29.0%, is that of couples with a part-time working wife and a full-time working husband. 17.3% of the couples are composed of a non-working wife and a full-time working husband. Over time, the distribution of the employment status match remains largely stable. Over half of the wives share less than 40% of income. 30% of the couples have wives share 40 to 60% of income. The proportion of total income shared by the wife is growing. During the period from 1991 to 2000, 62.6% of the wives contributed less than 40% of total income, and this number dropped to 53.3% during the period from 2009 to 2017. More wives have become the primary income contributor (share >60% of total income) in later periods as well. Housework remains the wife's job: only 12.8% of the couples have wives sharing less than 50% of the housework, and more than 50% of the couples have wives doing more than 75% of the housework. Despite this overall inequality in housework share, the wife's share of housework declines over time. During the period from 2009 to 2017, wives shared 50 to 75% of housework in approximately 40% of the couples, and these couples were the dominant group.

Table 3-1. Weighted descriptive statistics for the selected couple-wave observations

	All	1991 to 2000	2001 to 2008	2009 to 2017
Employment match[1]				
Women FT Working x Men FT Working	41.8%	40.9%	41.7%	42.7%
Women FT Working x Men PT/Non-Working	3.7%	3.6%	3.3%	4.3%
Women PT Working x Men FT Working	29.0%	28.1%	31.6%	26.9%
Women PT Working x Men PT/Non-Working	2.4%	2.2%	2.2%	2.9%
Women Non-Working x Men FT Working	17.3%	18.5%	17.2%	16.3%
Women Non-Working x Men PT/Non-Working	5.8%	6.8%	4.0%	6.9%
Women's share of income				
< 20%	25.3%	30.1%	24.5%	21.6%
20-40%	32.7%	32.5%	33.6%	31.7%
40-60%	30.0%	28.3%	30.1%	31.4%
>60%	12.0%	9.1%	11.8%	15.3%
Women's share of housework				
< 50%	12.8%	10.5%	12.2%	17.9%
50-75%	33.8%	31.1%	33.2%	39.5%
75-90%	28.9%	29.4%	29.9%	25.9%
>90%	24.6%	29.1%	24.7%	16.7%
Couples having children in household	71.2%	69.2%	72.1%	72.0%
Number of co-residing children	1.35 (1.13)	1.32 (1.14)	1.33 (1.08)	1.36 (1.13)
Women's age	34.20	33.67	34.88	34.63
Men's age	37.04	36.22	37.52	37.62
Cohabitation	23.8%	16.9%	24.6%	29.7%
Partnership duration if partnered (years)	9.24 (6.24)	9.64 (6.60)	9.84 (5.78)	10.07
Women's education				
GCSE Level or Lower	45.8%	60.0%	46.9%	29.9%
Some Higher Qualifications	30.8%	27.7%	31.8%	32.7%
First Degrees or Above	23.5%	12.3%	21.3%	37.4%
Men's education				
GCSE Level or Lower	43.2%	51.6%	44.1%	33.7%
Some Higher Qualifications	34.3%	33.3%	34.8%	34.8%
First Degrees or Above	22.5%	15.1%	21.1%	31.5%
Women's self-rated health				
Excellent	23.8%	25.0%	25.8%	20.3%
Good	46.1%	47.8%	50.0%	40.0%
Fair	21.2%	19.6%	17.3%	27.3%

	All	1991 to 2000	2001 to 2008	2009 to 2017
Poor	8.9%	7.7%	6.9%	12.3%
Men's self-rated health				
Excellent	26.1%	29.4%	28.7%	19.9%
Good	45.5%	46.6%	48.9%	40.4%
Fair	20.9%	17.5%	17.6%	28.3%
Poor	7.5%	6.5%	4.9%	11.4%
Women's race				
White	93.7%	96.0%	95.7%	89.2%
Black	0.8%	0.6%	0.5%	1.4%
Asian	4.6%	3.0%	3.5%	7.3%
Others	0.9%	0.4%	0.3%	2.1%
Women being religious	52.1%	58.7%	52.1%	45.4%
Location				
England	87.4%	87.1%	87.2%	88.1%
Wales	4.5%	4.7%	4.5%	4.4%
Scotland	8.1%	8.3%	8.3%	7.5%
Division of labour type				
Male-breadwinner	27.8%	31.4%	27.1%	24.8%
Modified male-breadwinner	23.1%	21.6%	25.8%	21.6%
Dual-earner	39.3%	37.8%	39.1%	41.1%
Female-breadwinner	3.2%	2.8%	2.8%	4.3%
Precarious	6.6%	6.5%	5.3%	8.3%
Couples[3]	12,888	3,692	3,052	9,008
Couple-year observations	60,548	15,681	13,205	31,662

Note 1: FT represents "full-time". PT represents "part-time".

Note 2: Median value reported.

Note 3: The same couple can be observed in different periods.

Sums of percentages for discrete variables may differ slightly from 100% because of rounding.

Approximately 70% of the couples have children younger than age 15 in their households. The mean ages for women and men are about one year older in the latest sample than in the 1991 to 2000 sample, reflecting delayed union formation. More couples are cohabiting rather than being married, but the stability of the partnerships seems to remain unchanged, with similar partnership durations across the three periods. Couples' educational levels have improved substantially over the years.

Table 3-2. Item response probabilities conditional on latent class membership

	Male-breadwinner	Modified male-breadwinner	Dual-earner	Female-breadwinner	Precarious
Employment status of the couple					
Women FT Working x Men FT Working	0.2%	28.3%	93.1%	17.2%	15.2%
Women FT Working x Men PT/Non-Working	0.1%	0.0%	1.3%	64.5%	2.3%
Women PT Working x Men FT Working	27.5%	66.7%	4.9%	0.1%	0.9%
Women PT Working x Men PT/Non-Working	0.0%	0.7%	0.0%	12.3%	20.3%
Women Non-Working x Men FT Working	65.6%	4.3%	0.2%	0.0%	0.3%
Women Non-Working x Men PT/Non-Working	6.5%	0.0%	0.4%	5.9%	60.9%
	100%	100%	100%	100%	100%
Women's share of income					
Women share <20% income	73.1%	13.3%	1.6%	0.5%	10.9%
Women share 20-40% income	17.5%	66.4%	24.3%	4.0%	19.2%
Women share 40-60% income	7.4%	15.8%	61.7%	10.1%	30.7%
Women share >60% income	2.0%	4.5%	12.4%	85.4%	39.2%
	100%	100%	100%	100%	100%
Wife's share of housework					
Women share <50% housework	3.7%	7.3%	21.3%	46.4%	16.1%
Women share 50-75% housework	19.4%	33.5%	47.1%	37.1%	38.2%
Women share 75-90% housework	34.6%	34.0%	22.7%	11.4%	21.2%
Women share >90% housework	42.4%	25.1%	8.9%	5.1%	24.5%
	100%	100%	100%	100%	100%
Level of gender traditionalism	Higher			Lower	Mixed
Total (weighted)	27.8%	23.1%	39.3%	3.2%	6.6%

3. 6. 2 Five Division of Labour Types

The LCA identifies five couple-level division of labour types (see **Table 3-2**). Based on the response pattern of the three indicators, we name and order the division of labour as the male-breadwinner type (most traditional, 27.8%), the modified male-breadwinner type (23.1%), the dual-earner type (39.3%), the female-breadwinner type (least traditional, 3.2%), and the precarious type (6.6%).

Conditional on membership in the "male-breadwinner" type, the probability that the wife does not work and the husband works full-time is 0.656, and the probability that she works part-time and he works full-time is 0.275. Not surprisingly, more than 90% of these couples have wives who contribute less than 40 % of the total income. In these couples, the probability that she does more than 75% of the housework is 0.770. These couples demonstrate a typical gender specialization model, with the husband as the key breadwinner and wife as the primary homemaker.

The "modified male-breadwinner" type is predominately couples with part-time working wives and full-time working husbands, but they still have a 0.283 probability of being dual full-time workers. Wives share a majority of the housework and contribute a relatively small proportion of household income for this type.

The "dual-earner" type, which is the largest group, features dual earners who work full time. Even among them, only 61.7% of these couples with the wife and the husband making similar contributions to the household income. And 26% couples with the same employment status still have the husband outearning the wife. 78.7% of these couples have the wives doing a larger share of housework. Nevertheless, this division of labour type best fits the egalitarian family model.

Among the "female-breadwinner" couples, they are most likely to be composed of a full-time working wife and a part-time working or non-working husband, and 85.4% of the wives are primary earners. However, only about 46% of the wives do less than 50% of the housework. This group of couples accounts for only 3.2% of all couples. The last group is classified as the "precarious" type because they are mostly composed of underemployed couples. There is no clear pattern of the gender division of labour. In the later sections, we focus on the first three groups in **Table 3-2**, which account for more than 90% of the observations.

The increase in women's share of total income and the decline in women's share of housework over the years, as reflected in **Table 3-1**, imply that the distribution of the different division of labour types should have changed. **Figure 3-1** displays the trend of the distribution of the five division of labour types from 1991 to 2017. Over time, the proportion of the dual-earner type increases, and the proportion of the male-breadwinner type decreases. The proportion of the more traditional type increases first and then declines. The surge of the precarious division of labour after 2008/2009 may reflect the impact of the economic recession or the fact that a completely new sample was drawn in this year to form the 1st wave of UKHLS right after the financial crisis.

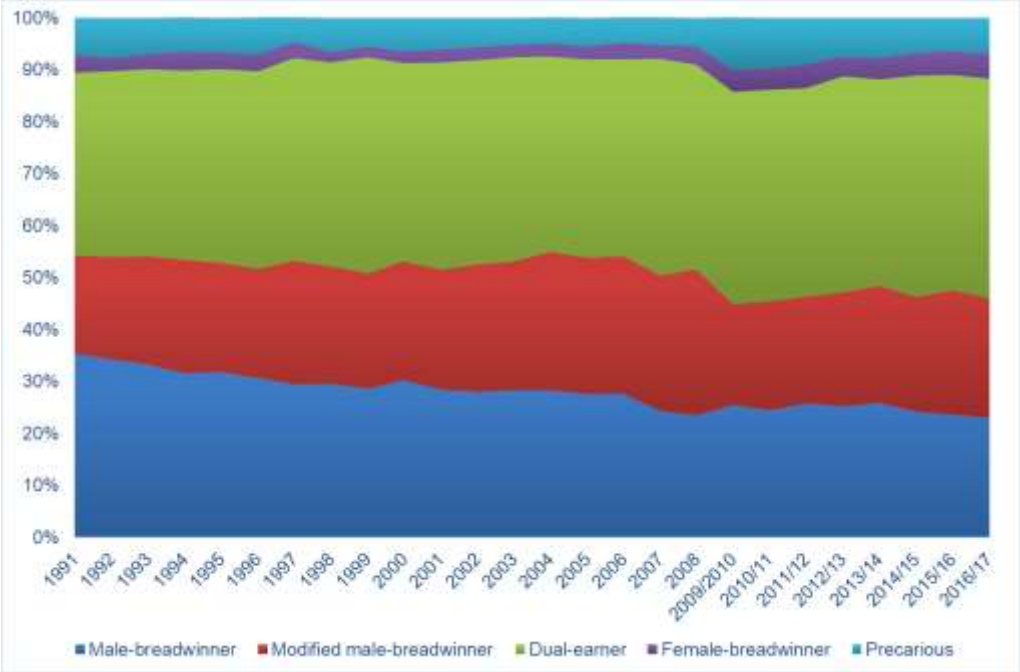


Figure 3-1. Weighted distribution of the five division of labour types for the selected couples from 1991 to 2016

Source: Combined sample from BHPS and UKHLS

Next, for a descriptive purpose, we use the multinomial logistic regression models to show correlations between the division of labour type and parenthood status as well as whether the likelihood of belonging to a specific division of labour type has changed over time.[31] The reference category is the less traditional type, allowing us to compare predictors in other types to this one. We use a full sample, a sample of childless couples, and a sample of parents to identify the key group with a changed distribution of division of labour. **Table 3-3** and **Table 3-4** present the selected coefficients.

[31] Appendix Table A 3 reports a full list of coefficients.

Table 3-3. Cross-sectional multinomial logistic regressions predicting the log odds of belonging to a certain division of labour type rather than the dual-earner one

	All Sample (reference: Dual-earner)			
	Male-breadwinner	Modified male-breadwinner	Female-breadwinner	Precarious
Period (ref: 1991-2000)				
2001 to 2008	-0.123	0.141*	-0.142	-0.096
	(0.067)	(0.063)	(0.126)	(0.098)
2009 to 2017	-0.204**	0.028	-0.032	0.087
	(0.070)	(0.062)	(0.112)	(0.097)
Number of Children (ref: Zero)				
One	1.738***	1.531***	0.522***	1.125***
	(0.078)	(0.065)	(0.108)	(0.114)
Two or more	2.644***	2.059***	0.824***	2.258***
	(0.082)	(0.070)	(0.114)	(0.118)
Constant	1.512*	-2.356***	-1.302	4.934***
	(0.675)	(0.715)	(1.152)	(0.925)
Weighted number of observations	57,151			

Note: Models also include whether cohabiting, partnership duration, couples' age and age square, educational attainments, self-rated health, women being religious, women's race, and location. Models are weighted with population-equilibrated cross-sectional weight. Please refer to **Appendix Table A3** for a list of all the coefficients.

* p< .05 ** p< .01 *** p< .001

Table 3-4. Cross-sectional multinomial logistic regressions predicting the log odds of belonging to a certain division of labour type rather than the dual-earner type by childless couples and parents

	Childless couples (reference: Dual-earner)				Parents (reference: Dual-earner)			
	Male-breadwinner	Modified male-breadwinner	Female-breadwinner	Precarious	Male-breadwinner	Modified male-breadwinner	Female-breadwinner	Precarious
Period (ref: 1991-2000)								
2001 to 2008	-0.019	0.026	-0.248	0.318	-0.182*	0.142	-0.143	-0.258*
	(0.146)	(0.115)	(0.165)	(0.235)	(0.081)	(0.078)	(0.188)	(0.115)
2009 to 2017	0.029	0.148	-0.103	0.542*	-0.331***	-0.049	-0.082	-0.153
	(0.135)	(0.105)	(0.171)	(0.218)	(0.084)	(0.076)	(0.147)	(0.112)
Number of children (ref: One)								
Two or more					0.964***	0.564***	0.355***	1.203***
					(0.064)	(0.056)	(0.105)	(0.095)
Constant	-0.062	0.786	-1.722	3.260	5.362***	0.021	2.135	8.429***
	(1.345)	(1.159)	(1.442)	(1.871)	(0.928)	(0.961)	(1.972)	(1.181)
Weighted number of observations	16,553				40,598			

Note: Models also include whether cohabiting, partnership duration, couples' age and age square, educational attainments, self-rated health, women being religious and women's race, and location. Models are weighted with population-equilibrated cross-sectional weight.

* p< .05 ** p< .01 *** p< .001

Results from the full sample (Error! Reference source not found.) show that over t ime, couples are 18.4% ($1 - e^{-0.204}$) less likely to be classified into the male-breadwinner type as opposed to the dual-earner one. When the full sample is divided into childless couples and parents, it is shown that this trend is only driven by changes among parents (**Table 3-4**), it is shown that this shift from the most or more traditional types to the less traditional type is only driven by changes among parents. Compared to parents observed in the reference period of 1991 to 2000, those observed in the period of 2009 and 2017 are 28.2% ($1 - e^{-0.331}$) less likely to be classified into the male-breadwinner type rather than into the dual-earner one. This finding implies a change in the relationship between the division of labour and parenthood. Besides, childless couples are more likely to be classified into the precarious type. This may be associated with the worsening macroeconomic conditions after 2008 because the economic recession disproportionately affected lower-class men and led to an increase in no-earner households (Sani 2017).

Parenthood is a significant factor correlated with the division of labour. In the full sample (**Table 3-3**), couples with more children are more likely to be classified into any type of the division of labour other than the less traditional one. This is even true for the least traditional type, although the size of the coefficients is the smallest. This correlation between underemployment and parenthood, even for men, is also found in previous studies, highlighting men's cost of childrearing (Baizán 2007, Schmitt 2012, Inanc 2015). The social welfare system, which could compensate the financial pressure brought by underemployment and childrearing, may be one reason. Meanwhile, given the limited and expensive childcare services, childrearing in countries like the UK becomes extremely time-consuming. Therefore, underemployed couples in the UK may have limited financial pressure but are rich in time to rear more children.

3. 6. 3 The Effect of the Division of Labour on Fertility

The above results show that over the years, parents are less likely to be classified into the male-breadwinner type. This change indicates that the relationship between fertility and the division of labour may have changed. In what follows, we first examine whether the division of labour has any effect on childbearing. Specifically, we would like to examine that, in different periods, whether the (positive) effect of adopting a male-breadwinner model (vs. a dual-earner one) on the likelihood of having a child would be the same. A couple-level fixed-effect logistic model (Equation 3-1) is used to predict the odds of having a new child. Those who are going to have a new child within the next 12 months (6.2% of the sample) are dropped to minimize potential anticipation effect or the impact of physiological or medical reasons on women's working time. Because this is a logistic fixed-effect regression analysis, only those couples (2,246) who do experience a change in the number of children are analysed.[32] The results of the key estimated coefficients are reported in **Table 3-5**.

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[32] Now we have couples who had a change in the number of children during the observational period. In certain couple-wave pairs, there was a change, but in other couple-wave pairs, this change did not happen. Fixed-effect regressions ask in which two pairs this event is more likely to happen. 53% of the time a couple in this sample displays a dual-earner model, 55% of the time a male-breadwinner type, 42% of the time a modified male-breadwinner type, 31% a female-breadwinner type, and 44% the couple displays a precarious couple type.

Table 3-5. Fixed-effect logistic regressions predicting the log odds of having a child associated with the division of labour type

	All births	
	Basic	Interaction
Division of labour type (ref: Dual-earner)		
Male-breadwinner	0.376**	0.933***
	(0.115)	(0.182)
Modified male-breadwinner	0.248*	0.540**
	(0.103)	(0.173)
Female-breadwinner	0.052	0.042
	(0.216)	(0.216)
Precarious	0.292	0.279
	(0.166)	(0.168)
Period (ref: 1991-2000)		
2001-2008	-0.401**	-0.170
	(0.143)	(0.183)
2009-2017	-0.169	0.263
	(0.253)	(0.273)
Interactions		
Male-breadwinner * 2001-2008		-0.527*
		(0.217)
Modified male-breadwinner * 2001-2008		-0.307
		(0.226)
Male-breadwinner * 2009-2017		-0.989***
		(0.227)
Modified male-breadwinner * 2009-2017		-0.473*
		(0.224)
Couples	2,246	
Couple-year observations	15,985	

Note: Records where new child observed within the next 12 months are dropped. These models include number of children, wife's age and its squared term, husband's age and its squared term, cohabitation, duration of partnership, and number of years until the next observation.

