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Post-war fertility change in Finland 1950-2018: *Understanding the post-2010 fertility decline in the long-term context of post-war fertility change*

by

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Abstract

Finland has had a steep decline in fertility since 2010, which has yet to show any signs of slowing down. This is highly problematic for a country like Finland which has had well below replacement level fertility over the past five decades. This study analysed previous studies and theories related to fertility, primarily in the Finnish and Nordic contexts. Moreover the author performed his own econometric analysis on the main indicators influencing differences in Total Fertility Rates (TFR's) between regions in Finland during the years 1990-2018. The study found a number of drivers behind the recent decline in fertility including; fewer marriages, more divorces, economic recession and hardship, high long-term unemployment, a growing share of tertiary educated women, an increasing gap in education between women and men, the social norm of economic independence before parenthood, and young women perceiving childbearing as non-essential for feeling fulfilled. While these drivers together are likely to explain most of the recent decline in fertility in Finland; the author suspects that there may be other factors related to the physical and mental well-being of young Finns that are not yet well-measured or well-understood.

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1. Background and Significance

Between 1950 and 2019 Finland's population grew from around 4 million to 5.5 million at an annual rate of around 0.5 percent and a population doubling time of 151 years; in other words at a very slow rate (**Figure 1**). From the Total Fertility Rate (TFR) graph (**Figure 2**) we see how fertility went from around 5.00 in 1900, down to a low of 2.00 in 1942 (with downward spikes during the Civil War 1918, the Winter War 1939-1940, and the Continuation War 1941-1944). After the wars there was a short baby boom where TFR reached 3.47 at its peak in 1947. From 1947 to 1973 there was a steep decline down to a low of 1.50. By 1960 the share of under 5 year-olds had already dropped close to the 1940 minimum (Sweetser and Piepponen, 1967). During 1973-2010 the TFR recovered slightly and fluctuated just above 1.7, reaching its peak of 1.87 in 2010. After 2010 there has been a steep decline in TFR reaching a predicted 1.35 in 2019; by far the lowest level ever reached in Finnish history. This turning point in fertility coincided with the Great Recession (2007-2009), and the Finnish economy has indeed struggled to recover from the recession. The number of females has remained persistently higher than the number of males during the entire 1950-2019 period (**Figure 3**). Females outnumbered males by around 180,000 in 1950 with a narrowing of the gap particularly since the 1990s to around 70,000 in 2019; likely due to faster declines in male old-age mortality relative to female old-age mortality. The initial gap can largely be explained by the lives lost during the Civil War, as well as the Winter- and Continuation Wars; where casualties were mainly young Finnish men (over 80,000). Moreover over 400,000 (12 percent of the Finnish population at the time) Karelians had to be relocated after 1940, and over half a million Finns emigrated, to Sweden in particular, during the 1960s (Rotkirch and Miettinen, 2017). These losses of population were a likely cause for the shorter 'baby boom' of just five years (1946-1950) experienced in Finland in comparison to the other Nordic countries, being three times shorter than the US baby boom (Sweetser and Piepponen, 1967). Moreover Finland had huge war reparations to pay and a devastated economy, leading to high female employment due to the lack of manpower in rebuilding the country and its economy (Rønsen, 2004). Looking at Crude Marriage Rates (CMR, not to be confused with the Crude Mortality Rate), that is the number of marriages per 1,000 population, it fell from 11.8 in 1945 to 8.5 in 1950 (Sweetser and Piepponen, 1967). After that there was a slight recovery to 5.8 in 2008, after which CMR fell to 4.5 in 2016 with a small increase to 4.7 in 2017 (**Figure 4)**. In other words the CMR has gone down well below half its value in 1945; meaning that fewer and fewer Finns have been getting married over time.

When looking at the Crude Divorce Rate (CDR, not to be confused with the Crude Death Rate), the number of divorces per 1,000 population, for the years 1960-2017 in **Figure 5** we instead see an increase over time; from 0.8 in 1960 to its highest value of 2.9 in 1989, after which there has been a slight decline down to 2.4 in 2017. As will be further discussed later marriage and divorce are closely linked to fertility as indicators of union stability, whereby it makes sense that these two trends seem to be correlated with the development of fertility over time. There has also been a major shift in the age structure of Finland as a result of the decline in fertility, and to a lesser extent due to the increases in life expectancy. **Figure 6** and **Figure 7** show the shares of 15-49 year-old women and men in 5-year age groups the years 1880-2019. For both sexes we see a decline in the share of 15-24 year olds from 1940 onwards, being steepest from 1980 to 2019. There is also a substantial decline in the share of 25-34 year olds from 1980 to 2019. Simply put; the decline in fertility has resulted in rapid population aging, which has reduced the share of individuals in reproductive ages, which in turn perpetuates further fertility decline. One more indicator that is useful to look at when analysing fertility is unemployment, as for why will be discussed later. Unemployment rose sharply as a result of the early 1990s recession in Finland. After the initial spike receded to around 6 percent in 2007, it rose again to 11.4 percent in 2015, after which it declined to around 7.9 percent in 2018 (**Figure 8)**. It can already be noted that fertility is a complex issue that requires study of long-term changes and interactions between a multitude of social, political, economic, and demographic factors. This long-term change in Finland for the post-war period is what this study attempts to analyse; with the aim of unravelling the most important drivers behind the recent decline in fertility.

While there have been many studies done on different aspects relating to the fertility development in Finland, there is to the author's knowledge no attempt at a holistic study of the factors that have been influencing fertility change in Finland after the Second World War; with particular focus on the post-2010 fertility decline. Moreover, the econometric analysis further explained in the data and methods sections below is also an original contribution as there are no previous studies comparing indicators influencing fertility over time between regions in Finland for the 1990-2018 time period. In other words, the significance of this study is to further the understanding of modern fertility change in Finland; with particular focus on the recent fertility decline since 2010.

2. Specific Aims

2.1 The problem

TFR has been fluctuating well below replacement level in Finland after declining to a historic low between 1947 and 1973. Fertility has also seen a sharp downturn in Finland after the 2007-2009 financial crisis. One of potential explanation behind the consistently low fertility rates and the sharp decline since 2010 could be the three major economic crises in the mid-1970s and early 1990s, as well as the Great Recession in 2007-2009. There are however a number of other social-, economic-, and demographic changes that need to be considered in order to gain a holistic understanding of the fertility change.

2.2 Scope and aim of the study

This study will analyse the Finnish population (mainly the fertile age population between 15 and 49 years of age) during the 1950-2019 time period. Looking at the long-term development of fertility from 1950 until today, this study aims to analyse the main drivers behind the changes in fertility over time. Finland was chosen because the country is an outlier among the Nordic countries both in its exceptionally sharp decline in fertility over the last decade and in its unique demographic context in terms of population loss and economic devastation after the Second World War. The year 1950 was chosen as a starting point as the study will focus on the post-war fertility development and wanted to exclude the immediate post-war effects of the baby boom on fertility and population. The post-2010 fertility change was chosen as a point of focus due to currently being one of Finland's most pressing issues.

2.3 Research Design

The study will be conducted as quantitative case study, combining an extensive literature analysis on previous studies and theories with the authors own longitudinal econometric analysis. The study will look at the long-term change in fertility from 1950 until 2018 in the literature review, with the econometric analysis focusing on factors influencing fertility differences between regions in Finland over the past three decades. The study will be holistic in the sense that it will attempt to capture as many as possible of the complex range of drivers behind the fertility change over time in Finland for the 1950-2018 time period, with the focus being to explain the post-2010 fertility decline.

2.4 Research questions

This study has two separate research questions:

How can the recent decline in fertility (2010-) be understood in the context of long-term post-war (1950-) fertility change in Finland, and which have been the major drivers of change in the recent development?

How have the main indicators associated with differences in TFR between regions in Finland impacted fertility over the 1990-2018 time period, and how can the impacts of these indicators be related to the recent (2010-) fertility decline?

The first question can be seen as the overarching research question, of which the second question could be considered a sub-question. The first question is largely answered based on the extensive literature review in the first part of this study. The second question is linked to the econometric analysis performed by the author that makes up the second part of this study, and the results from the analysis were used to complement the literature review. The hypotheses for the econometric analysis are presented later in the methodology section where the variables are also listed. As the econometric analysis is focused on the 1990-2018 time period, it is the most recent development in fertility that is the focus for this study. However fertility change is a slow demographic process with effects running across generations, so it is essential to look at change over a longer period of time in order to better understand the most recent development.

2.5 Relevance and contribution

No holistic study, trying to encompass as many of the potential drivers of change as possible, has been done on the long-term modern change in fertility in Finland, to the author's knowledge. The author is also unaware of any previous econometric analyses done using aggregate data to construct a longitudinal panel of the regions in Finland and compare indicators influencing TFR differences for the years 1990-2018.

2.6 Outline of the study

The study will begin with an extensive literature review that connects to the first research question, followed by a methodology and data analysis section connected to the second research question. The literature review is primarily concerned with the Nordic context, with a strong focus on Finland. First

some general fertility-related theory will be presented, followed by sections on; fertility change in Finland, Socioeconomic factors influencing fertility decisions, public policy related to fertility in Finland, macro-economic factors influencing fertility, and lastly a section on unions and children. The methodology part of the text begins with a presentation of how the data was collected and what variables were selected, as well as their hypotheses, and then presents the econometric method and models that were used for the data analysis. The data analysis section begins with a descriptive analysis of the data, followed by the process of model construction and the various tests performed on the data, and concludes with the results from the analyses. The conclusion section will wrap up what has been learned from the literature and data analysis, and answer the research questions.

3. Theory, previous studies, and the Finnish context

3.1 General theory

Micro-economic theory on fertility claims that higher levels of socioeconomic resources among couples tends to have a positive association with childbearing, with the impacts of men's resources being more consistently positive than women's. The relationship is however neither clear-cut nor linear as there is a tradeoff between the quantity and quality of children. The increase in number of children makes the cost of increasing the quality of children higher. In the same manner the increase in quality of the children makes each additional child more expensive (Becker and Lewis, 1973). In this way parents with a higher standard of living and higher level of education may actually have fewer children than parents with a lower standard of living and lower level of education; as the former may choose to invest more in each child than the latter. A woman's earnings on the one hand contribute to household income and thereby positively affect the feasibility of having children, on the other hand child rearing takes away time from the woman's paid work and increases opportunity costs of motherhood. Thereby on the one hand the contribution to household economic resources by both sexes, the income effect, increases the ability of the household to invest in children. On the other hand, the limitations to career opportunities and loss of earned wages that come with motherhood obligations are referred to as the opportunity costs (Becker, 2009; Joshi, 1990). Thereby more highly educated women are expected to have higher opportunity costs than less educated women, and delay their childbearing longer then less educated and -career oriented women (Aassve and Lappegård, 2010). Conversely, more highly educated men are expected to have higher probabilities of fatherhood due to their greater capacity to