Standard errors are in parentheses. * p< .05 ** p< .01 *** p< .001

First, the basic model compares couples with different division of labour arrangements. The results show that the odds of having a new child in the next observation is 46% ($e^{0.376} - 1$) higher if a couple adopt a male-breadwinner model

rather than the dual-earner one. Then, we include interaction terms between the male-breadwinner and the modified male-breadwinner types and the period indicator.[33] The statistically significant negative estimates of the interaction terms indicate the variations in the relationship between the division of labour and fertility. The positive effect of the male-breadwinner model on the birth of a child has declined significantly in later periods. For example, in the period of 1991 to 2000, the odds of having a new child almost triples ($e^{0.933}$) if a couple adopt a male-breadwinner model rather than the dual-earner one. However, in the period of 2001 to 2008, the odds of having a new child increases only by 1.50 ($e^{0.933-0.527}$) times with the same change in the division of labour. Most interestingly, from 2009 to 2017, the shift into the male-breadwinner arrangement has little effect ($e^{0.933-0.989} - 1$) on having a new child. The same trend also applies to the originally positive effect of the modified male-breadwinner type. We then calculate the exponentiation of the estimated coefficients and plot the odds ratio with a 95% confidence interval in each period in **Figure 3-2**. The reductions of the positive effects of the male-breadwinner and the modified male-breadwinner types over time are obvious. In summary, the positive effect on fertility associated with the traditional gendered division of labour declines over time.

[33] We also interact all of the division of labour categories with the period indicator. First, the estimates of the male-breadwinner and the modified male-breadwinner types and their interactions with the period indicators remain unchanged. The shift into the precarious type is less likely to have a birth in later periods. Because of the small number of the observations of the least and the precarious types, which may render the results unstable, hence we choose to conduct and report interactions with the most and more styles.

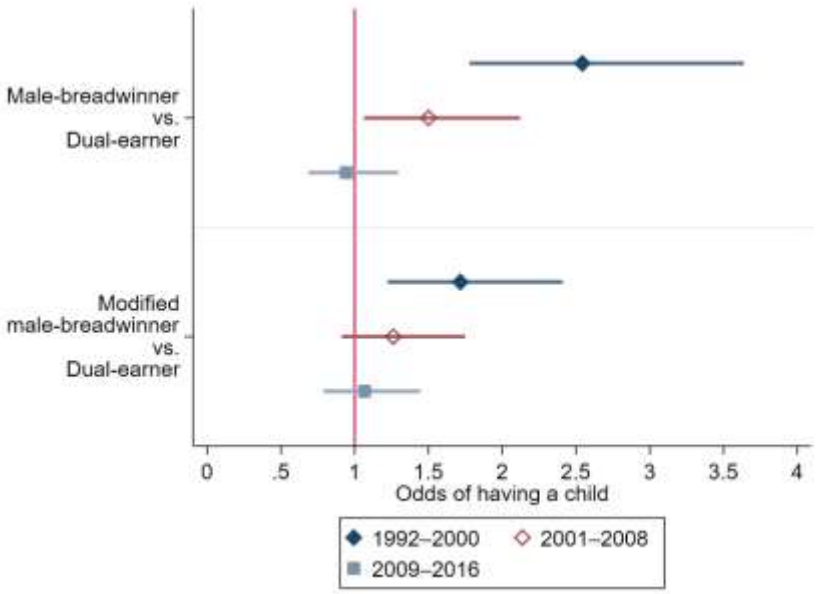


Figure 3-2. The effects (represented by odds ratio) of the division of labour type on having a new child

3. 6. 4 The Effect of Parenthood on the Division of labour

This finding of a weakened positive effect of the specialization family model on having a child implies that the cost of parenthood may become less gender-specific. That is, the traditionalizing effect of childrearing is expected to become weaker over the years.

We use the fixed-effect model (Equation 3-2) to examine the traditionalizing effect of childrearing on the division of labour. Because the fixed-effect logistic regressions only analyse couples who have experienced a change in the division of labour, focusing on the specific transition between every two of the five division of labour types would substantially reduce the sample size. To be consistent with the theory and to boost the occurrence of changes in the division of labour, we aggregate and rank the dual-earner and the female-breadwinner types into the less traditional group (the reference group) and the male-breadwinner and the modified male-breadwinner types into the more

traditional group.[34] We then evaluate whether the shift between the two groups and the number of children are associated. We have also excluded couples with children younger under the age of one and those women on maternity leave to minimize the impact of temporal disruptions to a couple's work-family arrangement. A total of 3,597 couples experienced a transition between these two groups.[35] **Table 3-6** presents the estimates from the fixed-effect logistic models.

As expected, an increase in the number of children has a very strong traditionalizing effect on the division of labour. For instance, having one child is associated with multiplying the odds of being in the more traditional group by a factor of 12.96 ($e^{2.562}$). Having two or more children is associated with multiplying the odds by 33.5 times ($e^{3.511}$).

The time-varying effect of parenthood is reflected through interactions between the number of children and the period indicator. Estimates of this interaction term report whether the effect of the same change in the number of children in the latter two periods differs from that in the reference period of 1991 to 2000.

[34] We have conducted the same analysis with more refined classifications, such as (1) the male-breadwinner type vs. the dual-earner type, (2) the modified male-breadwinner type vs. the dual-earner type, and (3) the male-breadwinner type vs. the modified male-breadwinner type. Precarious couples are not included in these analyses. The conclusion from each regression remains the same: the traditionalizing effect of parenthood gets weaker over the years. These tables are available upon requests to the authors.

[35] Please refer to Note 7 for sample selection concerns.

Table 3-6. Fixed-effect logistic regressions predicting the log odds of belonging to the more gendered division of labour group associated with the number of children

	Basic	Interaction
Number of children (ref: zero)		
One	2.562***	2.998***
	(0.102)	(0.165)
Two or more	3.511***	4.413***
	(0.129)	(0.197)
Period (ref: 1991-2000)		
2001-2008	0.234**	0.778***
	(0.085)	(0.148)
2009-2017	0.068	1.019***
	(0.154)	(0.218)
Number of children * Period		
One * 2001-2008		-0.503**
		(0.174)
Two or more * 2001-2008		-1.053***
		(0.180)
One * 2009-2017		-0.882***
		(0.192)
Two or more * 2009-2017		-1.537***
		(0.223)
Cohabitation	-0.266**	-0.241**
	(0.091)	(0.089)
Partnership duration	0.005	-0.017
	(0.049)	(0.050)
Women's age	-0.263*	-0.266*
	(0.106)	(0.105)
Women's age square	0.002+	0.002*
	(0.001)	(0.001)
Men's age	0.303**	0.296**
	(0.100)	(0.099)
Men's age square	-0.003***	-0.003**
	(0.001)	(0.001)
Couples	3,597	
Couple-year observations	26,439	

Standard errors are in parentheses. * p< .05 ** p< .01 *** p< .001

The negative estimates of the interaction terms show that the traditionalizing effect of the number of children becomes weaker. For example, an increase in the number of children from zero to one is associated with multiplying the odds of falling into the more traditional group by 20 times ($e^{2.998}$) in the period of 1991 to 2000. However, from 2001 to 2008, when the same change in the number of children occurs, the odds of falling into the more traditional group is only associated with multiplying a factor of 12.12 ($e^{2.998-0.503}$). Similarly, from 2009 to 2016, having one child is only associated with multiplying the odds by a factor of 8.30 ($e^{2.998-0.882}$) only. The same trend is observed or even stronger for couples having two or more children. Based on this model, we plot the estimated odds ratio with a 95% confidence interval of the number of children in **Figure 3-3**. It is evident that this traditionalizing effect of childrearing is much weaker in later periods.

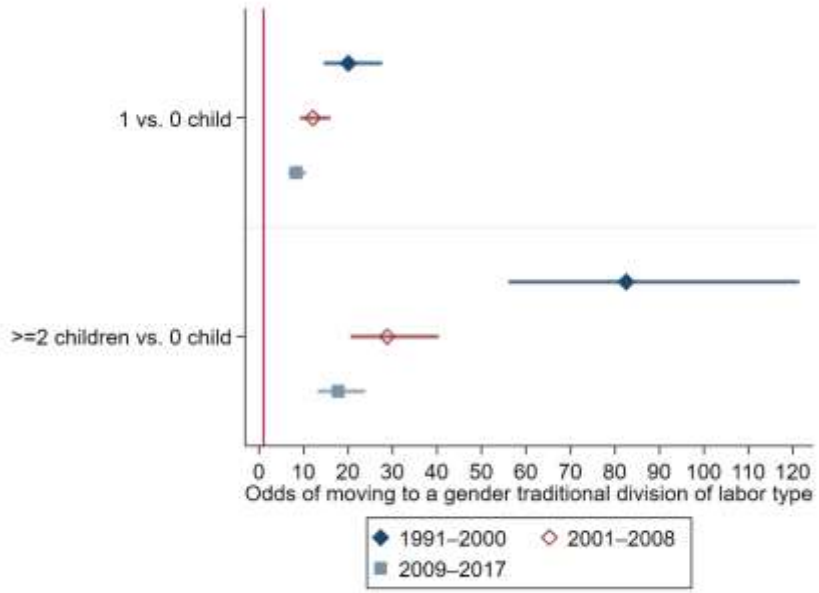


Figure 3-3. The effects (represented by odds ratio) of childrearing on the gendered division of labour

3.7. Discussion and Conclusion

In this paper, we examine the relationship between the division of labour and fertility. More importantly, we investigate how this relationship has changed over the past three decades. Instead of relying on a single indicator to represent the level of gender equality among couples in previous studies, we use multiple indicators and LCA to construct a couple-level division of labour measure. We then use this measure to predict the couple's fertility behaviour and reciprocally as a dependent variable to see how parenthood alter the division of labour. The weakening relationship between the traditional division of labour and fertility from 1991 to 2017 in Great Britain, as documented in this paper, reveals the most recent changes in micro-level family equilibrium among couples. Different from earlier work, which often misses out the time-varying dimension of the relationship between gender equality and fertility, our work contributes to the current literature by highlighting how the relationship between gender equality and family formation at a micro-level evolves with the gender-revolution progress.

The use a couple-level, holistic approach to identify different levels of traditionalism in the division of labour has enabled a better measure of the gender equality level within couples because this division of labour classification considers 1) the division of labour in both the public and private spheres and 2) how the two spheres are matched. Economic resources play a determining role in shaping the division of labour because the five-class typology identified in this paper partly echoes earlier classifications solely based on employment match, such as the male-breadwinner, the 1.5 earner, and the dual full-time earner families (Connolly et al. 2016, Ellingsæter 2013). However, what is different is that our typology reveals a pattern that the same division of labour type include various employment status matches, shares of income, and shares of housework. One example is that when a couple is classified as the relatively gender-egalitarian "dual-earner" type, both the husband and the wife work full-time. However, couples who both work full-time may

not necessarily belong to the egalitarian "dual-earner" type because many of them share housework in a highly unequal way, and those couples should be grouped into the more traditional types, e.g., the "modified male-breadwinner" type. Similarly, couples with women doing 50% to 75% of housework are conventionally considered to be "gender equal". However, those couples spread out across the five types once the couple's performance in the public sphere is considered. This complexity calls for a reconsideration of the meaning of gender equality within couples. Gender relations are reflected not only by how the earning power or housework are independently divided between spouses but also by how the division of labour in the two spheres is combined. Previous research, which uses a single indicator or multiple indicators additively, does not effectively capture the gender relation in marriage and is subject to the risk of misrepresenting the gender equality level within couples.

The question about whether the gendered division of labour and fertility are associated does not have a simple "yes" or "no" answer. Results confirm the time-varying relationship between the division of labour and fertility. The interactions with the period indicator enable the identification of the within-couple association between the division of labour and fertility in different periods. This methodological innovation differs from the common approach that could not differentiate between- and within-couple differences. We find out that couples adopting the male-breadwinner arrangement used to be more likely to have a new child than those with a dual-earner model. It is no longer the case now. This shift challenges the conventional assumption that the traditional family model is conducive to childrearing.

On the other hand, over the years, couples are much less likely to conform to the male-breadwinner female-housekeeper arrangement following the birth of a child. Changes in both directions reflect that the cost and expectation of parenthood are becoming less gender specific. The male-breadwinner specialization model, being developed in the context of substantial gender

inequality, has started to lose its grounds. Our findings support the gender revolution framework — the prevalence of egalitarian families will not hamper fertility with the continuation of the gender revolution. However, the argument of a fertility-promoting effect of gender equality has yet been supported.

This research is a pioneer in examining time-varying patterns in the dynamics between the division of labour and the birth of a child. The changing family equilibrium in Great Britain, reflected through the dampening positive relationship between the traditional gender division of labour and fertility, reveals the consequences of the undergoing gender revolution on family lives from the 1990s. We provide a few potential explanations here. For instance, women's economic position in the family is becoming increasingly important. The surge in the proportion of precarious couples also indicate that these selected in later periods could be more economically vulnerable. As the economic uncertainties and difficulties grow, a dual-earner model increases the financial security of the family and is thus preferable than a traditional single-earner model. Over the years, fewer families would decide to follow the traditional division of labour or "do gender" when they plan to or have become parents. Alternatively, the changing gender norms may also influence how people are selected into a stable partnership. Couples formed in later periods may hold more liberal gender attitudes than those formed in earlier periods. Accordingly, their fertility decision would not be strongly discouraged by a deviation from traditional gender roles, and their division of labour would be less affected by the transition into parenthood. Whether it is due to the period effect or the cohort effect that different people are selected into a partnership over the years is not the focus of this paper. Our paper, nevertheless, sheds lights on how the relationships between alternative family models and fertility evolve from the 1990s within the gender revolution framework.

Our paper has a few limitations. First, the effect of the gendered division of labour on fertility

may differ for the first birth or higher order births. Some prior work has noted that economic resources have greater constraints on the birth of a first child than higher order births (Dommermuth, Hohmann-Marriott, and Lappegård 2015, Kreyenfeld and Andersson 2014), but others do not find this difference (Miettinen, Lainiala, and Rotkirch 2015). In a supplementary analysis (**Appendix Table A4**), we noted that compared to the dual-earner type, the male-breadwinner and precarious types seem to be less conducive for the first birth but more conducive for higher order births. Nevertheless, the pattern of a declining positive link between the male-breadwinner model on fertility over years is clear for both first and higher order births in the interaction models. Due to the small sample size that may render the estimates unreliable, we do not report the results in the main texts. We believe that future work with larger samples would provide valuable insights into the complexity of fertility decisions.

Second, this paper focuses extensively on changes in the micro-level relationship between gender equality and fertility within the gender revolution framework, and precarious couples where both spouses do not work full time fall out of the scope of this paper. The number of these families is small but has been increasing over time in the past decade due to rising economic uncertainties. Previous work has found out that although precarious couples were more likely to have children than dual-earner ones in the past, it is less likely to be the case in more recent years in the UK (Inanc 2015). Economic uncertainties and difficulties are becoming more detrimental to childrearing over the years. Future research should investigate how the macro-level economic condition might moderate the relationship between precarity and fertility.

Despite these limitations, this paper contributes to the literature by illustrating that the association between the traditional division of labour and fertility has been evolving over time. The positive association between the traditional division of labour and fertility should be applicable in countries where the gender equality level is relatively low with significant conflicts

between women's employment and childrearing responsibilities. In countries where the gender equality level is relatively high, and the childcare services are inexpensive and widely accessible, the association between the gendered division of labour and fertility could be weak, as what has just emerged in the UK in the late 2010s. Although we agree that the specific relationship between the gender division of labour and fertility differs across countries, the trend of a weakening positive relationship between the traditional gender division of labour and fertility is expected in developed countries where the gender revolution has been continuing for decades.

CHAPTER 4: MARRIAGE, PARENTHOOD, AND GENDERED TIME ALLOCATION IN GREAT BRITAIN: 1992-2017

Marriage, Parenthood, and Gendered Time Allocation in Great Britain: 1992-2017

Abstract

This paper presents the distinct and changing roles of the transitions and durations of marriage and parenthood in shaping gendered time-use patterns in Great Britain. Using harmonized data from BHPS and UKHLS (1992-2017), the results from fixed-effect linear regressions show that, soon after marriage, women's housework time and men's paid work time increase. As marriage continues, women's paid work time and men's housework time decrease, thereby enhancing traditional gender roles. Both women and men reduce paid work time and increase housework time to cope with the arrival a new-born child. As the child grow up, mothers' paid work time increases, and their housework time decreases, whereas fathers' time allocation remains stable. The much more substantial shift into the caregiver role for women than for men drives the strong traditionalizing role of parenthood on gendered time-use pattern. Over the last 25 years, the traditionalizing role of marriage has almost disappeared for women in the 2010s, and the traditionalizing role of motherhood has also weakened. However, the association between time allocation and family formation has changed little among men, implying that the "second half" of the gender revolution has made little progress in Great Britain.

Keywords: gender, life course, time use, housework, marriage, parenthood

4.1. Introduction

In the last few decades, women's and men's time-use patterns have been converging. Women spend more time in paid work with growing labour force participation, and men tend to do more domestic work (Altintas and Sullivan 2016, Kan, Sullivan, and Gershuny 2011, Sayer 2016). However, marriage and especially parenthood still represent a vital source of gender inequality. Mothers are less likely to be employed full time, suffer from a wage penalty, and perform the lion's share of domestic work, whereas men, especially husbands and fathers, tend to enjoy an advantage in the labour market (Hodges and Budig 2010, Yavorsky, Kamp Dush, and Schoppe-Sullivan 2015).

Given the significance of marriage, and especially parenthood, in shaping gendered time-use patterns, this article has two aims. We first seek to obtain a more nuanced perspective on the roles of marriage and parenthood by separating these life-course events into transitions and durations. Previous studies have documented that people's time allocation patterns, especially women's, are strongly associated with their marital and parenthood status (Borra, Browning, and Sevilla Sanz 2017, Craig and Mullan 2010). These studies typically treat family status as static rather than as a trajectory with transitions and gradual changes. If married women do more housework than unmarried women, when does this difference appear, and how does it accumulate? Do women immediately do more housework upon marriage or gradually increase their housework time over the course of marriage? Some studies have employed a life-course perspective to analyse the dynamics of people's time allocation. However, they either focus on age, and thereby no specific life events are targeted (Leopold, Skopek and Schulz 2018), or they select couples, and thereby overlooking the status transition from being single to being partnered (Baxter, Hewitt, and Haynes 2008, Craig and Mullan 2010, Nitsche and Grunow 2016). Studies using cross-sectional time diary data provide important descriptive analysis about gendered time-use patterns for people of

different family status, but the results could be biased due to the selection of people with different life style preferences into the various family status, and these results often mix up the age and cohort effects (Anxo et al. 2011, Neilson and Stanfors 2014). In addition, many studies examine only housework time (Baxter, Hewitt, and Haynes 2008, Borra, Browning, and Sevilla Sanz 2017, Gupta 1999). We do not know whether the effects of marriage and parenthood on housework time will always correspond to a reversed effect on paid work time. For example, if marriage increases women's housework time, does it simultaneously lead to a reduction in women's paid work time? Furthermore, in the previous literature, the role of parenthood is often the focus, and changes in time use before and after the birth of a child *among couples* are regarded as the effect of parenthood (Kühhirt 2012, Percheski and Wildeman 2008, Schober 2013c). These studies have overlooked the changes that simultaneously occur over the course of the partnership and that may *exaggerate* the traditionalizing effect of parenthood. The lack of a comprehensive analysis about the roles of these transitions and the durations of both marriage and parenthood also leads to another unanswered question: are the gendered time-use patterns primarily determined by critical life events such as getting married or having a child, or are gendered time-use patterns gradually formulated over the course of marriage and/or parenthood?