secure a sufficient standard of living for their family, and due to there being less of a conflict between career and family building for men. Theories on fertility development and gender suggest that fertility decline in the West is related to women being under a double burden of education and career on one hand, and caring for their families on the other. There has recently been a shift towards more equal division of domestic roles among couples as well as between men and women in the public sphere in certain Western countries (Oppenheimer, 1994; Anderson and Kohler, 2015; Esping‐Andersen and Billari, 2015; Goldscheider et al., 2015; McDonald, 2000). The social context of the country is therefore important in determining whether women's socioeconomic resources encourage or impede childbearing (Kalmijn, 2011; Kreyenfeld, 2009; Thomson and Bernhardt, 2010). Opportunity costs are expected to be lower in more gender-egalitarian societies like the Nordic countries. The convergence hypothesis states that as women reach levels of educational attainment similar to or higher than men, and as social and economic roles become more similar between the sexes; differences associated with fertility and education would also be expected to be reduced. Studies on the timing of entry into parenthood for men and women in France as well as fertility postponement and childlessness in Britain give some support to this hypothesis (Kneale and Joshi, 2008; Winkler-Dworak and Toulemon, 2007). Therefore some scholars are arguing that fertility levels may be maintained or increased if men take on more responsibility in caring for their children as well as distributing household work more equally with their partner (Anderson and Kohler, 2015; Esping‐Andersen and Billari, 2015; Goldscheider et al., 2015; McDonald, 2000; Neyer et al., 2013). According to a couple of fairly recent studies the more equal division of household labour in Finland is a result of well-educated young women outsourcing or reducing housework rather than men doing more (Miettinen and Rotkirch, 2008; Niemi and Pääkkönen, 2001). Some studies suggest that there has been a change in the relative income contribution between the sexes particularly in Nordic countries; where an increasing share of women have similar or higher earnings and educational attainment than their partners (Chudnovskaya, 2017; Klesment and Van Bavel, 2017; Mäenpää and Jalovaara, 2015). Lastly, generous family policies like home care allowances and public childcare have been found to increase fertility, while high unemployment and an insecure labour market have been found to decrease fertility especially for younger women (Adsera, 2004).

3.2 Fertility change

Sweetser and Piepponen (1967) studied postwar fertility trends in Finland and the US, using data for the years 1920-1960. Concerning the fertility decline in Finland, they note that the general decline was

a decline across all birth orders (first-, second-, third birth and so on). The authors argue for a number of factors explaining the faster decline of fertility in Finland compared to the US. First, they argue that it was associated with Finland's difficult economic situation during early pre-war and early post-war development; being the poorest Northern European economy at its independence in 1917 with a GDP per capita less than half of that of the UK at the turn of the 20th century (Hjerppe, 2008). This led to large-scale labour participation of Finnish women due to the rapid urbanization and industrialization in the post-war period. In tandem with the developments in the economy and labour market, Finland developed an early pattern of later marriage and fewer children per woman (Sweetser and Piepponen, 1967).

Hellstrand et al. (2019) studied TFR in Finland using aggregate data on age-specific fertility the years 1960-2017 accessed from the Human Fertility Database, with the specific aim of analysing the steep fertility decline observed in Finland since 2010. From their analyses they reach a number of results. By looking at age and parity (number of previous live births per woman) effects on the fertility decline 2010-2017 they observed that the only positive effect to the fertility change were women near the end of their reproductive lives, albeit their contribution was very modest. The decreases in intensity of first births were found to account for more than three-quarters of the total decline in fertility. Second and third order births accounted for 21 percent of the decline, with higher-order births having a negligible effect in explaining the decline in fertility. The decline in first-birth intensities led to an increase in childlessness for younger women; from 64 to 69 percent for women ages 25-29 the years 2010 and 2017, and 37 to 40 percent for women ages 30-34 for the same years. Moreover declines in first-order births were most pronounced for highly educated women, with declines in third- and higher-order births being stronger in rural than urban areas. Concerning tempo-adjusted TFR the authors found that the mothers mean age by all child births increased by two years 1990-2017 to 30.9 years of age. The tempo effect that is adjusted for refers to the timing of births, which in turn is connected to the mean age of childbearing. Another way to view an increase in the tempo effect is as an expansion in the interval between generations, where the number of births within each calendar year declines (VID, 2020). Tempo-adjusted TFR was higher than observed TFR for every year in the 1990-2017 time period; meaning that TFR would have been higher in the absence of fertility postponement. The largest tempo effect was observed for first-order births. However, as the tempo-adjusted TFR declined in tandem with observed TFR the years 2010-2017, the decline in fertility in Finland since 2010 was not mainly attributable to change in the timing of childbirth. Looking at cohort fertility rates (CFR) for

women born since 1974, the authors observed that women born in 1973 with the latest observed CFR (having reached age 44 by 2017, almost completing their reproductive lives) had an average number of children per woman at 1.89; roughly the same level that was observed over the previous 30 years. The three forecasting methods used by the authors however all point to a substantial decline in completed CFRs for women currently in their reproductive years. The predicted number of children for the 1980 cohort was 1.80, for the 1985 birth cohort 1.75 children, and for the 1987 birth cohort 1.7 children. These observations show that even if fertility rates do not decline further, CFR is expected to approach 1.65 for late-1980s cohorts. The authors pointed out however, that this is the most optimistic scenario. Using the Bayesian method or five-year extrapolation gave an expected completed fertility of 1.6 for the 1987 cohort. They therefore concluded that CFR in Finland will decline rapidly unless there is a quick recovery in age-specific fertility rates. Assessing the potential for cohort fertility recuperation the authors concluded that keeping the CFR at the level observed over the last few decades would require a stronger recuperation than has ever before occurred in Finland. While their non-parametric analysis showed that it is possible for CFR to stay above 1.75 for the late-1980s cohorts, the current trend does not indicate that this is going to happen (Hellstrand et al., 2019).