Second, we would like to know whether the relationship between gendered time allocation and family formation has changed over the past three decades. Marriage is an important institution for traditional gender display (Cherlin 1978, Gray 1997); however, the magnitude of the traditionalizing roles of marriage and parenthood may have been weakened given the progress of the gender revolution. Again, the role of parenthood turns out to be the only focus of previous work. Studies using *cross-sectional* time-use data have shown that *among couples*, the gender gap in time use between parents and non-parents was reduced in Sweden, Germany, and Canada, but not in Italy and Australia during the 1990s (Craig, Mullan, and Blaxland 2010, Dribe and Stanfors 2009, Neilson and Stanfors 2014). A recent study using the harmonized BHPS and the UKHLS

Data notes that parents are less likely to conform to a traditional division of labour when they have more children (Zhou and Kan 2019). However, these studies pool women and men together, and women's and men's *respective* contributions to the observed shrinking gender gap remain unknown.

Understanding women's and men's respective contributions to the observed weakened traditionalizing effects of marriage and parenthood could determine whether the second half of the gender revolution has begun. The gender revolution has been argued to be highly "uneven" or even "stalled" following the slowed improvement in the gender pay gap since the early 1990s (Cotter, Hermsen, and Vanneman 2011, England 2010). Meanwhile, men's contributions to domestic work remain extremely limited, despite women's outstanding performance in education and the labour market (England 2010, Sullivan, Gershuny, and Robinson 2018). Nevertheless, studies have increasingly suggested that men have been doing more domestic labour over the last few decades (Altintas and Sullivan 2017, Leopold, Skopek, and Schulz 2018, Siegel 2017), implying that the "second half" of the gender revolution, which features men's active involvement in domestic labour, has been occurring. Evaluating the changing roles of marriage and parenthood in enhancing gender-specific time-use patterns over time for women can reveal whether the gender revolution has slowed or even stalled. Assessing whether men's time allocation patterns have become more dependent on men's family status over the last three decades can help clarify whether the gender revolution has indeed progressed to the next stage with men shouldering more domestic responsibilities, especially core housework duties, as husbands and fathers.

Using combined data from the British Household Panel Survey (BHPS) and Understanding Society (referred to as the UK Household Longitudinal Study (UKHLS) in the following text), we evaluate changes in paid work time and housework time during the transitions into and over the course of marriage and parenthood. The longitudinal nature of the data enables the application

of fixed-effect models. These models predict changes in time allocation for the same individual as their family status changes (e.g., either the experience of transitions such as getting married or having a child or the experience of durations such as the course of a marriage or one's children's growing up). We further examine whether the time allocation dynamics during the family formation and development process changed from 1992 to 2017. Women and men are analysed separately to examine whether women's time allocation has been less responsive to marriage and motherhood and whether men's time allocation has become more responsive to family responsibilities in the last 25 years.

4.2. Theoretical Background and Previous Work

In this section, we discuss three theories that are commonly used to explain why marriage and parenthood shape women's and men's time allocation differently. We review the most recent work and propose several predictions of the dynamics of time allocation as families form and develop. Finally, we introduce the social context in the UK to facilitate a better understanding of the potential changes in the role of family in shaping gendered time-use patterns.

4. 2. 1 Gendered Time Allocation and Family Formation

There has been a theoretical consensus that family is at the root of gendered time-use patterns. The *economic approach* suggests that the utility of a family can be maximized through specialization, whereby spouses allocate their effort to market labour work and domestic labour work based on their relative comparative economic advantages. The one who earns higher wages, usually the husband, assumes the primary responsibility for paid labour. The other person, often the wife, is primarily responsible for domestic work (Becker 1981, 1985). Alternatively, the intra-household *bargaining perspective* argues that the one who controls more resources has greater bargaining power and is more able to achieve their preferred outcomes (Lundberg and Pollak 1993,

Manser and Brown 1980). Accordingly, the undesirable responsibilities are allocated to the person with fewer resources. Given that housework is largely considered boring, repetitive, and undesirable (Blood and Wolfe 1960, Gershuny 2013, Sullivan 1996), married men, who usually enjoy greater bargaining power in a marriage, are likely to allocate the housework burden to their wives.

In addition to the micro-level calculation and bargaining between partners, another perspective emphasizes the roles of norms and values. Marriage and parenthood have well-defined values and clearly structured norms for appropriate husband/father and wife/mother behaviours (Cherlin 1978). A "good" husband and/or father is first expected to be a "good provider" (West and Zimmerman 1987). In contrast, as wives and mothers, women should prioritize the caring needs of her family (Garey 1999, Hays 1996, Mercer 2004). By "*doing gender*", women and men internalize and perform the expected roles imposed by gender norms (Stryker 1968, Zimmermann and Konietzka 2017). Accordingly, we would expect that married women and mothers would spend more time on housework and less time on paid work than unmarried women and non-mothers, respectively, whereas married men and fathers would spend more time on paid work and less time on housework than unmarried men and non-fathers, respectively.

4. 2. 2 Time Allocation, Marriage, and Parenthood

The above theories, however, do not discuss variations in the levels of specialization during the family formation and development processes. Marriage and parenthood are expected to shape gendered time-use patterns through different processes. When the demand for housework and care work has not dramatically increased, marriage per se may reveal an incremental and gradual formulation of gendered time-use patterns through day-to-day interactions and bargains. However, gendered time-use patterns could also be immediately revealed right upon marriage if people finally get the chance to realize their internalized gender norms or if women immediately assume

their caregiver role given their husbands' substantial comparative advantage in earnings. Time-use patterns, on the other hand, are expected to be the most traditional right after the birth of a child when women minimize paid work time and maximize unpaid work time to meet the childcare demand.

Specifically, with respect to the role of the transition into marriage, women are more likely to share additional housework that results from this transition, such as cleaning a larger house or a change in the cleanliness standard. The effect of the transition into marriage on men's housework time is less obvious. Men may not change their housework time because their partners have already shared additional tasks; they might even reduce their housework time if their partners have taken over some of the work that they used to do.

The small differences in daily time-use practices right after the transition into marriage accumulate as the marriage continues, expanding the already existing gender gap in earnings and bargaining power. The initial increase in women's housework time could lead to a decrease in women's paid work time as marriage continues, and again, re-increases women's time spent on housework. Men's time spent on housework may reduce accordingly, which may then benefit their time on paid work. In summary, as the marriage continues, women's paid work time will decrease, and their housework time will continue increasing; and the opposite works for men's time allocation.

Both the cross-sectional and longitudinal research has confirmed that there is an increase in housework time for women due to marriage. Nonetheless, the effects of marriage on men's housework time are mixed. Two studies using data from the two waves of the National Survey of Families and Households (NSFH) conducted during the periods from 1987 to1988 and 1992 to 1993 in the United States (US) has found that right after marriage, there is little change in men's housework time, whereas women increase their time spent on housework (Gupta 1999, Hersch

and Stratton 2000); the same is observed using data from the German Socio-Economic Panel (Pollmann-Schult 2011). Borra et al. (2017) used panel data and fixed-effect models from the US (PSID), the UK (BHPS), and Australia (HILDA) and noted a 3.47-hour increase of routine housework per week for women and a 1.8-hour drop for men due to changes in marital status in the UK.

Fewer studies have investigated whether these gender-specific changes in housework time could spill over to paid work time. One study using a sample from the BHPS 1994 to 2005 data notes little change in both women's and men's paid work time as the marriage continues (Kan and Gershuny 2009). Two studies using data from the National Longitudinal Survey of Youth 1979 Cohort (NLSY79) finds that in the US, marriage is associated with an increase in both women's and men's paid work time, although the increase is larger for men than for women (Astone et al. 2010, Killewald and Gough 2013).

Overall, these studies confirm the traditionalizing effect of marriage on women's housework time, but the effects of marriage are limited on men's housework time and on paid work time for both women and men. Again, previous studies treat marriage as a static status and do not differentiate the roles of the transition into marriage and the course of marriage in shaping gendered time-use patterns. One couple-level study in western Germany notes that the husband's relative share of housework declines over the course of a marriage, although the authors do not state whether this decline is due to women's increased housework time or men's decreased housework time (Grunow, Schulz, and Blossfeld 2012). We still do not know the initial adjustment in time allocation upon marriage, and how the time spent on the both paid and unpaid work of women and men evolves as marriage continues. Moreover, the discrepancies in findings could be due to the fact that the associations between time allocation and marriage vary in different social contexts, and this study will address this issue by analyzing how these associations vary across

different historical periods in a single country.

Marriage per se should foster gender specialization only to a limited extent because a highly specialized arrangement is a risky strategy and is expected to appear only temporarily when necessary. According to Oppenheimer (1997), the welfare of a family in which couples specialize is at higher risk than that in marriages in which both spouses remain active in the labour market. Families with a single earner may suffer from financial difficulties if the primary earner becomes unemployed or has health issues or is subject to other sudden incidents that demand a large amount of money. The great uncertainties in the labour market and economics along with the process of globalization also makes the male-breadwinner model a luxury (Blossfeld et al. 2008, Zhou and Kan 2019). Therefore, families are expected to follow the single primary-earner model only when *necessary*.

Given that caring for a young child demands a substantial time investment, paid work time is often negatively affected. Because women are socially expected to exchange their work time for fulfilling their family responsibilities, there should be a substantial reduction in women's paid work hours and a surge in their housework time soon after the birth of a child. As young children grow up to be more independent, the housework burden will be reduced because certain housework tasks such as preparing food specifically for a young child or bottle-cleaning are no longer needed, the children spend most of their time at school and are better able to organize themselves, and they may even help in doing some of the housework. Accordingly, women with older children should be able to have more time available for paid work, and the time allocation pattern will be less gendered.

Previous research has consistently confirmed the strong impact of the transition into parenthood on women's time use. For example, studies using time diary data report that the amount of unpaid work done by mothers (six to twelve hours per day) doubles the amount done

by non-mothers although more than 80 percent of the difference is due to childcare (Craig 2006, Craig and Bittman 2008). Using the US data from the 1996 to 2008 panels of the Survey of Income and Program Participation that follow women 12 months after the birth, Lu et al., (2017) reports that 24 percent of women employed before childbirth will drop out or scale their work time. A similar proportion (28 percent) is reported in an Australian study (Argyrous, Craig, and Rahman 2016) analysing first-time parents with a child one year old or younger from the Longitudinal Survey of Australian Children in 2004; among those who continue to work while caring for a new-born, women's work time is reduced by 14 hours per week. Another study (Baxter, Hewitt, and Haynes 2008) focuses on couple's housework time and finds that couples from a 1996/1997Australian longitudinal panel study report an increase in women's housework time by 32 percent if they experience childbirth. As soon as the condition requiring one spouse to substantially reduce working hours has been alleviated, the person who specializes in unpaid labour, usually the woman, returns to the labour market to maintain a dual-earner family model. Based on data from the 2003 and 2004 American Time Use Survey, Kimmel and Connelly (2007) focus on women and report that mothers with a very young child (aged 0 to 2) spend 69 fewer minutes on paid work than non-mothers on weekdays, and this difference disappears when the youngest child has reached age 13 or older. Additionally, having one child is associated with an approximately 20-minute increase in housework per day, which does not vary with the age of the child. Using fixed-effect regressions and the German Socio-Economic Panel data, Kühhirt (2012) follows the same individual and shows how parenthood leads to a long-term change in women's time allocation. Women cut their daily paid work time by five hours and spend one to 1.5 more hours on housework per day when they become mothers. The amount of paid work slowly increases as the children grow older. When the youngest child grows from zero to ten years old, women's daily paid work time increases only by about two hours, and their housework time remains stable. When the youngest child has reached 15 years old, there is still a three-hour gap

in daily paid work time between mothers and non-mothers in Germany. The shift away from the male-breadwinner model as the children grow older is also observed in Langner's couple-level study (Langner 2015) using the same data.

The relationship between time allocation and parenthood for men is less consistent than that for women, partly because changes in men's time allocation due to parenthood is extremely limited. Many studies do not find that fathers work longer hours than non-fathers (Argyrous, Craig, and Rahman 2016, Craig and Mullan 2010, Killewald and García-Manglano 2016, Koslowski 2011, Sanchez and Thomson 1997); however, some US studies find that unmarried men tend to increase their paid work time when they become fathers (Astone et al. 2010, Percheski and Wildeman 2008). In family-friendly welfare states such as Norway, men are even found to curtail their working hours (Bünning and Pollmann-Schult 2016, Dommermuth and Kitterød 2009). As the children grow, Norwegian and German men born in the 1960s slightly increase their paid work time (Dommermuth and Kitterød 2009, Pollmann-Schult and Reynolds 2017). Interestingly, that is not the case for younger men in Germany (Pollmann-Schult and Reynolds 2017, Kühhirt 2012). With regard to men's housework time, many studies report little change before and after the birth of a child, and some even find a decrease in men's housework time because mothers have already assumed most of the domestic responsibilities (Baxter, Hewitt, and Haynes 2008, Gupta 1999, Kan and Gershuny 2009, Kühhirt 2012, Sanchez and Thomson 1997). However, a number of other studies also document that men temporarily and slightly increase their housework time as fathers, and the increase is more obvious among men with more liberal gender attitudes (Hersch and Stratton 2000, Killewald and García-Manglano 2016, Okun and Raz-Yurovich 2019).

In summary, women's time allocation is most strongly affected by parenthood, whereas the effect of parenthood on men's time allocation is much more limited and mixed. As the children grow older, the time-use pattern becomes more gender equal, and it is driven by changes in women

behaviour. While most of the prior studies analyse the effect of parenthood among couples, they ignore the fact that partnership and childrearing have a joint impact on how women and men allocate their time, and the effect of parenthood per se may be misrepresented. Furthermore, the social contexts in which gender and family are situated have changed over the past three decades, and the previously documented relationship between time allocation and family status may have evolved.

4. 2. 3 The Changing Gender and Family over the Last Three Decades

Theories are made in the specific social and historical context and are restricted by the social context where the theories are derived. The gender-specific relationship between time allocation and family status is dependent on the assumptions and conditions of the abovementioned theories. If the social context that enables the establishment of these theories no longer holds, the predicted relationship between time allocation and family status should change. For example, if the husband's comparative economic advantage over the wife has become less substantial, the utility gained by specialization will be smaller (Bavel, Schwartz, and Esteve 2018, Zhou 2016), which will render the specialization arrangement less attractive. Similarly, the bargaining power between spouses will also change as women have gained greater economic power than before. Additionally, if the gender norm for women to provide care and for men to earn has dampened, fewer people will "do gender" when they form families. In sum, improved gender equality will undermine the condition that promotes those mechanisms that lead to a strong association between gendered time-use patterns and family formation.

In the UK, women's and men's economic positions have continuously converged over the last three decades. Women's economic resources have become critical as men face growing difficulties in securing jobs and earnings with the increased economic uncertainties following extensive globalization and the 2008 economic recession (Blossfeld et al. 2008, Sani 2017). For example,

the employment rate for women rose from 62.7 percent in 1989 to 70.5 percent in 2017, and the employment rate for men dropped from 82.3 percent in 1989 to 79.8 percent in 2017 (Office for National Statistics 2018). The gender pay gap based on median hourly earnings changed from 27.5 percent in 1997 to 21.9 percent in 2007 and finally dropped to 18.4 percent in 2017 (Office for National Statistics 2017b).

There have been a few new family and childcare policies that aim to promote gender equality or to alleviate the childcare burden for families with young children. Childcare provision is becoming more supportive. The hours of free childcare services per year have increased from 412 in 1998 to 570 in 2010 and now cover all 3 and 4-year-olds in England, as well as 2-year-olds from disadvantaged background (National Audit Office 2016). Since 2015, eligible women and men can share parental leave when traditionally it was only the mother who could take paid time off work. In addition, the gender norm for women to provide care has also weakened. The proportion of people who agree that mothers should stay at home dropped 31 points from 1989 to 2012, although 33 percent of individuals polled still supported this view in 2012 (Scott and Elizabeth Clery 2013). One study analysing couples using harmonized BHPS and UKHLS data found that couples were less likely to shift to a traditional gendered division of labour when they had children from 1991 to 2017 and explained that the cost of parenthood has become less gendered (Zhou and Kan 2019). In sum, the gender gap in earning power is shrinking, women are gaining a stronger position in bargaining, and gender-differentiated values and expectations are losing ground.

However, differentiated expectations persist for women and men. Even in 2018, over half of people support the idea that women should take longer leave to care for children than men (British Social Attitudes 2018). Women are still much more likely to curtail their paid work time to fulfil their family responsibilities, whereas men's time use is unlikely to be affected by their family

responsibilities. In a sample of fathers and non-fathers in 1999-2000 data from the BHPS and National Child Development Study, Dermott (2006) finds that men's paid work time is not dependent on their fatherhood status. The same is observed in Schober's work (2013c), which analyses 310 couples from the 1992-2007 BHPS data. Not surprisingly, the clear gender-specific connection between marriage/parenthood and time allocation continues. Nonetheless, given the abovementioned gradual changes in the labour market, family policies, and social norms, it is reasonable to expect the traditionalizing effect of marriage/parenthood on women's time allocation patterns to weaken, whereas there should be a trend over the years that men do more housework and work fewer hours when they become husbands and fathers.

4.3. Data and Method

4. 3. 1 Data and sample

We combine data from all 18 waves of BHPS and the first eight waves of UKHLS. Altogether, these two datasets last from 1991 to 2018 and enable the investigation of whether the association between family formation and time allocation has changed over time. .[36] Data are collected by following the same individuals over time through face-to-face interviews, with refreshed samples included in specific waves. In 1991, BHPS recruited a national representative sample of 5,500 households from Great Britain and successfully collected approximately 10,000 individual interviews. Extension samples from Scotland and Wales and from Northern Ireland were included in 1999 and 2001, respectively. Building on the work of BHPS, a national representative sample of over 40,000 households was redrawn during 2009/10 across the UK in the 1st wave of UKHLS. The old BHPS sample was included from the 2nd wave of the UKHLS survey. This long-term,

[36] 2009-2017 and Harmonized BHPS: Waves 1-18, 1991-2009: Special License Access. [data collection]. 10th Edition. UK Data Service. SN: 6931, http://doi.org/10.5255/UKDA-SN-6931-9

consistent design of data collection enables the investigation of whether the association between family formation and time allocation has changed over time.

We aim to capture changes in people's paid work time and housework time when they enter and stay in marriage or parenthood. Waves in which information about housework was not collected are excluded.[37] We excluded the Northern Ireland samples because they were not included in the BHPS sample before 2001 and may disrupt the time trend. After these restrictions, the observation period covers the years from 1992 to 2018, leaving 80,096 individuals (15 years or older) with 363,699 person-wave records. Women aged between 20 and 45 years and men aged between 20 and 55 years were selected (45,635 individuals). Among the selected individuals who live with a partner, we limited their female partner's age to between 20 and 45 and the male partner's age to between 20 and 55, leaving 42,508 individuals and 163,782 records. We further excluded 5,345 records in which the individuals were full-time students. We now have 40,797 individuals with 158,437 records. The selected sample is most likely to form a partnership, give birth to a child, or be in the labour force.

After excluding observations with missing values, we have 38,827 individuals and 151,712 person-wave records. Of the selected individuals, 68.0 percent of the individuals have repeated observations and are used for fixed-effect regression analyses. As found in other studies that used the same dataset and method, sample selection issues are limited if applying fixed-effect models and will not alter our conclusions (Schober 2013c, Zhou and Kan 2019, Zhou 2017).[38]

[37] The 1st wave (1991) of the BHPS and the 3rd, 5th, and 7th waves of the UKHLS do not collect housework time information. Furthermore, housework information was not collected for individuals interviewed between January and June 2009 in 1st wave of UKHLS.

[38] We have also used random-effects models that utilize a sample further including individuals with only one

To ensure that the analyses focus on the family formation process, we also excluded these records with a divorce, separation, or widowhood status only after the first observation (4,764 records) because these records indicate the occurrence of a marital dissolution.[39] The final sample contains 26,179 individuals with 134,300 person-wave records. All individuals have more than one observation and have the age clock to reflect changes in time spent on paid work or housework as they age. 52% of these individuals experienced transitions into marriage/cohabitation (from being single) or parenthood (having more children) so that changes in time allocation before and after a certain transition could be measured. For individuals who experienced no such transitions or have completed these transitions, those in a partnership have a marriage/cohabitation clock, and those who rear the same number of children have a parenthood clock as well as a marriage/cohabitation clock if they are in a partnership, in addition to the age clock. These two family-related clocks are used to estimate the effect of marriage/cohabitation durations and age of the child on time use.

4. 3. 2 Measures

Weekly working hours

This variable measures the sum of the number of hours normally worked per week and the number of overtime hours worked in a normal week, capped at 80 hours per week. For employees, the question about normal weekly paid working hours is "Thinking about your (main) job, how many hours, excluding overtime and meal breaks, are you expected to work in a normal week?" The

observation. These models produced similar results, though the estimates do not pass the Hausman test, showing the existence of unobserved time-constant factors that are correlated with both the dependent and the independent variables. Therefore, results from the fixed-effect are presented.

[39] Individuals could be observed for multiple waves. If an individual is not of a separated/divorced/widowed status in their first wave but reported belonging to this marital status afterwards, these observations recording this marital status after the first wave are not included in the sample.

question about overtime hours is "And how many hours overtime do you usually work in a normal week?" For self-employed people, the work time question is "How many hours in total do you usually work in a week in your job?" There is no question about overtime for self-employed individuals. People who do not work (18.5 percent) have a value of zero.

Weekly housework hours

Information on housework time is collected by asking "About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning, and doing the laundry?" Individuals' answers are most likely to reflect their time spent on routine housework. It is known that the stylized or questionnaire-based estimates are less accurate than diary-based estimates of housework time. However, the main source of error for the stylized measures does not differ from that for the questionnaire-based measures, and most of the errors are random rather than systematic (Kan and Pudney 2008). Moreover, the panel nature of the surveys enables us to track *changes* in housework time along with individuals' marital and fertility history. Therefore, measures of housework time from the selected surveys are preferred. The reported value is capped at 80 hours per week for this analysis.

We do not examine the time-varying association between childcare and parenthood for two reasons. First, childcare is closely related to the ideals of parenthood and the intergenerational transfer of human and cultural capital. Although both women's and men's time spent on childcare has increased substantially over the years (Dotti Sani and Treas 2016), it is difficult to identify how much of those changes is attributable to changes in gender roles and how much is attributable to the shift to a more intensive parenting norm over the years. Second, there is no information about the exact time spent on childcare in the current dataset. Nonetheless, we used the UK time-use data to examine how time spent on childcare has evolved over the years with cross-sectional models (Appendix: Chapter 4). The results (**Appendix Table A 8**) confirm that both women's and

men's time spent on childcare has increased over the years and the increase in women's childcare time is even greater than men's. Therefore, compared to housework, childcare is less ideal as an indicator of the gendered time allocation pattern.

Marital status

Marital status is classified as single, cohabiting, or married. Because those who changed to a divorced/separated/widowed status after the first observation were excluded, if individuals were observed as divorced/separated/widowed in their first record, they were classified as being single throughout the observational period. These records form 17.2 percent of the single category.

Partnership duration is another indicator of marital status. For people who are currently in a partnership, including those who experienced a transition into marriage or cohabitation as well as those who are in a partnership from the first observation, the duration is the number of years in the current partnership. This variable includes the number of years of cohabitation if they married after cohabiting with the same person. Records where a partnership started in the same year as in the year of observation has a value of zero. Single people are assigned a value of zero for this variable. The squared term of this variable is included to show the non-linear relationship between partnership duration and time allocation.

Parenthood status

The number of own children under age 16 in the household describes parenthood status. This variable has three categories: zero (reference), one child, and two or more children. The age of the youngest child is another indicator of parenthood status. In our sample, the age of the youngest child ranges from zero to fifteen. Records for which there is no child in the household are assigned a value of zero for this variable. The squared term of this variable is included to show the non-linear relationship between the age of the child and time allocation.

Periods

The years when the observations were recorded is grouped into three categories. The reference group covers the period of 1992 to 2000, the second category is from 2001 to 2008, and the last category is from 2009 to 2017. This classification enables the number of years to be evenly distributed in each period. It also clearly separates the two surveys, The first and final periods correspond to the nationally representative samples[40] that are selected for the first time in 1991 and 2009/11, respectively, and followed for eight to nine years. This classification can, therefore, lower the sample bias due to different attrition patterns of individuals being followed for different numbers of years.

Other variables

Age and its squared term are used because time spent on paid work and housework has this curvilinear relationship with age, as shown in many of the previous studies (Bünning and Pollmann-Schult 2016, Leopold, Skopek, and Schulz 2018). This curvilinear relationship is also confirmed in our sample of individuals who are single and childless with their time-use patterns are not (yet) affected by the additional family formation process.[41] One's health condition is correlated with their time use and family formation behaviours and is included in the models. Health condition is a self-rated score on a scale of "excellent" (reference), "good", "fair", and "poor". Educational attainment is coded as first degree or above, some higher qualifications, and General Certificate of Secondary Education (GCSE) level or lower (reference). Only a very small

[40] I only selected samples from Great Britain. The samples from Northern Ireland are not included because it was not included in BHPS before 2001.

[41] A correlation matrix using the selected sample does not show that these time-related variables are highly correlated in a linear way. The correlation coefficient between the duration of partnership and the age of the youngest child is 0.42. This relatively low estimate is reasonable given that many people (10,949 individuals in our sample) experienced a change in the number of children at a certain point, and the age of the youngest child will then shift based on the birth interval rather than the one-year increase in partnership duration.

proportion of people changed their educational attainment in the given sample; excluding this educational variable does not change the results.

4. 3. 3 Analytical techniques

Fixed-effect linear regressions are used to establish the relationship between time spent on paid work and housework and different family conditions for women and men. This approach has three important advantages. First, this method utilizes multiple observations of the same individual and identifies the effect of marriage and parenthood by comparing weekly hours spent on paid work and housework by *the same individual* with different marital or parenthood statuses. Accordingly, fixed-effect models implicitly account for person-specific time-invariant factors (e.g., class background, personality, lifestyle preferences, long-term health conditions) that may correlate with both family status and time-use patterns. Second, this method reduces the risk of inconsistent OLS estimates. Although time spent on paid work and housework often does not present a normal distribution, the changes in these variables are close to a normal distribution and work as the dependent variable in fixed-effect regressions. A further advantage is that this method can cancel out measurement errors caused by people persistently misreporting their time allocation due to certain person-specific time-invariant characteristics.

We also utilize the long-term feature of the two surveys and use interactions between family statuses and the period variable to examine whether the same change in family status, if it occurred in different periods, is associated with different changes in time spent on paid work and housework. These interaction models illustrate how the effects of marriage and/or parenthood on paid work hours and housework hours, after considering time-constant confounders, differ across the three periods.

The first regression model treats the family status as static and relates the weekly hours spent on paid work or housework to the family status without consideration of the differentiated effect

of the transitions and durations. The model is

$$Hour_{it} = \beta Marital_{it} + \gamma Parent_{it} + \delta Period_{it} + \lambda Z_{it} + \vartheta_i + \varepsilon_{it} \qquad \textbf{(Equation 4-1)}$$

where index *it* denotes person *i* at time point *t*, and $Hour_{it}$ is the weekly working hours or weekly housework hours observed for person i at time point *t*. $Marital_{it}$ is the categorical marital status for a given person-wave record with β as its coefficient, reflecting differences in time allocation among single, cohabiting, and married people. $Parent_{it}$ represents the number of children in the household for a given person-wave record with γ as its coefficient, reflecting differences in time allocation among people with no child, one child, or two children or more. $Period_{it}$ is the period category for person *i* at time *t*, with δ as its coefficient.

Z_{it} includes other time-varying factors. For example, pure ageing effects are accounted for by including Age_{it} and Age_{it}^2. Z_{it} also includes self-reported health condition and educational attainment for each person-wave observation. ϑ_i and ε_{it} are the two error terms: ϑ_i represents the person-specific fixed effect, simultaneously capturing the time-invariant characteristics associated with the dependent and independent variables; and ε_{it} is the random variation for each person-wave observation. The fixed-effect model uses within-individual variations by demeaning the dependent and independent variables from person-specific means, thus deleting ϑ_i.

We then focus on the more nuanced transitions and durations in different family status to determine how time allocation is associated with these variables using the equation below:

$$Hour_{it} = \beta Marital_{it} + \eta_1 Duration_{it} + \eta_2 Duration_{it}^2 + \gamma Parent_{it} + \theta_1 ChildAge_{it} + \theta_2 ChildAge_{it}^2 + \delta Period_{it} + \lambda Z_{it} + \vartheta_i + \varepsilon_{it}$$

(Equation 4-2).

On top of **Equation 4-1**, here we include $Duration_{it}$, which is the partnership duration with

η as its coefficient. We also have $ChildAge_{it}$, which is the age of the youngest child with θ as its coefficient. In this equation, Coefficients β and γ represent changes in paid work and housework time immediately after marriage/cohabitation and after the birth of a child, respectively. Coefficients η and θ reflect further changes in paid working hours and housework hours as the partnership lasts and as the children grow up, respectively. The other variables are the same as in **Equation 4-1.**

Finally, we interact $Marital_{it}$ and $Duration_{it}$ as well as the squared term with $Period_{it}$ to examine whether the associations between marital status and time allocation vary over the years, holding others unchanged. Similarly, we interact $Parent_{it}$ and $ChildAge_{it}$ as well as the squared term with $Period_{it}$ to examine whether the associations between time allocation and parenthood status differ across the three periods. In the interaction models, the main effects are the effects of the family status on time allocation in the reference period, which is from 1992 to 2000. Combining the main effects and results from the interaction terms reveals the effects of marital or parenthood statuses in the periods of 2001 to 2008 and 2009 to 2017. These models can verify how the dynamics in time allocation along with the family life cycle, after considering time-constant confounders in each period, change from the 1990s onward. Given that new samples are drawn in various waves of the two surveys and people younger than 16-year-old grow up and enter the adult sample, people observed in different periods are not necessarily the same individuals. Those changes in the relationships of interest could reflect how people observed in different periods behave differently and provide new insights into the cohort replacement process.

In the above models, we do not include more control variables such as whether there are changes in jobs or job nature/positions. We consider those changes most likely being on the causal path between marriage/parenthood and time spent on paid, especially for women. Based on a similar rationale, when predicting time spent on housework, we do not further control for one's

income or time spent on paid work.[42] We are interested in the overall effect of family status on time allocation, and the inclusion of these mediator variables related to economic decisions could undermine this goal.

4.4. Results

4. 4. 1 Descriptive statistics of the sample

Table 4-1 presents the summary statistics of the sample. 37.7 percent of the women were single at some point of the observation period, 33.3 percent cohabited at some point, 58.9 percent were or are currently married, and 55.1 percent had no child in the household at some point. Of the men, 39.7 percent were single at some point, 31.3 percent cohabited at some point, and 56.4 percent were or are currently married. 67 percent of the men had no child in the household at some point. With respect to the person-wave records, the average weekly paid working hours are longer for employed men than for women. The average weekly housework hours are much longer for women than for men. Of the person-wave records for women, 24.8 percent reflected single status, 20 percent recorded cohabiting status, and slightly more than half recorded married status. Men share the similar distribution pattern of marital status. 38.0 percent of the records for women recorded having no child, 24.0 percent reflected having one child, and 38.0 percent revealed having two or more children in the household. Men have fewer children in the household than women.

[42] In a supplementary analysis, we have included total monthly income and time spent on paid work to predict time spent on housework in Equation 4-2. Although the coefficients do change when these mediators are included, the conclusions about the roles of family status and their changes across the three periods remain unchanged.

Table 4-1. Descriptive statistics for selected women and men

	Women	Men
Individuals[1]		
Marital status		
Single	37.7%	39.7%
Cohabiting	33.3%	31.3%
Married	58.8%	56.4%
Parenthood status		
No child	53.3%	67.0%
Having one child	46.0%	36.5%
Having two or more children	48.6%	39.4%
Period		
1992 to 2000	34.2%	36.2%
2001 to 2008	32.5%	34.3%
2009 to 2016	69.9%	68.0%
Number of individuals	13,558	12,621
Weighted person-waves[2]		
Weekly working hours (employed)	24.95 (18.16)	39.01 (17.98)
Weekly housework hours	14.93 (11.45)	5.71 (5.61)
Marital status		
Single	24.8%	28.9%
Cohabiting	20.0%	18.6%
Married	55.2%	52.5%
Partnership duration[3]	8.50 (6.64)	8.53 (6.72)
Parenthood status		
No child	38.0%	51.9%
Having one child	24.0%	17.7%
Having two or more children	38.0%	30.5%
Age of the youngest child[4]	5.56 (4.37)	5.40 (4.39)
Age	33.8 (6.78)	36.20 (8.52)
Self-rated health		
Excellent	23.1%	25.8%
Good	44.6%	44.1%
Fair	22.1%	21.3%
Poor	10.2%	8.8%
Period (unweighted)		
1992 to 2000	30.5%	31.4%
2001 to 2008	29.8%	30.9%
2009 to 2016	39.7%	37.7%
Number of person-wave records	68,836	65,464

Note 1: The same individual can be observed at multiple statuses and periods. Therefore, the sums of the percentages are larger than 100%.

Note 2: Sums of percentages for discrete variables may differ slightly from 100% because of rounding. Sample is weighted to maintain a similar sample size across the three periods.

Note 3: Among people in a partnership.

Note 4: Among those having children in the household.

Mean and standard deviations (in brackets) are reported for continuous variables.

4. 4. 2 Multivariate Results

Table 4-2 presents key estimates from the fixed-effect regressions to predict changes in weekly working hours and housework hours associated with changes in marital or parenthood statuses. The full list of estimates is presented in **Appendix Table A5**. The family status model (**Equation 4-1**). without considering the transition and duration dynamics, reflects that married women work 2.218 fewer hours and spend 2.806 more hours on housework than single women. Mothers with one child spend 10.209 fewer hours on paid work and 3.806 more hours on housework. Married men tend to work 1.144 more hours but spend similar hours on housework than compared with single men. Fathers with one child, work 0.688 fewer hours and spend only about 0.182 more hours on housework.

Estimated coefficients of the transitions and durations models (**Equation 4-2**) in the same table show that for women, there is little change in weekly paid work time right after marriage, while women work even more hours right after cohabiting. However, the duration of a partnership has a negative effect. The effect of parenthood on women's time allocation is much more substantial than that of marriage. There is a more than 15-hour drop in women's weekly employment hours and a six-hour growth in weekly housework hours soon after the birth of a first child. As the child grows up, women's paid work time progressively recovers. As expected, men experience much smaller changes than women as they form and maintain a family.

Table 4-2. Changes in women's and men's weekly paid work hours and housework hours

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations
Marital status (ref: Single)								
Cohabiting	-0.122	1.102***	2.003***	1.383***	1.144**	1.186**	0.575***	0.619***
	(0.314)	(0.308)	(0.184)	(0.185)	(0.375)	(0.374)	(0.132)	(0.131)
Married	-2.218***	0.563	2.806***	1.569***	1.144**	1.082*	0.038	0.238
	(0.396)	(0.399)	(0.227)	(0.244)	(0.436)	(0.450)	(0.159)	(0.164)
Duration		-0.222***		0.122**		0.074		-0.121***
		(0.063)		(0.042)		(0.072)		(0.023)
Duration squared/100		0.612*		-0.579**		-0.049		0.389***
		(0.283)		(0.194)		(0.299)		(0.094)
Parenthood status (ref: No child)								
One child	-10.209***	-15.729***	3.806***	6.124***	-0.668*	-0.974**	0.182*	0.432***
	(0.309)	(0.356)	(0.155)	(0.195)	(0.263)	(0.317)	(0.091)	(0.111)
⩾Two children	-14.675***	-18.509***	6.894***	8.770***	-1.129***	-1.507***	0.431***	0.772***
	(0.376)	(0.387)	(0.200)	(0.235)	(0.324)	(0.371)	(0.111)	(0.128)
Age of the youngest child		0.889***		-0.623***		0.099		-0.039
		(0.072)		(0.052)		(0.086)		(0.029)
Age of the youngest child squared/100		0.492		1.903***		-0.499		0.131
		(0.502)		(0.356)		(0.623)		(0.205)
Period (ref: 1992 to 2000)								
2001 to 2008	-1.162***	-1.217***	0.191	0.184	-1.574***	-1.576***	-0.037	-0.017
	(0.224)	(0.216)	(0.145)	(0.144)	(0.240)	(0.241)	(0.079)	(0.079)
2009 to 2017	-1.521***	-1.352***	0.974***	0.877**	-3.204***	-3.187***	0.459**	0.486***
	(0.399)	(0.388)	(0.270)	(0.266)	(0.430)	(0.430)	(0.143)	(0.143)
Constant	6.741*	6.189*	5.906***	6.013***	12.755***	13.718***	0.460	-0.631
	(2.669)	(2.688)	(1.549)	(1.580)	(2.539)	(2.593)	(0.774)	(0.786)
Overall R^2	0.238	0.259	0.190	0.184	0.066	0.075	0.020	0.028
Number of individuals			13,558			12,621		
Person-wave record			68,836			65,464		

Note. Models also include age and its squared term, self-rated health, and education. Standard errors are in parentheses. * p<0.05 ** p<0.01 *** p<0.001

The negative coefficients of the period variables when predicting weekly working hours indicate that an individual, especially a man, works fewer hours in the later periods. This change could be due to the career development cycle experienced by this individual, some period effects, e.g., macroeconomic condition (the 2008 financial crisis), or life cycle effects that are not captured by the age variable or other time-related variables. People also spend slightly more time on housework during the period from 2009 to 2017 than during the period from 1992 to 2000. Note that these estimates of fixed-effect regressions reflect a calculation conditional on the same individual. In other words, these coefficients of the period variables capture changes in working or housework hours that are not captured by the age or other time-related variables, for the same individual who stays across these periods. In a supplementary analysis using pooled OLS disregarding the panel nature of the data, there are a 0.722-hour decrease in women's paid work time, a 3.232-hours drop in women's housework time, a 2.158-hour drop in men's paid work time, and a 0.482-hour increase in men's housework time comparing the period from 2009 to 2017 with the period from 1991 to 2000 (Appendix **Table A7**).

To understand the roles of marriage and parenthood in shaping gendered time-use patterns, we need to combine the estimates of both the duration and child's age variables and their squared terms. I, therefore, visualise the estimates of these variables of married, partnership duration, one child, and age of the youngest child in **Table 4-2**. In the following figures, **Figure 4-1** and **Figure 4-2** report changes in paid work time and housework time related to marriage, which include the transition into (vs. being single) and during the first ten years of marriage as an example. **Figure 4-3** and **Figure 4-4** report changes in time allocation related to parenthood, which include the birth of a first child and as the child reaches 10 years old as an example. Year 0 on the horizontal axis indicates the transition into marriage or parenthood.