Jalovaara et al. (2019) studied education, gender, and cohort fertility in the Nordic countries with the most recent cohort data. The gap in cohort fertility between highly educated men and men with lower education remained substantial in Finland between the 1940-44 and 1965-67 cohorts. The gap between highly- and lowly educated men was the largest at around 0.3 children, increasing slightly to 0.4 children between the 1960-64 and 1965-67 cohorts due to a sharp decrease in fertility among lowly educated men (CFR 1.6-1.4). Finland has had the largest gaps in cohort fertility between different educational levels among the Nordic countries (Sweden, Norway, and Denmark). For cohorts of women Finland is also an exception among the Nordic countries as it was the only country that showed substantial gaps in cohort fertility between different educational groups for the latest cohort, while gaps converged to almost equal levels in the other Nordic countries. The pattern was the opposite to that of men, as the women with low education have had the highest fertility (CFR fluctuating around 2.0 for 1940-1972 cohorts) and the ones with the high education have had the lowest fertility (CFR fluctuating around 1.8 for 1940-1972 cohorts). As for childlessness Finnish men show the highest levels out of the Nordic countries, with the largest gap between highly and lowly educated across the cohorts being around 11 percent and 23 percent respectively for the 1940-44 cohort, and around 22 percent and 36 percent for the 1965-69 cohort. Finnish women on the other hand were the only ones among the Nordic

countries to show a strong convergence and a significant increase in childlessness (around 22 percent for the latest 1970-1972 cohort) for all educational groups across all cohorts (1940-1972). These trends are worrying as lowly educated women are the most likely to partner with lowly educated men; but the gap in fertility between women and men with the lowest education has been increasing and was around 0.6 children for the latest cohort. Moreover, individuals with the lowest education have the lowest likelihood of forming unions and retaining them; applying to both sexes in the Nordic countries (Jalovaara et al., 2019; Bracher and Santow, 1998; Jalovaara, 2012; 2013; Jalovaara and Fasang, 2015; 2017).

3.3 Socioeconomic factors

A number of recent studies have shown a positive correlation between women's employment and fertility (Adsera, 2011; Andersson, 2000; Hoem and Hoem, 1989; Kravdal, 2002; Pailhé and Solaz, 2012). The significance of men's and women's economic prospects and activities vary depending on the gender equality in a society, and how paid and unpaid work is divided between partners. Many of the studies reporting positive impacts of women's employment indeed study the Nordic countries, with high female labour force participation (Engelhardt et al., 2004; Rindfuss and Brewster, 2000; Myrskylä et al., 2009) and high levels of gender equality (WEF, 2019; EIGE, 2020). Increased compatibility between parenthood and work is likely to reduce the negative impact of women's employment on fertility; and there is evidence from Nordic countries of significantly increased risks of first-births as earnings income increases (Andersson et al., 2009a; Hank, 2001; Vikat, 2004; Andersson, 2000; Hoem, 2000). Finnish women tend to work full-time and stay in the labour market until retirement, only taking family leave when they have young children (Rissanen, 2001; Rønsen and Sundström, 2002). The two earner family is the social norm in Finland, but mothers are far more likely to take a family leave of one to three years after childbirth; which increases the importance of the man's income in families considering having children (Lammi-Taskula, 2007). Jalovaara and Miettinen (2013) in their study on how socioeconomic resources of married and cohabiting partners affected entry into parenthood in Finland found that unemployment had a slightly positive impact only for women ages 17-24, the effect being rather weakly negative or neutral for 25-30 year-olds; which was in line with previous studies on Nordic countries (Andersson, 2000; Hank, 2001; Kravdal, 2002; Vikat, 2004; Jalovaara and Miettinen, 2013).

A number of studies have shown that prolonged education and being enrolled in study, as opposed to being employed, delayed parenthood for both sexes (Andersson, 2000; Blossfeld and Huinink, 1991; Hoem, 2000; Hoem, 1986; Lappegård and Rønsen, 2005; Liefbroer and Corijn, 1999; Winkler-Dworak and Toulemon, 2007). Women had lower education attainment until the 1980s in Europe, whereas now women are more likely than their male counterparts to earn a tertiary degree in all European countries except for Switzerland (Mamolo et al., 2014). The share of Finnish women ages 25-34 with a tertiary education increased from 46.9 percent in 2000 to 49.5 percent in 2018, while the corresponding rates for Finnish men ages 25-34 were 30.7 and 33.5. For women ages 55-64 the share of tertiary educated increased from 21.7 percent in 2000 to 46.0 percent in 2018, the corresponding rates for Finnish men ages 55-64 were 25.2 percent and 33.9 percent. So not only had the share of tertiary educated women far surpassed that of men already by 2000, the share of tertiary educated women has also grown more rapidly since then (OECD, 2020c). Jalovaara and Miettinen (2013) found that a higher level of education led to postponement of childbearing until age 30, after which the educational gradient was strongly positive. The two main conclusions of their study was that higher levels of economic resources had fertility promoting impacts regardless of gender, and that the positive impact of the female partner's economic resources was equal to or even stronger than the impact of the male partner's economic resources. Being economically independent and having their own resources are also cultural norms for Finnish women. Finishing their studies and finding employment before having children is preferred by many, as family formation could interfere with enrollment or employment. Being employed for a time also entitles the woman to higher parental allowance, as the amounts received are earnings-related. Moreover, the high frequency of union dissolution enhances the importance of economic independence among women (Jalovaara and Miettinen, 2013). Finnish women's employment rates are among the highest in Europe, and almost as high as employment rates of Finnish men (OECD, 2020a). Labour participation among women has also increased significantly in Europe, even in Southern Europe where the majority of women were outside the labour market in the past (Thévenon and Horko, 2009; OECD, 2011).

The situation where women face the choice between being a parent or having a career has by some been referred to as the "incomplete gender revolution" (Esping-Andersen, 2009). With the labour market becoming less secure and more competitive, young men and women often work in poorly paid temporary jobs; and parenthood has become an increasingly costly investment (Blossfeld and Mills, 2005; McDonald, 2002). Thereby childlessness rather than being planned from a young age, is often a

mixture of adverse circumstances and failure to adapt to unforeseen events such as poor health, not finding a suitable partner, union dissolution and infertility (Gray et al., 2013; Heaton et al., 1999). As early as the 1980s above 70 percent of Finnish women did not think that having a child was necessary in order to be fulfilled (Nikander, 1992), and only 20 percent thought that a person could not be completely happy without having children (Paajanen et al., 2007). More recent surveys on young Finnish women have shown a pursuit of interesting life goals as opposed to parenting as the main reason for postponing child birth (Miettinen, 2015). Voluntary childlessness has been found to be rare in the EU (including Finland) (Miettinen and Rotkirch, 2008; Miettinen and Szalma, 2014). Recent Family Barometer surveys from Finland for the years 2015 and 2018 however indicate that over one-fifth of childless Finns in their 20s responded that 0 was their ideal number of children, whereas this share was below 6 percent a decade earlier (Berg, 2018). Finnish women born in 1940 had the third highest childlessness in the EU of around 14 percent, and women born in 1968 the fourth highest in the EU at almost 20 percent (Sobotka, 2017). The current (2017) levels of childlessness among Finnish adults in ages 40-45 is around 25 percent for men and 20 percent for women (Rotkirch and Miettinen, 2017). In their study Rotkirch and Miettinen (2017) found that in Finland the relationship between socioeconomic status and number of children is positive for men, in large part due to childlessness being more common among less educated men. Finnish men with low levels of education were also the most likely to never have had a spouse, and to be childless had they had at least one spouse. For Finnish men childlessness has increased across educational groups with the educational gradient persisting across cohorts. They also found that about 30 percent of Finnish women currently (2017) in their 40s had three or more children, and that these high parity mothers combined gave birth to half of the children born in Finland. This, together with the increasing share of childless women among younger cohorts makes Finland an exception among the Nordic countries; which have lower levels of childlessness (Andersson et al., 2009b) and less of a reproductive skew (Eurostat, 2015) towards higher parities than Finland (Rotkirch and Miettinen, 2017). In a study on childlessness among Finnish men and women born in 1969-1970 Jalovaara and Fasang (2017) examined union trajectories identified with childlessness. They found that the most typical clusters of trajectories were: ‘never partnered’ (45 percent), ‘briefly cohabited’ (25 percent), ‘cohabitors, often serial’ (19 percent), and ‘married’ (11 percent). The ‘never-partnered’ cluster was male-dominated; men with rural background as well as less educated men and women were also overrepresented in the ‘never-partnered’ cluster. They concluded that the vast majority of the childless in the cohorts they studied had union trajectories characterized by

either an almost complete absence of coresidential unions or fragmentary cohabitation (Jalovaara and Fasang, 2017). While men are able to have children at later ages than women, few Finnish men do, as roughly 80 percent of Finnish couples have an age difference of 5 years or less, with below 0.5 percent having an age difference of 20 years or more (Nikander, 2010).

A Finnish survey found that relationship satisfaction was a stronger predictor of fatherhood than the man's own fertility intentions; whereas there was no link between relationship satisfaction and fertility for women. Lack of a permanent job was found to negatively influence having a first child among men; while being unemployed or in education, and age, had a negative influence for both sexes (Lainiala, 2012). Miettinen et al. (2011) studied how gender role attitudes relate to childbearing intentions using the Finnish Well-being and Social Relationships Survey of 2008 conducted on 25-44 year-old men and women with one or no child. They found that both traditional and egalitarian attitudes towards gender equality raised fertility intentions for Finnish men, while the impact of gender attitudes among women were small and ambiguous (Miettinen et al., 2011).

Rønsen (2004) in her study on the impacts of public policy on fertility in Finland and Norway, for women born between 1938-1967 and 1945-1968 respectively, found that daughters of manual workers had their first child sooner than other social groups; whereas daughters of upper employees waited the longest (Rønsen, 2004). Nisén et al. (2014) studied Finnish women and men born 1940-1950 to investigate the impacts of family background on fertility and childlessness. Their results also showed that women born in families headed by professional or administrative workers were more likely to remain childless than women born in families headed by farmers or manual workers. These results remained after controlling for variables like family type and number of siblings (Nisén et al., 2014). At second and third parity births Rønsen found conception risks to be lowest among highly educated women. Coming from a large family generally sped up the fertility process, and religiously active women were found to delay their first child, but had a higher risk of second and third birth. Single or cohabiting mothers were found to have lower risk of second conception than married women, while women who married directly had higher risks of second birth than women who married after a period of cohabitation. A higher wage delayed the time of first birth for women, and reduced the risk of second and third births. In line with previous studies (Klevmarken and Tasirian, 1996; Kravdal, 1992) Rønsen found supply of day-care to negatively impact fertiltiy, except for transitions to parity two. She

however also found indications that extensions of maternity leave have had positive impacts on fertility in Finland, particularly for higher order births (Rønsen, 2004).