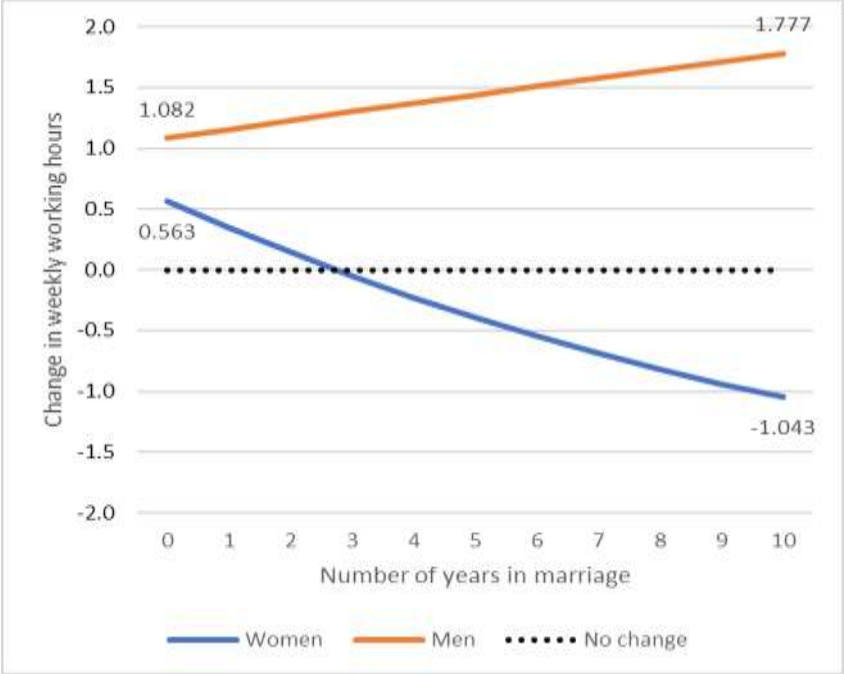


Figure 4-1. Changes in paid work time as marriage form and develop

The difference in paid work time before and after marriage for women is primarily driven by a gradual process of reduction in women's paid work time as their marriage continues, as shown in **Figure 4-1**. Upon marriage, men work 1.082 hours more per week, and men's paid work time increases gradually as the partnership lasts for one more year, although none of the duration terms is statistically significant at the 0.05-level. In summary, the gradual decline in women's paid work time over the course of marriage and the initial growth in men's paid work time upon marriage formulate the enlarged gender gap in paid work time between single and married individuals.

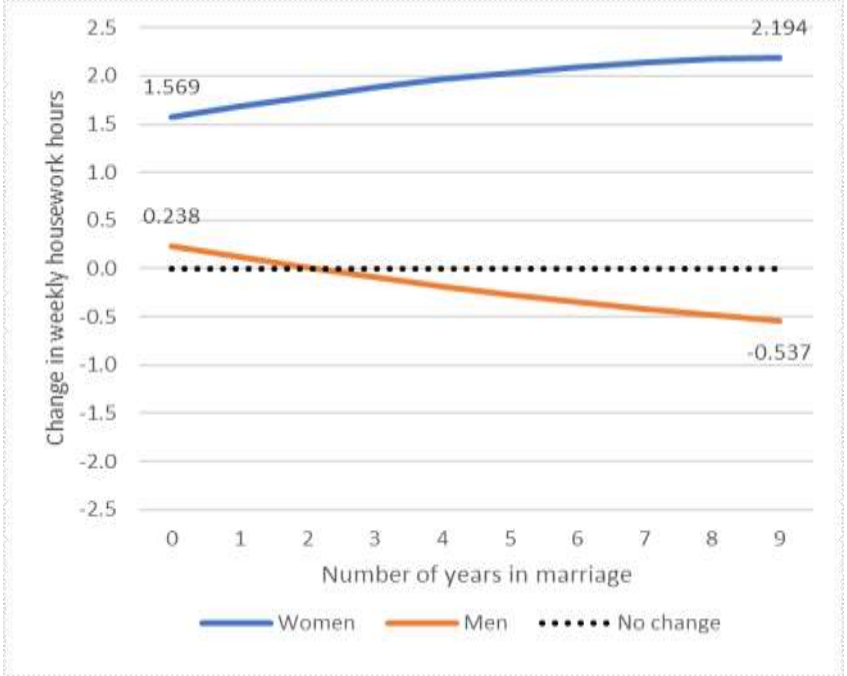


Figure 4-2. Changes in housework time as marriage form and develop

Figure 4-2 supports that women spend 1.569 more hours on housework per week right after marriage than when they are single, and their housework time slowly increases as partnership continues. Women's time spent on housework is primarily established at the beginning of a partnership. Although men's housework time remains unchanged upon marriage, their housework time decreases along with the partnership. Again, we noticed that at the start of marriage, women and men have already started to allocate their housework time differently. The gender gap in housework slowly enlarges as the marriage continues, echoing the same change in the gender gap in paid work time.

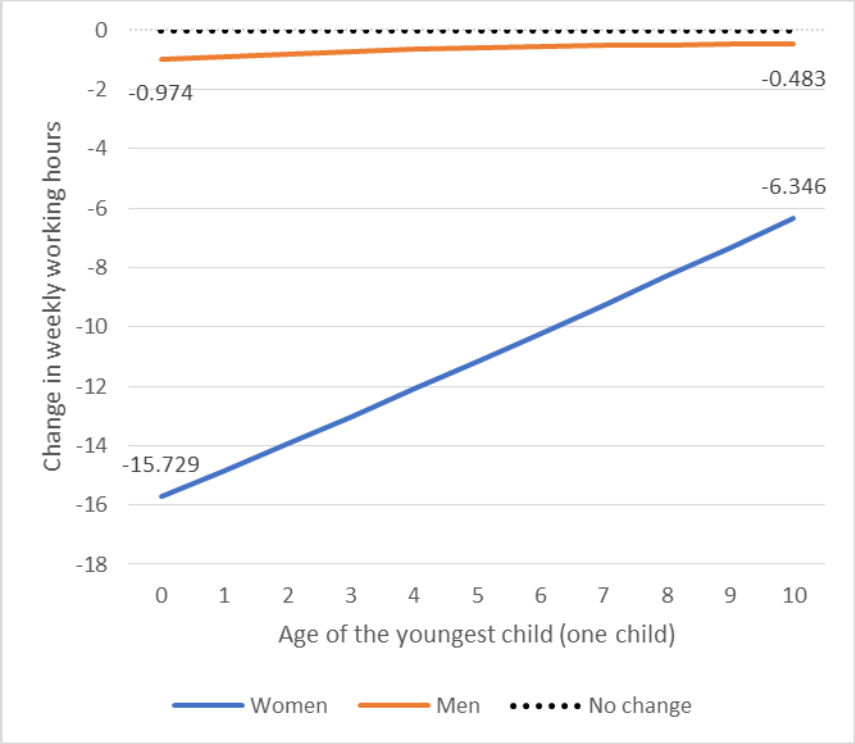


Figure 4-3. Changes in paid work time as having and rearing a child

The most noticeable pattern in **Figure 4-3** is the sharp drop in women's paid work time (15.729 hours) once there is a new-born child and the quick recovery of women's paid work time as the child grows up. However, women are far from achieving their prenatal working hours even when the child has reached the age of ten with a 6.346-hour gap. Men's paid work time is reduced by approximately one hour per week once there is a first-born. As the children grow one year older, men's paid work and housework time remain stable.

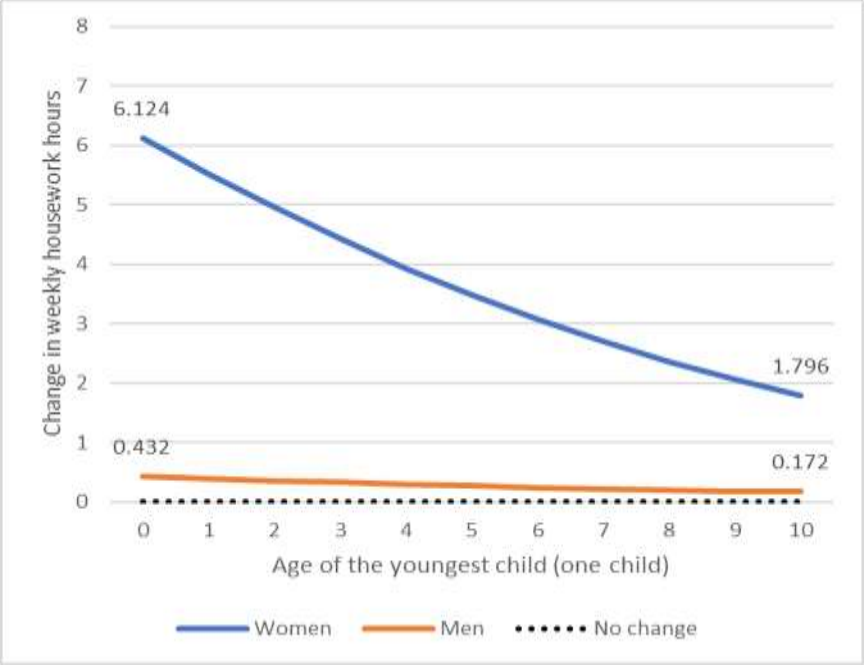


Figure 4-4. Changes in housework time as having and rearing a child

Figure 4-4 predicting housework time also reveals the substantial changes in women's time allocation surrounding motherhood. Women spend 6.124 more hours per week on housework once there is a new-born child, and they also experience a sharp decline in housework time when the child grow up. Men also spend 0.432 more hours on housework per week soon after they have one child, and they retain the same housework hours as the child grow up. In summary, women's and men's time spent on paid work and housework moves in the same direction to cope with the arrival of a child. The enlarged gender gap in time allocation due to parenthood is driven by the much larger changes in women's time allocation that enhances the caregiver role.

4. 4. 3 Visualizing the dynamics of women's and men's paid work time and housework time along with the family life cycle in different periods

In this section, we examine whether the roles of the transitions into marriage or parenthood as well as their durations in shifting the time-use patterns for women and men have changed across the three periods by interacting the family status variables with the period variables. The results of these interaction models are reported in **Appendix Table A6**. Because the effects across periods are combinations of the main effects (in the reference period) and the estimates from the interaction terms, for ease of understanding, we calculate the combined effects for all the periods and use the following figures to present these period-specific effects.

Figure 4-5 and **Figure 4-6** visualize the changes in women's and men's paid work time and housework time related to marriage. These figures are based on the estimated coefficients of the marriage transition and the partnership duration variables in the marital status interaction models in **Appendix Tables A6**. **Figure 4-7** and **Figure 4-8** depict changes in women's and men's time allocation related to parenthood. These figures are based on the estimated coefficients of one child (vs. no child) and the age of the youngest child in the parenthood interaction models in the same Appendix tables. To visualize the changing effects of marriage and parenthood on women's and men's time allocation over the last 25 years, we plot the changes in women's and men's time allocation in each of the three periods in the same figure. In each figure, the solid lines represent women's time allocation patterns, and the dotted lines represent men's time allocation patterns. The colours red, blue, and green indicate the period from 1992 to 2000, 2001 to 2008, and 2009 to 2017, respectively.

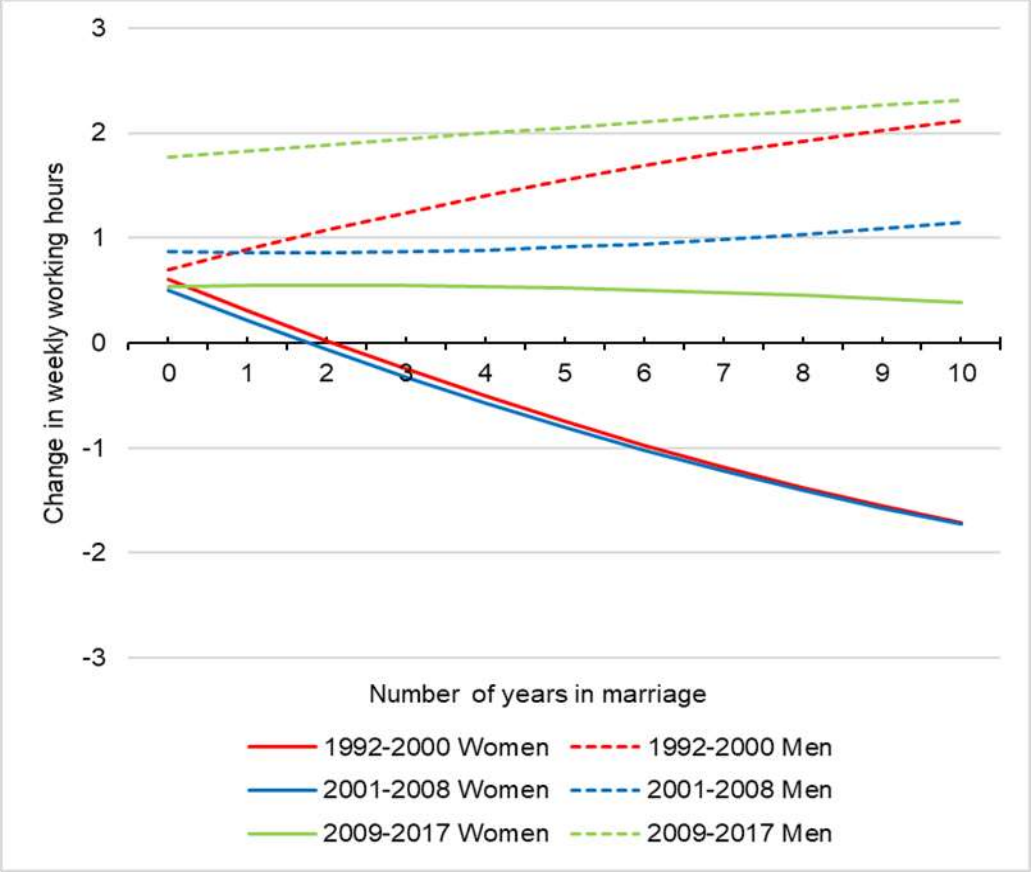


Figure 4-5. Changes in weekly working hours as marriage forms and continues

Figure 4-5 presents the changes in women's and men's paid work time immediately after the transition into marriage and as the marriage continues. Upon the transition into marriage, changes in paid work time is modest (fewer than one hour) for both women and men who experienced this transition in the period from 1992 to 2000. The flattened solid green line indicates that the negative effect of partnership duration on women's paid work time has disappeared during the period from 2009 to 2017. However, there is no sign of a weakening positive effect of marriage on men's paid work time in more recent years. In later periods, especially from 2009 to 2017, men work longer hours immediately after marriage. Men's breadwinner role as a husband even seems to be enhanced in the latest period, given the largest increase in men's weekly paid work time upon marriage from 2009 to 2017.

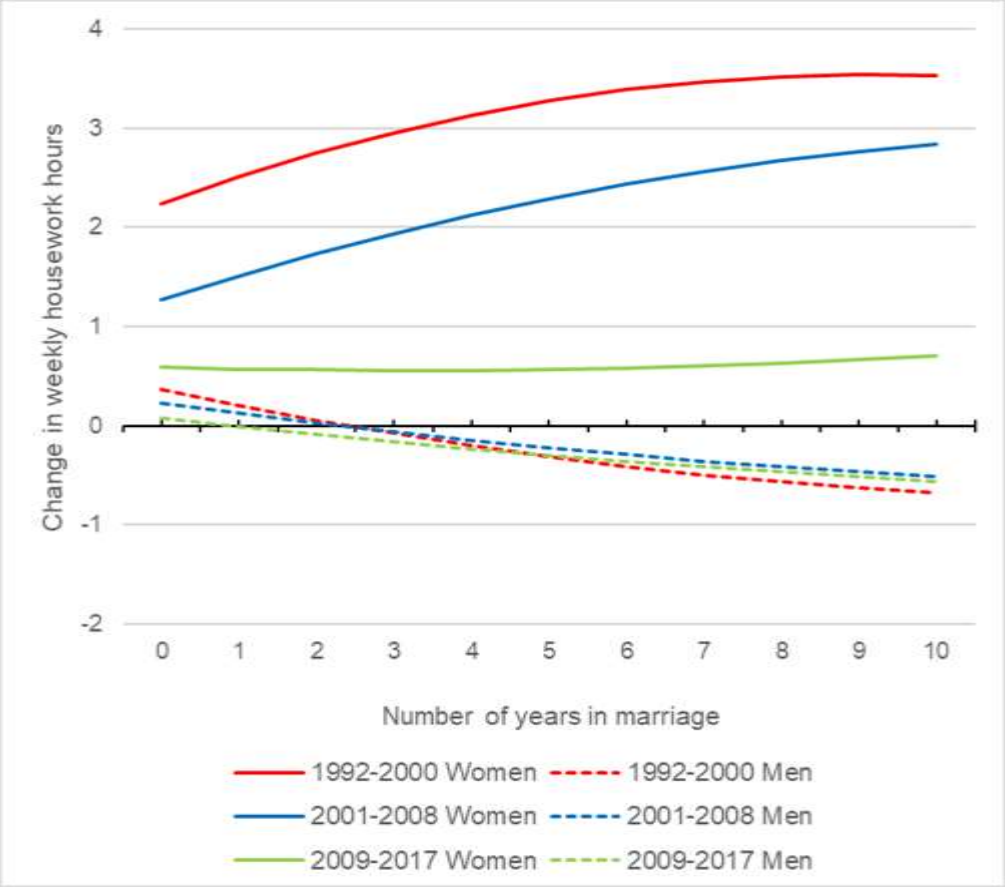


Figure 4-6. Changes in weekly housework hours as marriage forms and continues

Figure 4-6 shows the changes in housework time soon after the transition into marriage and as marriage continues in each period. The greatest change across the three periods is that the initial surge in women's housework time upon marriage shrinks. From 1992 to 2000, women spend over two more hours on housework per week if they experienced a transition into marriage, but the corresponding increase almost disappears from 2009 to 2017, and there is no increase in women's housework time as their marriage continues in the most recent years.