3.4 Fertility related public policy in Finland

Finland can be classified as an universalistic type of welfare state with a generous social welfare and family policies (Esping-Andersen, 1990: 20, 25, 86-87). In Finland universal right to paid leave during birth weeks was implemented in 1964, initially for a duration of 9 weeks. Income compensation was quite low at around 45 percent and the benefits were non-taxable. In the 1970s-1980s a number of extensions were made to the leave increasing the duration to 29 weeks by 1974, 43 weeks by 1981, and finally 263 weekdays since 1987 (with a temporary further increase by 2 weeks 1991-1992). Fathers leave has been available since 1978, initially limited to 2 weeks, but later on increased together with the extensions in the leave program. Since 1987 Finnish fathers can share all except the first 105 days of the parental leave with their partner. In 1982 the compensation was increased generously to 80 percent during the part of the leave reserved for the mother and 70 percent during the rest of the leave; benefits were also made taxable and included in the pension basis. Since 1983 an earnings ceiling has been implemented which reduces compensation once reached. During 1991-1994 cuts were made to the paid leave; resulting in a replacement rate maximum of 66 percent since 1994. Since 2005 if a woman gets another child within three years from the previous one, she gets to keep the same level of parental allowances she got for her previous child. This may incetivize shorter spacing between births and reduce the economic stress of staying home longer to care for the children (Haataja and Juutilainen, 2014). A father's quota was introduced in 2003 (the so-called 'daddy-month'), and extended to a maximum of 36 workdays in 2010 (Aholainen, 2010; Lammi-Taskula, 2017: 92). While parents have been able to share their parental leaves as they please since 1985, fathers only recently started using child care leave, particularly after the 'daddy-month' was introduced (Lammi-Taskula, 2007). Before 2003 only 2-3 percent of fathers took parental leave; this increased to around one third of fathers using their 'daddy-month' in 2012 (Lammi-Taskula, 2017: 92-93). Both parents have a statutory right to return to their place of work after the home-care leave has expired. In 1985 a home care allowance scheme was introduced; giving parents the option to choose between public day-care or an extra income transfer for staying home and taking care of their child. This scheme was gradually extended until 1990, after which all Finnish parents have been entiteled to the home-care allowance until their child reaches the age of 3. The scheme quickly became very popular among families, with almost 90 percent of families having a child in the 2000s using it (Haataja and Juutilainen, 2014). In 97 percent of

cases one of the parents stayed home with the child, and in 98 percent of cases it was the mother. The number of months receiving home care allowance increased with the mothers age, number of children, and if the mother alone stayed home with the child. The number of months decreased with income, educational attainment, and occupational position. (Salmi et al., 2009: 32, 36). The allowance is €341.69 per month for the first child below 3 years of age, €102.30 per month for each additional child below 3 years of age, and €65.73 per month for each child over 3 years of age until they reach school age. Additionally, there is a care supplement of a maximum of €182.86 per month that is reduced depending on if and by how much the family income exceeds a set income limit, which is dependent on family size. Furthermore the mother may be entitled to an additional municipal supplement which varies between municipalities (Kela, 2020b). In 1973 around 10 percent of Finnish pre-school children had a place in public day-care. This increased to around 28 percent in 1980, 45 percent in 1990, and gradually plateaued at around 50 percent after that. Public day-care has unsurprisingly been in short supply due to its popularity, and the excess demand has been met by private forms of child care such as private day-care centers, au pair girls, and 'day-moms'(Rønsen, 2004). In part due to the popularity of the home care allowance, the recent (2007) share of below 1-5 year-old children in publicly financed daycare has however been substantially lower in Finland than in it has in the other Nordic countries (Sipila et al., 2010: 52). In terms of all child day care benefits, 7.2 percent was received by fathers in 2018 (Kela, 2018: 274). In addition to paid parental leave and home care allowance, Finnish families are also entitled to a child benefit. The child benefit is a monthly tax-free benefit paid for each child until they reach age 17, which progressively increases for each additional child until the fifth child. For the first child the amount is €94.88 per month, the second €104.84, the third €133.79, the fourth €163.24, and for the fifth and each additional child €182.69 per month. Single-parents receive an additional €63.30 per month per child (Kela, 2020a). Lastly, mothers receive a one-time €170 (2018) maternity grant either in the form of a 'baby box' or in cash for each child they give birth to (Kela, 2018: 262-263).

Arguably the child benefit in its current form sets an incentive structure that is incompatible with Finland's current context of declining fertility and increasing childlessness. As the benefit is the lowest for the first two children, and increases more rapidly from the third child onwards the child benefit gives greater incentives to higher-order births than it gives to first- and second-births. This is counter-intuitive for three reasons. First, the socio-economic hurdle for having the first child is substantially higher than it is for subsequent children, as has been expressed in increasingly high levels of

childlessness. Second, the norm for a Finnish family is one or two children (Kela, 2014: 274; 2018: 274). Third, the cultural norms of having many children for recent immigrants from low- and medium-HDI countries are further enforced by the incentives of the child benefit. Not only does this put additional strain on Finnish public finance, it further depresses female employment among immigrant women which leads to both greater socio-economic disparities between native and immigrant families as well as poorer assimilation prospects for children of immigrant families of low- and medium-HDI origin.

Seija Ilmakunnas (1997) analyzing Finnish survey data found a strong relationship between the the potential earnings of mothers and their choice of childcare. The less their potential earnings were the higher the probability was for them to stay home while the child is small. Income of the father was positively related to chosing private daycare, negatively to chosing public daycare. Based on her model, popularity of home care increased linearly with the generousity of the allowance (Ilmakunnas, 1997). Sipiä et al. (2010) point to the significance of parental preferences, cultural values, and ideas of parenthood influencing the type of childcare they choose, and whether they opt for home care allowance (Sipila et al., 2010-26, 30, 57). The home care allowance has been criticized by some authors for strengthening traditional gender norms by encouraging mothers to stay home with their children, thus diminishing their attachment to the labour market (Hiilamo and Kangas, 2009). This affects mothers' earnings development and lifetime earnings, which in turn reduces their future pensions (Hakovirta, 1998; Hämäläinen, 2005; Rissanen and Knudsen, 2001). Moreover, some argue that the potential long stay at home may channel mothers into unemployment as well as possible marginalization and poverty. The selection of this channelling would also mean that those in the weakest labour market positions would be the most incentivised to choose the home care allowance (Haataja, 2005; Hämäläinen, 2005). Anni Erlandsson (2017) studied the impact of child homecare allowance on second- and third order births in Finland for women ages 20-44 during the years 1992-2007. In her study she lifted up the issue of how policy should be able to increase fertility without decreasing female employment. Erlandsson's results show that using child care allowance increased the risk of mothers having a third child by 170 percent compared to mothers not receiving the allowance. The mother's age at previous birth decreased the risk of third births linearly. Married mothers were found to have a 76 percent higher risk of third birth compared to unmarried mothers. Mothers with the highest education were found to have the highest risk of third birth. Overall the fertility of the least educated mothers was the most affected by home care allowance use. Erlandsson also points out that if

a mother were to decide to have another child right before her previous child turns 3, and keeps using the child homecare allowance for this child until it turns three, she may remain outside the labour market for 6 years straight. This would have a substantially negative impact on her ability to re-integrate into the labour market (Erlandsson, 2017).

3.5 Macro-economic factors and economic recessions

Sobotka et al. (2011) in their study on the impact of economic recessions on fertility stated that most studies have found that fertility generally is pro-cyclical, increasing during economic upturns and decreasing during economic downturns. These cycles in fertility tend to be in the order of a few percentage points and short in duration; and can therefore be overshadowed by secular trends (smooth, long-term, regular changes) that are driven by other factors than economic recessions. The temporary decline in fertility during recessions may oftentimes simply be a postponement in childbearing, particularly first births. In demographic terms recessions tend to have minor tempo effects and only small, if any, quantum effects on fertility decline. A tempo effect concerns the change in timing of childbearing, while a quantum effect concerns the change in completed fertility; that is the total number of births per woman. An example of a quantum effect for fertility is the total fertility rate, and an example of a tempo effect is the mean age at first birth (Bongaarts and Feeney, 2008). Sobotka et al. found that the main reason why recessions negatively impact fertility was the increase in job instability and unemployment; which impact young adults in particular. In their discussion the authors suggested that more highly educated women in particular are likely to perceive childbearing to be particularly risky during recessions, and are therefore likely to postpone childbearing. On the other hand the least educated men with precarious job positions will have increased difficulties finding a partner to start a family with. Therefore while fertility rates tend to correlate with GDP growth; Sobotka et al. noted that unemployment numbers and consumer confidence seem to be better indicators as they more closely reflect the economic impact on the individual (Sobotka et al., 2011). According to Sobotka et al. Andres Vikat's (2004) study on fertility in Finland in the 1980s and 1990s showed what could be an example of an unintentional policy managing to dampen the fertility reducing impact of a recession. The introduction of child allowance for parents staying home with their child below age 3 was introduced in the mid-1980s in Finland and may well have dampened the fertility reducing impact of the deep economic recession in the early 1990s; as the policy offered an attractive alternative to shrinking work opportunities for many Finnish women. While the first-order births declined from 1992-1994, there was a continuing increase in second and higher-order births throughout the 1992-

1994 period. This example would suggest that family and welfare policies may moderate or even reverse impacts of recessions on fertility (Vikat, 2002; Sobotka et al., 2011).

In his study on fertility responses to economic recession in Finland the years 1991-2015 Heikki Hiilamo (2017) also found evidence that unemployment seems to have affected timing of first births, but not completed fertility. Hiilamo found that a one percentage point increase in unemployment was associated with a 0.13 percentage point decrease in fertility. He also found that education was negatively associated with fertility (Hiilamo, 2017). While studies done on the period before the Great Recession (2007-2009) have shown that economic recessions only have a small and temporary impact on fertility, explained by developed countries not experiencing long-term economic decline due to recessions (Currie and Schwandt, 2014; Sobotka et al., 2011), more recent studies done on the period after the Great Recession have shown substantial impacts. Shneider (2015) for instance showed that the general fertility rate declined by about 0.6 births per percentage point increase in unemployment at the state level in the US (Schneider, 2015). Goldstein et al. (2013) studied the impact of unemployment on fertility in 28 European countries the years 2000-2010 and found a 0.2 percentage point decline in first birth rates for 15-19 year-old women, and 0.1 percentage point decline for 20-24 year-old women per one percentage point increase in unemployment (Goldstein et al., 2013). Comolli (2017) used the same methodology to study fertility responses to the Great Recession for the 2000-2013 time period in 31 European countries and the US, and found that a one percentage point increase in total unemployment was associated with a 0.08 percentage point reduction in TFR (0.09 percentage points for female unemployment) (Comolli, 2017). In Hiilamo's (2017) study interaction of unemployment with the years 2008-2014 gave a positive, statistically significant, coefficient which indicated that fertility responses to unemployment were stronger during and following the Great Recession than during and following the recession in the early 1990s in Finland (Hiilamo, 2017).