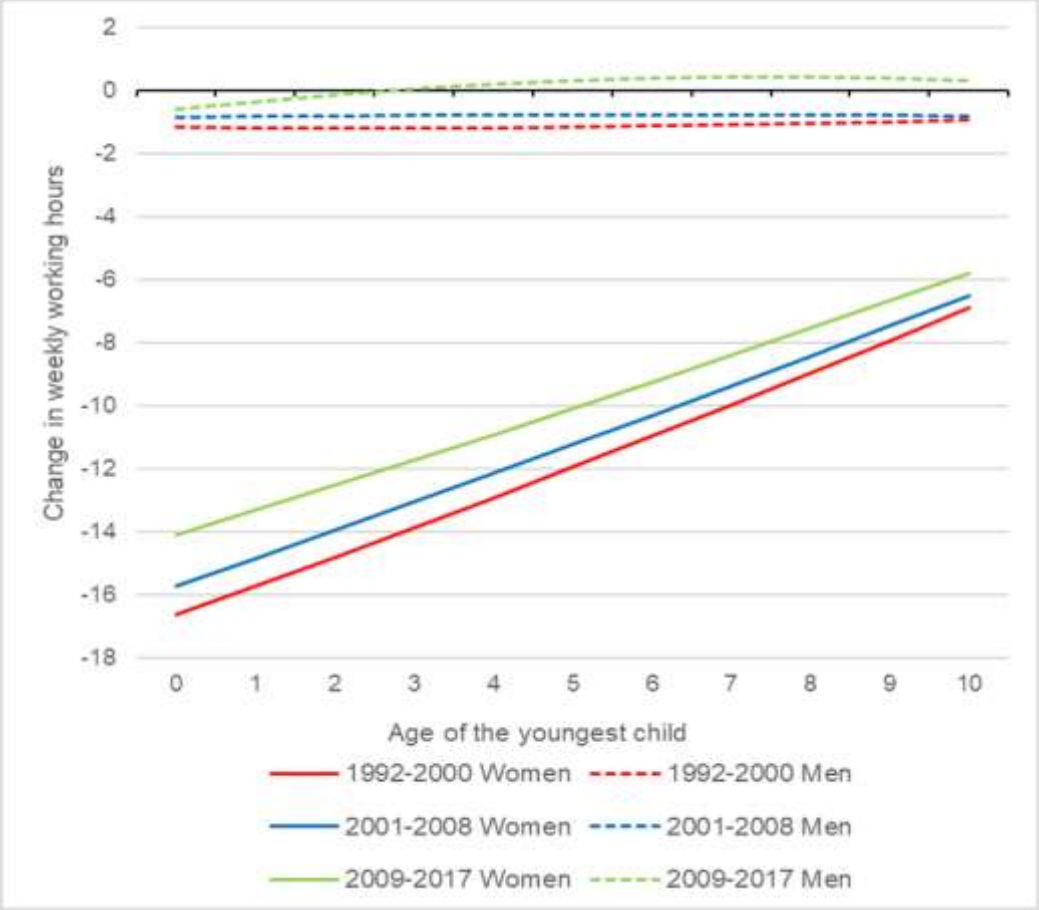


Figure 4-7. Changes in weekly working hours with the development of parenthood

Figure 4-7 shows the dynamics of both women's and men's paid work time soon after the birth of a first child and as the youngest child grows up. Both women and men reduce paid work time soon after the birth of a child. In this figure, the solid green line is always above the other two solid lines, indicating that the plunge in women's paid work time associated with motherhood is always the lowest in the latest periods, and this is driven by the smallest initial sharp reduction in women's paid work time. Again, there is no sign of an enhancing negative effect of parenthood on men's paid work time in more recent years. Fathers' paid work time is even less likely to be negatively affected than before.

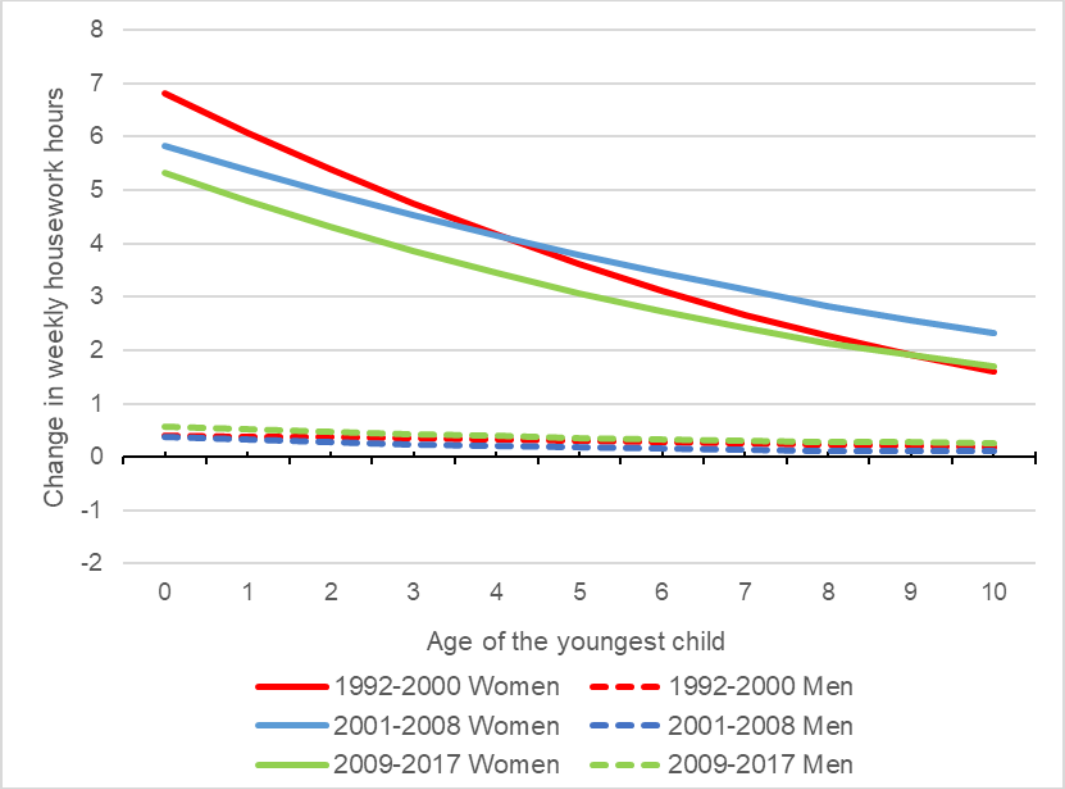


Figure 4-8. Changes in weekly housework hours with the development of parenthood

Figure 4-8 presents the changes in housework time soon after the birth of a first child and as the youngest child grows up. From 1992 to 2000, the birth of a first child is associated with an increase of nearly seven hours in weekly housework time. This increase is just five hours from 2009 to 2017. As the child grows up, women quickly reduce their housework time, but the declining rate is the most rapid in the earliest period. In contrast to women's substantial increase in housework time upon the birth of a child, the increase in men's housework time does not even reach one hour per week for all the three periods. The changes in men's housework time associated with fatherhood also remain stable across the three periods.

4.5. Discussion and Conclusion

This paper disentangles the roles of the transitions and durations of marriage and parenthood in shaping gendered time-use patterns. It provides a rich account of the dynamics of women's and men's paid work time and housework time as they form and maintain families. Moreover, by analysing how the associations between women's and men's time allocation and their family status change over the last 25 years, this paper demonstrates the changing consequences of marriage and parenthood on women's and men's lives.

Three conclusions can be drawn from these findings. First, the results support that both the transition into marriage and the duration of marriage enhance gendered time-use patterns. Women's paid work time and men's housework time gradually follow traditional gendered time-use patterns over the course of marriage and enhance the household specialization model through day-to-day interactions and bargains. Notably, the immediate increase in women's housework time and the stability of men's housework time at the beginning of a marriage reflect a tendency to realize the already internalized gender roles and the adoption of the specialization strategy once married.

Second, the strong traditionalizing role of parenthood on gendered time-use patterns is driven by the much greater move to the caregiver role of women than that of men right after the birth of a child. We find that both women and men reduce their paid work time and increase their housework time soon after the birth of a child, although as expected, the changes in women's time allocation pattern is much more substantial. People's adjustments in paid work and housework time following the birth of a child are predominantly expedient and temporary. Parents increase their paid work time and reduce their housework time as their children grow up.

Finally, this paper confirms that there is much greater flexibility in women's time allocation

patterns than in men's. This flexibility is reflected not only by the fact that women's time allocation is more sensitive to the varying needs of the family but also by the weakening relationships between women's time allocation and family status over the last 25 years. We have identified that important sources of these changes are the decline in the reduction in women's work time and the lessened increase in women's housework time surrounding the *transitions* into both marriage and parenthood.

We provide several tentative explanations for the weakened link between women's family status and time use over the past three decades. People who experienced those different transitions and durations of marriage and parenthood in different historical periods could differ. For instance, women from the latter cohorts may hold more liberal gender attitudes or delay their marriage/parenthood to maintain their stronger financial independence (Coltrane and Ishii-Kuntz 1992, Smith-Lovin and Tickamyer 1978). There could also be a period effect. Women may enjoy more supportive childcare policies or better employment opportunities. The growing economic uncertainties and the economic crisis that occurred during this period may have also contributed to the growing significance of women's economic roles (Berik and Kongar 2013). All these factors are part of a continuing gender revolution, which consists of a cohort replacement process mixed with periods effects (Sullivan, Gershuny, and Robinson 2018). Nonetheless, the lack of men's corresponding change since the 1990s raises concerns regarding whether there has been a genuine change in gender inequality in intimate relationships and the lack of political commitment in promoting greater gender equality on the part of the current UK government (McKay et al. 2013). The gender revolution in Great Britain remains a women's monodrama on the stage of marriage and family.

This paper has a few limitations. First, the analysis of housework time, which should predominantly represent routine housework time, may underestimate changes in men's roles.

Research has shown that men's increased time spent on domestic work from the 1960s is largely due to their growing contribution to non-routine housework and childcare (Dotti Sani and Treas 2016, Kan, Sullivan, and Gershuny 2011, Sullivan, Billari, and Altintas 2014). These types of domestic labour activities usually involve qualitatively different feelings and values and are usually more enjoyable than routine housework (Sullivan 2013). In particular, childcare is closely related to the ideals of parenthood and the intergenerational transfer of human and cultural capital, and both women's and men's time spent on childcare has increased substantially over the years (Dotti Sani and Treas 2016). It is thus difficult to identify how much of those changes are attributable to changes in gender roles and how much is attributable to the shift to a more intensive parenting norm over the years. In a simple supplementary analysis (**Appendix Table A8**), using 2014/15 UK time-use survey data and the earlier harmonized UK time-use data from the nationally representative Multinational Time Use Study, we also find out that from the early 1990s, both women and men increase their childcare time, and the increase is even greater for women. One recent study also shows that the childcare time of UK fathers has remained stable since 2000 (Henz 2019). In this paper, we consider routine housework to be an area of work in which gender display is deeply ingrained. The existence of a changing relationship between routine housework time and family status over the years offers a conservative indicator of the changing power relationship between the genders.

Second, the current empirical analysis does not include information about the spouse because including the spouse's information could confine the analysis to existing couples and hinder the analysis of the effect of partnership formation. Moreover, interactions between spouses are not the focus of this paper. Given the limited change in men's paid work time and housework time associated with their family status, it is unlikely that the changing dynamics of women's time allocation since the 1990s can be explained by the changing role of their spouses.

Third, these findings apply only to the specific social context of Great Britain, where extensive housekeeping and caregiving work and full-time employment are highly incompatible. Countries with a lower level of work-family conflict than the UK may have already witnessed an evident change in men's roles as husbands and fathers (Dommermuth and Kitterød 2009, Dribe and Stanfors 2009). Furthermore, many important issues fall out of the scope of the current study. For example, this work does not identify a key societal-level factor or aspect of progress out of many factors such as family policy, gender norms, and cohort replacement that may contribute to the observed weakened relationship between family status and time use for women. Additionally, the question of whether the observed changes differ across various social groups, e.g., women with different levels of educational attainment, would be worthwhile for further studies to explore to determine whether the gender revolution progress might implicitly alter the social class gradient as discussed by Cherlin (2016).

Despite these limitations, this paper provides new insight into the distinct roles of the transitions and durations of marriage and parenthood in shaping gender roles, it also has important implications. First, the initial surge in women's housework time but not in men's housework time right after marriage is likely to set the tone for the subsequent conformation to traditional gender roles, such as the gradual decline in women's paid work time and men's housework time over the course of marriage. Second, the swift recovery of mothers' paid working hours as their children grow up reveals a great conflict between employment and childcare responsibilities. Families do not retain this male-breadwinner and female-caregiver model. When the caring need is substantial, families have no alternative but to temporarily sacrifice women's employment to meet the family demand. Rather than framing the specialization family model a way to maximize the gains or utility, this model could at most minimize the cost in this case.

Finally, although it is well-known that changes in men's behaviours lag and are much more

limited than those of women (Sayer 2016, Sullivan, Gershuny, and Robinson 2018), the finding that there has been basically no change in the association between men's paid work and housework time and their family status over the last 25 years in Great Britain is still disappointingly unexpected. Furthermore, there is even some evidence showing a stronger enhancing role of marriage on men's paid work time in recent years. The rigidity of men's family roles as the breadwinner does not show any erosion. In fact, the persistent gendered roles assigned by the society and the high level of the incompatibility between employment and childcare responsibilities not only makes it difficult for mothers to remain actively participating in the labour market but also greatly hinders men's involvement in domestic labour. This incompatibility imposes severe challenges to the transition into the second stage of the gender revolution, in which women's and men's roles converge in both the private and public spheres.

CHAPTER 5: CONCLUSION AND DISCUSSION

The three empirical chapters asked three distinct questions to obtain an understanding of the relationship between gender equality and family formation in the UK. I examined the relationship between women's gender-role attitudes and their motherhood experience, the links between couples' division of labour arragenement and their fertility behaviours, as well as the dynamics of women's and men's time-use patterns during the family formation process. Although the topic of this thesis is "*The Making of the Modern British Family*", it must be acknowledged that there are many forms of families in contemporary UK. Homosexual couples, transgender couples, single-parent families, blended families with step-parent-children relationships, etc. are all important components of the modern families in the UK. Notably, these families do not serve as the key research target in this thesis. In this thesis, heterosexual couples and those who have children dominate the research sample, and the theoretical models and research questions are built primarily based on the female-male partnership assumption. The use of "modern family" in this thesis refers to the weakened gendered division of labour within families and the departure from traditional gender roles of women and (probably) men.

Moreover, all the findings of this thesis are based on the two longitudinal surveys conducted in the UK. Therefore, conclusions regarding the relationship between gender inequality and family formation should be limited to the UK context, which features relatively traditional gender norms and a high level of conflict between holding a full-time employment and childrearing. I re-address the above two points in the following limitation section.

In this chapter, I first provide a summary of the key findings and conclusions of the three empirical chapters and illustrate how these chapters contribute to the current

literature. I will then discuss the two general limitations of this thesis and new working directions. Finally, I provide some reflections based on the conclusions derived from this thesis and discuss some potential policy implications.

5.1. Main Findings and Conclusions

First, I provide a brief review of the key findings observed. The past few decades have witnessed women's, especially mothers', increasingly active engagement in the labour force. This change raises the question of whether the progress of the gender revolution has altered the gender relations within families and thus has altered the relationship between gender inequality and family formation. In Chapter 2, I ask how women's gender-role attitudes are associated with their employment and motherhood status in the UK. In Chapter 3, I investigate whether a more traditional gender division of labour is more conducive to childrearing among couples in Great Britain. More importantly, I ask whether these associations change over the years. The final empirical chapter (Chapter 4) examines how women's and men's time allocations change as they form and maintain families over the past 25 years in Great Britain.

Chapter 2 shows that surprisingly, women's gender-role attitudes are not associated with employment or childbirth per se, and the adjustments in attitudes only happen when motherhood and employment status are jointly considered. While gender-role attitudes do not vary among childless women who have different employment statuses, gender-role attitudes are the most traditional among non-working mothers and the least traditional among mothers who work full-time. These findings support the argument that the conflicts between women's desire or need to work and the internalised expectation to prioritize the children's needs drive adjustments in women's gender-role

attitudes during adulthood.

Chapter 3 shows that over the last 25 years, the overall positive association between the traditional gendered division of labour and the birth of a child has diminished substantially. Although childrearing is the primary source of the male-breadwinner and female-housekeeper model, couples with this traditional division of labour arrangement are no longer more likely to have a subsequent birth from 2009 onwards. These findings support the emergence of a new family equilibrium at the couple level in Great Britain.

Nonetheless, women remain the sole contributor to the diminishing role of marriage and parenthood in fostering traditional gender roles. Chapter 4 shows that the negative relationship between women's paid work time and their family roles as wives and mothers has weakened over the years. Meanwhile, the positive relationship between women's housework time and their family roles diminishes. However, the relationship between men's time allocation and their roles as husbands and fathers remains weak and stable over the last 25 years in Great Britain. There is even some evidence confirming men's enhanced breadwinner role as husbands and fathers in the 2010s.

5.2. Contributions

Theoretically, this thesis offers new insights into the relationship between gender inequality and family in the UK as follows:

- First, I provide a conflict perspective to explain the dynamics in women's gender-role attitudes during adulthood. Compared to identity theory (Stryker 1968), the interest-based approach, and exposure-based explanations (Bolzendahl and Myers 2004), the conflicts between women's employment and family responsibilities serve as the most important factor in explaining changes in women's gender-role

attitudes as they become mothers in the UK (Chapter 2).

- Second, I demonstrate that at the micro-level, the significance of the specialization family model in forming and maintaining a family has substantively weakened in Great Britain (Chapter 3). By showing that the gender egalitarian division of labour is no longer a barrier to the birth of a child in the 2010s, I argue that the reason is that the presumptions of the classic family theories, such as utility maximization (Becker 1985, 1981), bargaining (Lundberg and Pollak 1993, Manser and Brown 1980), and doing gender (West and Zimmerman 1987), that support the gendered division of labour, have been less likely to hold with the progress of the gender revolution.

- Third, this thesis highlights again that one of the most important issues in the formation of a family in the UK is the difficulty in combining employment with childcare responsibilities to meet both the financial needs and time demands of the family. Women now find that the decision to withdraw from the labour market to care for children highly conflicts with their pre-birth gender-role views (Chapter 2). Moreover, the transitory nature of the specialization strategy (Chapter 4) during the childrearing period also indicates that the contemporary British families are struggling to achieve the dual-earner model. The reason for the low fertility level is not the great gender equality women have achieved in education or the labour market; instead, the reason is the great gender inequality people still face at home (especially women) and in the labour market (McDonald 2013, 2000, Goldscheider, Bernhardt, and Lappegård 2015). This thesis collaborates these gender equity arguments.

- Finally, this study updates the stage of the gender revolution in Great Britain. The

rigidity of men's family role as the breadwinner casts doubt on men's contribution to the changing meaning of family formation and gender relations (Chapter 4). The gender revolution is still primarily women's revolution in the realm of marriage and family. In conclusion, the "second half" of the gender revolution has made little progress in the UK.

This study has several methodological innovations.

- The method used in Chapter 2 addresses issues related to both reverse causality and selection based on time-constant factors. I use dynamic panel data modelling within a structural equation framework to address the issue of reverse causality. I also incorporate the fixed-effect method within the same framework. This work applies this method for the first time to derive the relationship between attitudes and behaviours and should be adopted in future research suffering from similar issues.

- In Chapter 3, I construct a new division of labour classification using latent class analysis, which combines several factors representing a couple's performance in both the labour market and housework into one typology. This wholistic approach provides a direct answer to the question of how the gendered division of labour and fertility are linked, whereas earlier approaches fail to derive a clear conclusion due to the complex relationships between the division of paid work and fertility (mixed results for women and British men) (Jalovaara and Miettinen 2013, Inanc 2015), between the division of housework and fertility (mixed results) (Cooke 2009, Schober 2013a), and between the combination of the divisions in paid and unpaid work and fertility (often missing in previous work).

- The relationship between gender inequality and fertility has been hotly debated and is inconclusive based on the previous literature as noted above. One important reason is that after years of the gender revolution, at a time of great economic uncertainties when women are often strongly attached to the labour market at least before childbearing in industrialized societies, multiple equilibria between gender equality and fertility coexist, and the balance point is constantly shifting (Esping-Andersen and Billari 2015). The previous literature concerning the micro-level relationship between gender equality and fertility lacks a dynamic perspective that requires analysing and comparing this relationship across different historical periods within a society. This thesis fills this gap. In the last two empirical studies, I include interactions between the key independent variable and the period indicator in fixed-effect regression models to clearly show how relationships between gender equality and family formation vary over the past 25 years in the UK.

5.3. Limitations and Future Research

This study focuses on the role of family and, in particular, parenthood in shaping gender roles and relations. In addition to the limitations discussed separately in each of the three empirical chapters, I discuss two general limitations of this thesis in this section.

First, the current findings represent an averaged result driven by the predominant family type in the UK, i.e., heterosexual couples. However, as mentioned at the beginning of this chapter, the family structure has experienced growing diversity over the past few decades. For example, cohabiting couples with children, single mothers

and fathers, or parents with stepchildren may have different arrangements to maintain their families compared to households with married couples. Using fixed-effect regression analyses requires a large sample size with sufficient numbers of changes in the family status. Therefore, it is extremely difficult to stratify the sample into the various family subgroups and identify the group-specific associations. Nonetheless, the increased number of these previously minor family groups has provided new opportunities to enhance the understanding of the changing meaning of families in future studies.

Furthermore, this dissertation uses only data from the UK. Although the social context in the UK is highly interesting and relevant for studying the relationship between gender equality and family formation, we should be cautious in applying these findings and conclusions to a broader context. The role of marriage and especially parenthood in shaping gender roles and relations should be dependent on the level of conflict between employment and childrearing responsibilities, and the level of the such conflict is dependent on many contextual factors, such as gender norms, the economic environment, the flexibility of the labour market, and the cost of formal childcare services. Future studies analysing data from countries with different gender norms and institutional settings could shed light on the diversified strategies of forming and maintaining a family. These studies may explain the bifurcation of fertility levels across countries.

5.4. Discussion and Implications

Being restricted by their assigned roles within a family, women experience substantial difficulties in fulfilling their life goals and fail to maximize their wellbeing.

Women's primary role in the family as a caregiver creates a discrepancy between women's prenatal and postnatal life. This discrepancy requires women to readjust their self-perception, views, and career aspirations once they are mothers and imposes an additional mental burden on women. The pervasive conflict between women's family obligations and employment responsibilities lie at the heart of the persistent gender wage gap, poverty after childbirth, low fertility level, and declined wellbeing of women once they become mothers.

Nonetheless, over time, marriage and parenthood have been less likely to serve as an institution to enhance traditional gender display. Motherhood no longer implies a definite or long-term withdrawal from the labour market in the UK. Families only shift to a traditional division of labour temporarily when the children are very young, and the magnitude of the traditionalizing effect has been much weaker in the 2010s. The finding that egalitarian gender roles in a family are no longer a barrier to the birth of a child implies an optimistic prediction of population growth as families achieve a more gender-egalitarian division of labour in the future.

Many changes occurred over the past three decades and could serve as explanations. For instance, gender norms have been changing as more people become aware of and work against gender inequality. With improved education, women are better prepared for the labour market and have greater opportunities that are difficult to relinquish due to family responsibilities. Moreover, family policies aiming to resolve the conflict between employment and family responsivities have been implemented. Early years childcare represents a significant investment of public funds, and the quality of childcare services has improved substantially. By 2019/20, the government is projected to spend approximately £6 billion a year on childcare provision. These measures could

undoubtfully alleviate the difficulty in combining parenthood and full-time employment and are supported by many more families.

Nonetheless, given that 1) most changes are driven by women who are currently more strongly attached to the labour market than before and 2) there is little erosion in men's role as the breadwinner of a family, the spreading economic uncertainties over the last three decades provide a strong explanation for why families are less likely to conform to a traditional gender-role setting. Men's rigidity and women's flexibility reflect the great financial uncertainties faced by families, who could not risk undermining men's earning capability, and women are well motivated to stay employed or resume work whenever possible.

Therefore, these findings also raise questions regarding whether there has been a fundamental change in gender roles and values. Given that a part of the weakened traditionalizing role of the family is due to the financial needs, to what extent the growing maternal labour force participation has been "a change from agents who work because they and their families 'need the money' to those who are employed, at least in part, because occupation and employment define one's fundamental identity and societal worth" (Goldin 2006) remains unanswered. The fact that over half of the public considers that mothers should take more parental leave than fathers, even in 2018 (British Social Attitudes 2018), indicates persistent gender-differentiated expectations when it comes to family roles. Women's roles are still more flexible than men's, and at present, it is still thought that women should and could reduce their paid work time to meet family responsibilities. Men have little space to choose any other alternative if providing for the family financially is assigned to be their primary role. At a societal level, there seems to be a lack of fundamental change in gender relations in intimate

relationships.

Social and family policies in the UK that aim to promote gender equality remain very limited and ineffective (Birkett and Forbes 2019). Many families are not eligible for use of the shared parental leave, and for those who are eligible, it does not make financial sense for fathers who earn higher wages to take the leave for a substantial period. Not surprisingly, men are still discouraged from taking any additional parental leave, despite the implementation of the shared paternity leave (Kaufman 2018). Additional measures are needed to combat the persistent gender norms. The UK should consider the "use it or lose it" component in parental leave adopted by Sweden, for example, so that if the father does not take a three-month parental leave, the mother will lose her three-month leave.

Men's rigidity and women's flexibility also reflect the incompatibility between a good carer role and a good worker role in the current 24/7 working culture. More actions are needed, and these actions should not be limited to public policies and require the participation of the private sectors. Companies should provide better communication regarding gender equality policy to their employees, improve childcare policies, and ensure a working environment that promotes work-family balance. These measures could reduce costs due to absenteeism, lower turnover, and increase employee productivity and morale. Companies that support gender equality and work-life balance should be publicly recognized and rewarded.

Back to the overarching question asked in this thesis, what is the relationship between gender equality and family formation? Childbearing and childrearing remain the critical source in formulating traditional gender roles, whereas gender inequality reciprocally enhances the traditionalizing effects of marriage and parenthood. As

gender equality levels improve, the soil that incubates traditional gender roles is losing its ground. Families are transformed to sustain more equal gender relations. Accordingly, the previously negative link between gender equality and family formation becomes weaker over time. Is the gender revolution continuing in the UK? Yes and no. There is an evident and continuing transformation of women's roles in the past 25 years. However, women take the leading role in the gender revolution progress with a cost. Mothers adjust their gender-role attitudes and shoulder this additional mental burden no matter they can or cannot combine employment with motherhood. So, shall we conclude that the gender revolution is not stalled? The rigidity of men's roles shows that the gender revolution is, to a certain extent, stalled in the UK. British husbands and fathers maintain their roles as the primary breadwinner and keep making the minimum contribution to housework. Within the realm of marriage and family, there is a lack of fundamental change in the gender roles in intimate relationships. The transition into the "second half" of the gender revolution still faces significant challenges in the UK and a further step to improve gender equality is urgently needed.

APPENDIX

CHAPTER 2: MOTHERHOOD, EMPLOYMENT, AND THE DYNAMICS OF WOMEN'S GENDER-ROLE ATTITUDES

Table A 1. Change in the standardized score of traditional gender attitudes associated with changes in motherhood status, employment status, and the interaction between motherhood status and employment status (full list of the coefficients)

	Model 1	Model 2	Model 3	Model 4
Motherhood status: Childless (reference)				
Mother	0.045*	0.004	-0.176***	
	(0.022)	(0.024)	(0.029)	
Employment status: Full-time working (reference)				
Part-time working		0.011	-0.066*	
		(0.022)	(0.032)	
Non-working		0.181***	-0.042	
		(0.025)	(0.031)	
Raw interaction between motherhood & employment				
Mother * Part-time working			0.279***	
			(0.044)	
Mother * Non-working			0.572***	
			(0.047)	
Refined interaction between motherhood & employment				
Childless & Full-time working (reference)				
Childless & Part-time working				-0.067*
				(0.032)
Childless & Non-working				-0.041
				(0.031)
Mother & Full-time working				-0.200***
				(0.031)
Mother & Part-time working				0.020
				(0.029)
Mother & Maternity leave				-0.002
				(0.045)
Mother & Non-working				0.350***
				(0.032)
Single & Never married (reference)				
Cohabiting	0.034	0.040	0.035	0.032
	(0.025)	(0.025)	(0.024)	(0.025)
Married	0.037	0.040	0.045	0.043
	(0.029)	(0.029)	(0.029)	(0.029)
Divorced/Separated/Widowed	0.003	-0.001	-0.001	-0.002
	(0.053)	(0.053)	(0.052)	(0.052)

	Model 1	Model 2	Model 3	Model 4
Education: GCSE-level or lower (reference)				
Some high qualifications	-0.050	-0.050	-0.051	-0.052
	(0.038)	(0.038)	(0.038)	(0.038)
First degree or above	-0.024	0.020	-0.034	-0.036
	(0.056)	(0.056)	(0.056)	(0.056)
Age	-0.010	-0.003	-0.021	-0.020
	(0.025)	(0.024)	(0.024)	(0.024)
$Age^2/100$	0.038*	0.028	0.050**	0.050**
	(0.018)	(0.018)	(0.018)	(0.018)
Wave number: Wave 1 (reference)				
Wave 3	-0.058	-0.063	-0.060	-0.063
	(0.055)	(0.055)	(0.054)	(0.054)
Wave 5	-0.037	-0.044	-0.034	-0.040
	(0.094)	(0.093)	(0.093)	(0.093)
Wave 7	0.005	-0.003	0.010	0.004
	(0.134)	(0.133)	(0.132)	(0.132)
Wave 9	-0.078	-0.084	-0.064	-0.071
	(0.177)	(0.176)	(0.175)	(0.175)
Wave 11	-0.084	-0.092	-0.069	-0.077
	(0.218)	(0.218)	(0.216)	(0.216)
Wave 13	-0.051	-0.061	-0.030	-0.040
	(0.262)	(0.261)	(0.259)	(0.259)
Wave 15	0.006	-0.002	0.030	0.020
	(0.304)	(0.304)	(0.301)	(0.301)
Wave 17	-0.066	-0.072	-0.028	-0.040
	(0.347)	(0.346)	(0.344)	(0.344)
Wave 19	-0.214	-0.222	-0.165	-0.181
	(0.405)	(0.404)	(0.401)	(0.401)
Wave 21	-0.221	-0.229	-0.167	-0.180
	(0.449)	(0.448)	(0.445)	(0.444)
Constant	0.006	-0.141	0.212	0.183
	(0.464)	(0.463)	(0.461)	(0.460)
R^2 within	0.013	0.019	0.035	0.035
R^2 between	0.024	0.043	0.074	0.073
Overall R^2	0.015	0.032	0.062	0.062
Variance in the dependent variable due to fixed effects		0.631		
Person-wave observations		12,440		
Individuals		2,687		

Notes: All models include age, its square term, wave dummies, education, and marital status. Standard errors are in parentheses.

*p< .05 **p< .01 ***p< .001

Table A 2. Change in the standardized score of traditional gender attitudes associated with lagged changes in motherhood status, employment status, and the interaction between motherhood status and employment status

	Model 1	Model 2	Model 3	Model 4
Motherhood status: Childless (reference)				
Mother	0.024	-0.003	-0.122***	
	(0.024)	(0.027)	(0.032)	
Employment status: Full-time working (reference)				
Part-time working		0.018	-0.010	
		(0.025)	(0.035)	
Non-working		0.107***	-0.053	
		(0.028)	(0.035)	
Raw interaction between motherhood & employment				
Mother * Part-time working			0.146**	
			(0.050)	
Mother * Non-working			0.399***	
			(0.052)	
Refined interaction between motherhood & employment				
Childless & Full-time working (reference)				
Childless & Part-time working				-0.009
				(0.035)
Childless & Non-working				-0.054
				(0.035)
Mother & Full-time working				-0.169***
				(0.035)
Mother & Part-time working				0.017
				(0.032)
Mother & Maternity leave				0.079
				(0.050)
Mother & Non-working				0.207***
				(0.036)
Constant	1.198*	1.109*	1.253*	1.263*
	(0.544)	(0.545)	(0.543)	(0.543)
R^2 within	0.014	0.016	0.023	0.024
R^2 between	0.011	0.007	0.004	0.004
Overall R^2	0.002	0.001	0.000	0.000
Variance in the dependent variable due to fixed effects			0.701	
Person-wave observations			9,952	
Individuals			2,240	

Notes: All models include age, its square term, wave dummies, education, and marital status. Standard errors are in parentheses.

* p< .05 ** p< .01 *** p< .001

CHAPTER 3: A NEW FAMILY EQUILIBRIUM? CHANGING DYNAMICS BETWEEN THE GENDER DIVISION OF LABOUR AND FERTILITY IN GREAT BRITAIN, 1991-2017

Table A 3. Cross-sectional multinomial logistic regressions predicting the log odds of belonging to a certain division of labour type

	All Sample (reference: Dual-earner)			
	Male-breadwinner	Modified male-breadwinner	Female-breadwinner	Precarious
Period (ref: 1991-2000)				
2001 to 2008	-0.123	0.141*	-0.142	-0.096
	(0.067)	(0.063)	(0.126)	(0.098)
2009 to 2017	-0.204**	0.028	-0.032	0.087
	(0.070)	(0.062)	(0.112)	(0.097)
Number of children (ref: zero)				
One	1.738***	1.531***	0.522***	1.125***
	(0.078)	(0.065)	(0.108)	(0.114)
Two or more	2.644***	2.059***	0.824***	2.258***
	(0.082)	(0.070)	(0.114)	(0.118)
Cohabitation	-0.200**	-0.187**	0.487***	0.490***
	(0.073)	(0.065)	(0.115)	(0.097)
Partnership duration	0.007	0.010	0.001	-0.005
	(0.007)	(0.006)	(0.010)	(0.010)
Women's age	-0.223***	-0.044	0.037	-0.382***
	(0.047)	(0.045)	(0.091)	(0.067)
Women's age square	0.003***	0.001	-0.001	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Men's age	0.046	0.070*	-0.186**	-0.087
	(0.038)	(0.033)	(0.062)	(0.046)
Men's age square	-0.000	-0.001*	0.003***	0.001**
	(0.000)	(0.000)	(0.001)	(0.001)
Women's education (ref: GCSE or lower)				
A-level/other higher	-0.654***	-0.318***	-0.062	-1.174***
	(0.081)	(0.069)	(0.133)	(0.097)
1st degree+	-1.303***	-0.669***	0.274	-1.324***
	(0.101)	(0.084)	(0.158)	(0.137)
Men's education (ref: GCSE or lower)				
A-level/other higher	0.030	-0.003	-0.192	-0.601***
	(0.078)	(0.067)	(0.132)	(0.096)
1st degree+	0.551***	0.088	-0.130	-0.435**
	(0.100)	(0.085)	(0.156)	(0.142)
Women's self-rated health (ref: excellent)				
Good	0.026	-0.005	-0.141	0.073
	(0.061)	(0.057)	(0.109)	(0.101)

	All Sample (reference: Dual-earner)			
	Male-breadwinner	Modified male-breadwinner	Female-breadwinner	Precarious
Fair	0.258***	0.021	0.005	0.612***
	(0.071)	(0.066)	(0.120)	(0.114)
Poor	0.858***	0.069	-0.102	1.633***
	(0.097)	(0.090)	(0.153)	(0.129)
Men's self-rated health (ref: excellent)				
Good	-0.115*	-0.015	0.264*	-0.088
	(0.057)	(0.050)	(0.118)	(0.090)
Fair	-0.187**	-0.065	0.705***	0.381***
	(0.070)	(0.062)	(0.131)	(0.101)
Poor	0.055	-0.176*	1.758***	1.567***
	(0.095)	(0.090)	(0.153)	(0.117)
Women' race (ref: white)				
Black	-0.550*	-0.783**	0.404	0.783**
	(0.261)	(0.282)	(0.270)	(0.262)
Asian	0.390*	-0.234	0.403	0.710***
	(0.169)	(0.154)	(0.273)	(0.202)
Others	0.310	-0.289	-0.370	0.686*
	(0.234)	(0.195)	(0.456)	(0.327)
Women being religious	0.044	0.053	0.015	0.035
	(0.063)	(0.055)	(0.093)	(0.088)
Location (ref: England)				
Wales	-0.368***	-0.234*	0.217	0.140
	(0.107)	(0.093)	(0.157)	(0.151)
Scotland	-0.251**	0.059	0.038	0.142
	(0.092)	(0.077)	(0.137)	(0.129)
Constant	1.512*	-2.356***	-1.302	4.934***
	(0.675)	(0.715)	(1.152)	(0.925)
Weighted number of observations	57,151			

Note: Models are weighted with population-equilibrated cross-sectional weight.

Standard errors are in parentheses. * p< .05 ** p< .01 *** p< .001

Table A 4. Fixed-effect logistic regressions predicting the log odds of having a child associated with the division of labour type, by parity

	First birth		Second/higher order births	
	Basic	Interaction	Basic	Interaction
Division of labour type (ref: Dual-earner)				
Male-breadwinner	-0.450	0.701	0.398***	0.692***
	(0.468)	(1.092)	(0.107)	(0.171)
Modified male-breadwinner	0.083	-0.074	0.438***	0.538**
	(0.391)	(0.523)	(0.098)	(0.170)
Female-breadwinner	-0.238	-0.218	0.215	0.213
	(0.761)	(0.771)	(0.217)	(0.217)
Precarious	-1.963	-1.993	0.350*	0.345*
	(2.567)	(2.503)	(0.148)	(0.149)
Period (ref: 1991-2000)				
2001-2008	-1.401**	-1.275*	-0.519***	-0.372*
	(0.496)	(0.524)	(0.143)	(0.186)
2009-2017	-5.733***	-5.582***	-0.494+	-0.289
	(0.956)	(0.922)	(0.255)	(0.275)
Interactions				
Male-breadwinner * 2001-2008		-1.427		-0.220
		(1.176)		(0.205)
Modified male-breadwinner * 2001-2008		-0.027		-0.230
		(0.965)		(0.215)
Male-breadwinner * 2009-2017		-1.593		-0.529*
		(1.248)		(0.206)
Modified male-breadwinner * 2009-2017		0.159		-0.059
		(0.656)		(0.208)
Number of children (ref: Zero/One for higher order births)				
One				
≧ Two			-2.819***	-2.830***
			(0.089)	(0.090)
Cohabitation	-2.763***	-2.755***	-0.665***	-0.674***
	(0.791)	(0.776)	(0.145)	(0.144)
Partnership duration	1.286***	1.227***	0.079	0.078
	(0.354)	(0.329)	(0.119)	(0.120)
Women's age	6.136***	6.325***	0.783***	0.791***
	(1.769)	(1.835)	(0.162)	(0.163)
Women's age square	-0.102***	-0.104***	-0.012***	-0.013***
	(0.030)	(0.031)	(0.002)	(0.002)
Men's age	2.916**	2.912**	0.024	0.021
	(1.066)	(1.066)	(0.138)	(0.139)

	First birth		Second/higher order births	
	Basic	Interaction	Basic	Interaction
Men's age square	-0.032*	-0.032*	-0.003*	-0.003*
	(0.015)	(0.015)	(0.001)	(0.001)
Number of years till the next observation (ref: <1 year)				
1-2yr	0.128	0.116	0.128*	0.126+
	(0.137)	(0.141)	(0.065)	(0.065)
2-3yr	1.235**	1.236**	2.463***	2.468***
	(0.441)	(0.457)	(0.108)	(0.108)
3yr+	4.369***	4.432***	1.540***	1.533***
	(0.918)	(0.940)	(0.191)	(0.192)
Couples	712		2,348	
Couple-year observations	2,714		15,649	

Note: Exclusions are made based on whether having a child within the next 6 months to ensure enough number of cases to conduct separate analyses by parity. order.

Standard errors are in parentheses. * p< .05 ** p< .01 *** p< .001

Table A 5. Changes in women's and men's weekly paid work hours and housework hours (full model)

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations
Marital status (ref: Single)								
Cohabiting	-0.122	1.102***	2.003***	1.383***	1.144**	1.186**	0.575***	0.619***
	(0.314)	(0.308)	(0.184)	(0.185)	(0.375)	(0.374)	(0.132)	(0.131)
Married	-2.218***	0.563	2.806***	1.569***	1.144**	1.082*	0.038	0.238
	(0.396)	(0.399)	(0.227)	(0.244)	(0.436)	(0.450)	(0.159)	(0.164)
Duration		-0.222***		0.122**		0.074		-0.121***
		(0.063)		(0.042)		(0.072)		(0.023)
Duration squared/100		0.612*		-0.579**		-0.049		0.389***
		(0.283)		(0.194)		(0.299)		(0.094)
Parenthood status (ref: No child)								
One child	-10.209***	-15.729***	3.806***	6.124***	-0.668*	-0.974**	0.182*	0.432***
	(0.309)	(0.356)	(0.155)	(0.195)	(0.263)	(0.317)	(0.091)	(0.111)
≥Two children	-14.675***	-18.509***	6.894***	8.770***	-1.129***	-1.507***	0.431***	0.772***
	(0.376)	(0.387)	(0.200)	(0.235)	(0.324)	(0.371)	(0.111)	(0.128)
Age of the youngest child		0.889***		-0.623***		0.099		-0.039
		(0.072)		(0.052)		(0.086)		(0.029)
Age of the youngest child squared/100		0.492		1.903***		-0.499		0.131
		(0.502)		(0.356)		(0.623)		(0.205)
Period (ref: 1992 to 2000)								
2001 to 2008	-1.162***	-1.217***	0.191	0.184	-1.574***	-1.576***	-0.037	-0.017
	(0.224)	(0.216)	(0.145)	(0.144)	(0.240)	(0.241)	(0.079)	(0.079)
2009 to 2017	-1.521***	-1.352***	0.974***	0.877**	-3.204***	-3.187***	0.459**	0.486***

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations	Family status	Transitions and durations
	(0.399)	(0.388)	(0.270)	(0.266)	(0.430)	(0.430)	(0.143)	(0.143)
Age	1.272***	1.437***	0.356***	0.291**	1.428***	1.399***	0.247***	0.296***
	(0.162)	(0.165)	(0.094)	(0.097)	(0.142)	(0.144)	(0.044)	(0.045)
Age square	-0.014***	-0.020***	-0.007***	-0.004**	-0.018***	-0.018***	-0.003***	-0.003***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Health condition (ref: Excellent)								
Good	-0.096	-0.020	0.019	-0.011	0.047	0.041	-0.018	-0.014
	(0.154)	(0.149)	(0.104)	(0.103)	(0.159)	(0.159)	(0.054)	(0.054)
Fair	-0.492*	-0.400*	0.213	0.172	-0.761***	-0.768***	0.135	0.135
	(0.194)	(0.189)	(0.134)	(0.133)	(0.225)	(0.225)	(0.074)	(0.075)
Poor	-2.250***	-2.166***	0.193	0.149	-3.775***	-3.775***	0.217	0.215
	(0.288)	(0.283)	(0.195)	(0.192)	(0.379)	(0.379)	(0.126)	(0.126)
Education (ref: GCSE or lower)								
Some higher levels	3.951***	3.634***	-1.262**	-1.211**	0.229	0.186	-0.278	-0.265
	(0.723)	(0.677)	(0.455)	(0.441)	(0.916)	(0.914)	(0.284)	(0.283)
1st degree or above	7.513***	7.178***	-2.263***	-2.228***	2.183	2.212	-0.392	-0.440
	(1.138)	(1.032)	(0.628)	(0.593)	(1.262)	(1.263)	(0.375)	(0.374)
Constant	6.741*	6.189*	5.906***	6.013***	12.755***	13.718***	0.460	-0.631
	(2.669)	(2.688)	(1.549)	(1.580)	(2.539)	(2.593)	(0.774)	(0.786)
R^2 within	0.111	0.153	0.065	0.079	0.013	0.013	0.008	0.009
R^2 between	0.280	0.294	0.260	0.246	0.100	0.113	0.033	0.045
Overall R^2	0.238	0.259	0.190	0.184	0.066	0.075	0.020	0.028
Number of individuals	13,558				12,621			
Person-wave record	68,836				65,464			

Standard errors are in parentheses. * p<0.05 ** p<0.01 *** p<0.001

Table A 6. Changes in women's and men's weekly paid work hours and housework hours (full interaction model)

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction
Marital status (ref: Single)								
Cohabiting	0.881	1.113***	2.061***	1.379***	0.821	1.229**	0.897***	0.622***
	(0.487)	(0.308)	(0.309)	(0.185)	(0.551)	(0.374)	(0.193)	(0.131)
Married	0.603	0.594	2.242***	1.545***	0.695	1.131*	0.362	0.241
	(0.566)	(0.399)	(0.358)	(0.243)	(0.608)	(0.451)	(0.230)	(0.164)
Duration	-0.307**	-0.226***	0.284***	0.124**	0.201	0.065	-0.164***	-0.122***
	(0.097)	(0.063)	(0.069)	(0.042)	(0.111)	(0.073)	(0.034)	(0.023)
Duration squared/100	0.751	0.560*	-1.558***	-0.529**	-0.592	-0.087	0.598***	0.389***
	(0.451)	(0.284)	(0.323)	(0.194)	(0.483)	(0.299)	(0.154)	(0.095)
Parenthood status (ref: No child)								
One child	-15.738***	-16.627***	6.128***	6.807***	-1.000**	-1.168*	0.439***	0.393*
	(0.356)	(0.572)	(0.194)	(0.335)	(0.317)	(0.538)	(0.111)	(0.181)
≥Two children	-18.538***	-19.925***	8.789***	10.388***	-1.527***	-1.890**	0.775***	0.708***
	(0.387)	(0.564)	(0.235)	(0.401)	(0.370)	(0.610)	(0.127)	(0.207)
Age of the youngest child	0.881***	0.896***	-0.613***	-0.755***	0.100	-0.021	-0.042	-0.013
	(0.072)	(0.125)	(0.052)	(0.102)	(0.086)	(0.157)	(0.030)	(0.053)
Age of the youngest child squared/100	0.549	0.769	1.842***	2.336***	-0.486	0.435	0.141	-0.074
	(0.503)	(0.865)	(0.355)	(0.701)	(0.624)	(1.120)	(0.206)	(0.371)
Period (ref: 1992 to 2000)								
2001 to 2008	-1.173**	-1.826***	0.606*	0.584***	-1.341**	-1.796***	0.018	-0.004
	(0.430)	(0.324)	(0.242)	(0.162)	(0.448)	(0.321)	(0.141)	(0.102)
2009 to 2017	-2.478***	-2.725***	2.584***	1.746***	-3.452***	-3.707***	0.570*	0.440*
	(0.652)	(0.515)	(0.390)	(0.284)	(0.696)	(0.517)	(0.234)	(0.173)
Interactions								
Cohabitation * 2001 to 2008	0.335		-0.774*		0.608		-0.384	
	(0.593)		(0.350)		(0.640)		(0.205)	

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction
Married * 2001 to 2008	-0.099		-0.977*		0.175		-0.132	
	(0.620)		(0.385)		(0.648)		(0.222)	
Duration * 2001 to 2008	0.009		-0.034		-0.212*		0.058	
	(0.107)		(0.073)		(0.107)		(0.037)	
Duration squared/100 * 2001 to 2008	0.010		0.633		0.980*		-0.280	
	(0.491)		(0.344)		(0.454)		(0.160)	
Cohabitation * 2009 to 2017	0.213		-1.737***		0.397		-0.494	
	(0.703)		(0.426)		(0.786)		(0.262)	
Married * 2009 to 2017	-0.063		-1.654***		1.080		-0.281	
	(0.806)		(0.501)		(0.866)		(0.311)	
Duration * 2009 to 2017	0.300*		-0.302***		-0.144		0.078	
	(0.126)		(0.088)		(0.136)		(0.047)	
Duration squared/100 * 2009 to 2017	-0.984		1.866***		0.565		-0.367	
	(0.549)		(0.416)		(0.587)		(0.203)	
One child * 2001 to 2008		0.900		-0.986**		0.307		-0.024
		(0.616)		(0.373)		(0.630)		(0.214)
≥Two children * 2001 to 2008		1.483**		-2.102***		0.724		0.054
		(0.569)		(0.434)		(0.672)		(0.223)
Age of the youngest child * 2001 to 2008		-0.022		0.293*		0.051		-0.038
		(0.150)		(0.120)		(0.189)		(0.065)
Age of the youngest child squared/100 * 2001 to 2008		-0.302		-1.225		-0.688		0.317
		(1.055)		(0.841)		(1.366)		(0.459)
One child * 2009 to 2017		2.513***		-1.483***		0.564		0.183
		(0.709)		(0.419)		(0.672)		(0.244)
≥Two children * 2009 to 2017		3.220***		-2.928***		0.598		0.168
		(0.688)		(0.482)		(0.741)		(0.264)
Age of the youngest child * 2009 to 2017		-0.118		0.213		0.288		-0.043
		(0.158)		(0.126)		(0.199)		(0.071)

	Women				Men			
	Weekly working hours		Weekly housework hours		Weekly working hours		Weekly housework hours	
	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction	Marital status interaction	Parenthood interaction
Age of the youngest child squared/100 * 2009 to 2017		-0.246		-0.534		-2.190		0.305
		(1.105)		(0.867)		(1.422)		(0.491)
Age	1.476***	1.456***	0.250*	0.296**	1.409***	1.410***	0.297***	0.297***
	(0.167)	(0.167)	(0.098)	(0.096)	(0.146)	(0.144)	(0.046)	(0.045)
Age square	-0.020***	-0.020***	-0.004**	-0.004**	-0.018***	-0.018***	-0.003***	-0.003***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Health condition (ref: Excellent)								
Good	-0.027	-0.021	-0.002	-0.008	0.038	0.039	-0.015	-0.015
	(0.149)	(0.149)	(0.103)	(0.103)	(0.159)	(0.159)	(0.054)	(0.054)
Fair	-0.403*	-0.405*	0.183	0.182	-0.770***	-0.773***	0.133	0.133
	(0.189)	(0.189)	(0.132)	(0.132)	(0.225)	(0.225)	(0.075)	(0.075)
Poor	-2.166***	-2.162***	0.151	0.153	-3.768***	-3.781***	0.214	0.215
	(0.282)	(0.282)	(0.192)	(0.192)	(0.380)	(0.380)	(0.126)	(0.126)
Education (ref: GCSE or lower)								
Some higher levels	3.650***	3.562***	-1.209**	-1.178**	0.197	0.192	-0.256	-0.265
	(0.678)	(0.677)	(0.442)	(0.441)	(0.912)	(0.912)	(0.282)	(0.283)
1st degree or above	7.203***	7.144***	-2.238***	-2.210***	2.239	2.253	-0.443	-0.437
	(1.032)	(1.027)	(0.589)	(0.586)	(1.261)	(1.262)	(0.374)	(0.374)
Constant	5.670*	6.353*	6.195***	5.594***	13.491***	13.608***	-0.667	-0.656
	(2.701)	(2.700)	(1.587)	(1.569)	(2.605)	(2.597)	(0.799)	(0.788)
R^2 within	0.154	0.154	0.081	0.081	0.013	0.013	0.009	0.009
R^2 between	0.298	0.296	0.236	0.250	0.115	0.112	0.044	0.045
Overall R^2	0.261	0.261	0.180	0.190	0.074	0.074	0.027	0.028
Number of individuals	13,558				12,621			
Person-wave record	68,836				65,464			

Standard errors are in parentheses. * p<0.05 ** p<0.01 *** p<0.001

Table A 7. Pooled OLS predicting women's and men's paid work time and housework time

	Women		Men	
	Paid work	Housework	Paid work	Housework
Marital status (ref: Single)				
Cohabiting	1.831***	2.435***	4.347***	0.958***
	(0.381)	(0.195)	(0.467)	(0.133)
Married	1.520***	2.710***	7.844***	-0.125
	(0.408)	(0.223)	(0.505)	(0.145)
Parenthood status (ref: No child)				
One child	-12.341***	5.204***	-0.483	0.158
	(0.369)	(0.179)	(0.333)	(0.121)
⩾Two children	-18.404***	9.480***	-1.577***	0.449***
	(0.361)	(0.223)	(0.364)	(0.126)
Period (ref: 1992 to 2000)				
2001 to 2008	**-0.227**	**-2.197*** **	**-0.748***	**-0.172**
	(0.306)	**(0.183)**	**(0.296)**	**(0.092)**
2009 to 2017	**-0.722*** **	**-3.232*** **	**-2.158*** **	**0.482*** **
	(0.324)	**(0.189)**	**(0.328)**	**(0.102)**
Age	1.514***	-0.067	1.089***	0.179***
	(0.172)	(0.093)	(0.151)	(0.043)
Age square	-0.020***	0.003*	-0.016***	-0.001*
	(0.003)	(0.001)	(0.002)	(0.001)
Health condition (ref: Excellent)				
Good	-0.437	0.170	-0.824***	0.109
	(0.277)	(0.163)	(0.246)	(0.079)
Fair	-2.856***	0.876***	-3.956***	0.569***
	(0.339)	(0.198)	(0.353)	(0.110)
Poor	-8.893***	1.166***	-15.287***	1.299***
	(0.465)	(0.284)	(0.607)	(0.194)
Education (ref: GCSE or lower)				
Some higher levels	5.036***	-2.184***	2.287***	-0.132
	(0.372)	(0.227)	(0.373)	(0.122)
1st degree or above	8.277***	-3.828***	2.446***	0.058
	(0.433)	(0.218)	(0.402)	(0.121)
Race (ref: White)				
Black	-0.869	1.186	-7.414***	1.111***
	(1.027)	(0.648)	(1.325)	(0.313)
Asian	-3.253***	4.516***	-3.461***	-0.493*
	(0.816)	(0.610)	(0.858)	(0.234)
Others	-3.792**	1.301*	-5.565***	0.802
	(1.217)	(0.529)	(1.402)	(0.413)
Religious	-0.140	0.524**	-0.051	0.103
	(0.297)	(0.173)	(0.301)	(0.098)
Location (ref: England)				

	Women		Men	
	Paid work	Housework	Paid work	Housework
Wales	-0.170	1.356***	-2.889***	0.757***
	(0.500)	(0.372)	(0.537)	(0.186)
Scotland	0.172	0.369	-1.146*	0.576***
	(0.409)	(0.251)	(0.484)	(0.136)
Constant	5.136	9.347***	19.623***	0.058
	(2.693)	(1.469)	(2.531)	(0.709)
Weighted observations	65404	65404	63079	63079
R-squared	0.270	0.271	0.125	0.037

Standard errors in parentheses. * p<0.05 ** p<0.01 *** p<0.001

Women's and Men's Time spent on childcare

Data and sample

I combine two datasets to analyse the time spent on childcare. The first dataset is the harmonized UK time use data from the nationally representative Multinational Time Use Study (MTUS). This dataset covers the period between 1987 and 2005. The second dataset is the 2014/15 UK time use survey, which is a nationally representative household level survey. I recode variables to ensure a consistent naming and labelling method in the two datasets. I select mothers aged 21 to 49 and fathers aged 21 to 59 with children younger than 15 years old in the household.

Variables

The dependent variable is the number of hours spent on childcare per day. This variable is converted from the number of minutes spent on childcare per day and includes time spent on physical/medical childcare, teaching or helping with homework, reading to and playing with child, and supervising or other childcare.

The independent variables include whether the diary is recorded in (during Monday to Friday), whether in a partnership (value one means in a partnership), whether employed (value one represents employed), age and its squared term, and the number of children. The period variable has three categories: 1990s (1987-2000), 2000s (2001-2005), and 2010s (2014-2015).

Models and results

Weighted linear regression models with clustered standard errors are used to show a descriptive trend of time spent on childcare for women and men over the years.

Table A 8. Change in women and men's childcare time over the years

	Men	Women
Period (ref: 1990s)		
2000s	0.304***	0.505***
	(0.052)	(0.068)
2010s	0.387***	0.639***
	(0.057)	(0.075)
Weekday	-0.062	0.090**
	(0.035)	(0.032)
Employed	-0.399***	-0.612***
	(0.100)	(0.064)
In a partnership	0.203	0.393***
	(0.145)	(0.066)
Age	0.081**	0.075
	(0.025)	(0.042)
Age square	-0.001***	-0.002***
	(0.000)	(0.001)
Number of children (ref: One)		
Two or more children	-0.064	-0.049
	(0.049)	(0.068)
Constant	-0.242	1.430
	(0.435)	(0.733)
Observations	5,691	7,609
R-squared	0.045	0.113

Notes: Combined UK data from the MTUS and the UK 2014/15 time use survey
Standard errors in parentheses
* p<0.05 ** p<0.01 *** p<0.001

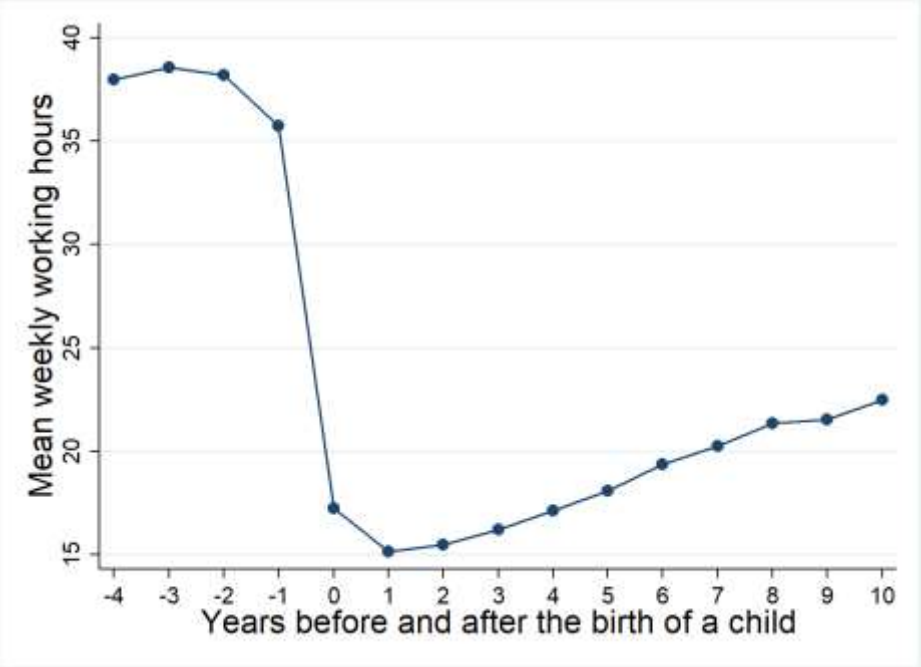


Figure A 1. Dynamics of women's average weekly working hours before and after the birth of a child

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