3.6 Unions and children

Elina Mäenpää (2015) studied socio-economic homogamy (similar socio-economic status between partners) and its impact on union stability in Finland using register data on 30 year-old women born between 1957 and 1979 (with different time intervals for her four sub-studies). She found that 46 percent of couples had had a similar educational background and 40 percent shared a similar class background. In 34 percent of couples the woman had a higher education than the man, in 20 percent of couples the opposite was the case. Concerning extreme educational heterogamy (different educational

attainment between partners) Mäenpää found that out of 15,000 unions only 73 were between one person with basic education and one with upper-tertiary education. From another point of view; half of the women with upper-tertiary education had male partners with a similar education, while 1 percent of women with basic education had a male partner with upper-tertiary education. All in all; 19 percent of couples were homogamous both in educational attainment and class background, a third of the couples were heterogamous in both dimensions, and half the couples were homogamous in one but heterogamous in the other. When comparing 1957-1960 and 1977-1979 cohorts Mäenpää found that the share of hypergamous (man more highly educated than woman) decreased from 25 to 17 percent, and the share of hypogamous (woman more highly educated than man) increased from 31 to 38 percent. The odds ratio for hypergamy also decreased from 1.0 in the 1957-1960 cohort to 0.7 for the 1961-64 cohort, and down to 0.4 for the youngest two cohorts (Mäenpää, 2015: 37-41, 51, 55-56). So while almost half of couples still have a similar educational background in Finland, there seems to be an increasing acceptance of hypogamy among women, probably as a reaction to the increasing gap in higher education between women and men.

Hoem et al. (2013) studied fertility patterns of Finnish women by union status for the years 2001-2003 using register data to create synthetic cohorts and duration-based TFR in order to produce different scenarios of union type; and estimating the number of children women would have borne throughout their reproductive years of life. Firstly they found that women not living in a union presented very low fertility rates (TFR = 0.17), reflecting how rare single childbearing is in a Nordic country like Finland. Secondly they found that consensual unions (TFR = 1.12) also produced much lower fertility rates than marriage (TFR = 1.82); with women directly married having the highest fertility of all groups (TFR = 1.88) (Hoem et al., 2013). Lyngstad and Jalovaara (2010) in their study on union dissolutions found that unemployment was connected not only with limited financial capacity, but also shame and depression; which in turn may make unemployed persons even less desirable as partners. Moreover, they found that unemployment increased union instability (Lyngstad and Jalovaara, 2010).

Studying interrelationships between childbearing and housing transitions in Finland for native-born women aged 16-49 the years 1988-2000, Kulu and Steele (2013) investigated the timing of housing choices and fertility decisions with respect to each other. The results they got from their analyses indicated that women that were more likely to have children were also more likely to move, regardless of the type of housing of the destination. The conclusion the authors drew from their results was that

long-term housing aspirations and family plans were closely related. In other words, women wishing to have a large family were likely to move in order to achieve desired housing. Concerning the timing of moves they found three distinct patterns; a couple moving and the woman becoming pregnant after the move, the woman becoming pregnant and the couple then moving into a new house where the child was born, as well as a child being born and the couple then deciding to move into a new house. Based on their results the authors also argued that affordability of housing played a more important role in larger cities than in more rural areas. Couples in rural areas could afford to move into relatively large houses before or during plans of having a child; while for couples in larger cities housing changes occurred closer to childbearing. They also suggest that couples in larger cities may have to delay childbearing or having additional children until they find and can afford appropriate housing; which could act to reduce family sizes in larger cities (Kulu and Steele, 2013). These results seem to be in line with what Lainala and Berg (2016) found in their study on spatial trends of fertility rates in Finland years 1980-2014. Fertility in Finland began conforming to the high suburban pattern in the 1990s, before large-scale migration from urban to suburban areas in the 2000s. According to the authors a convergence to a Western industrialised pattern of high suburban fertility seems to have occurred in Finland 1980-2015 (Lainiala and Berg, 2016).

Jalovaara and Andersson (2018) studied differences in children's experiences of family dynamics and –structures by the mother's educational attainment in Finland. They based their study on register data for women born since 1969 to then study these women's 0-15 year old children's experiences during 2003-2009. Looking at family type at birth, they found that children of mothers with low education were 1.8 times as likely to be born to a cohabiting and 4 times as likely to be born to a single mother compared to children of highly educated mothers. Analysing family dissolution they found that for all children 41 percent had their original family dissolved by age fifteen. For children born in marriage the proportion was one third, and for those born to cohabiting parents more than half. The mother's educational attainment made for large variations also for the likelihood of dissolution; as 43 percent of children born to mothers with a low education experienced family dissolution by age 6, and by age 15 the dissolution rate was up to 67 percent. For children of mothers with a high education the corresponding rates were considerably lower at 12 and 29 percent. Concerning children's experience of living outside a parental union the authors found that almost half of all children had experience living outside a parental union at some point during their childhood. Maternal education again played a major role in differences between children; as by age three almost half of the children born to mothers with a low

level of education had lived outside a parental union, while the corresponding share of children to highly educated mothers was 12 percent. At age 0-3 children of lowly educated mothers were 4 times as likely to experience life outside parental union compared to children of highly educated mothers. By age 15 the shares were three-quarters and one-third respectively. As for time spent in different family types, Jalovaara and Andersson found that in total children spent 69 percent of their childhood with both of their parents. Children of lowly educated mothers spent 36 percent of their time living with a lone mother or without a mother, while the corresponding share for children of highly educated mothers was 13 percent. For time spent with cohabiting or married parents the shares for children of lowly educated mothers was 51 percent and for children of highly educated mothers 81 percent. Children of highly educated mothers also spent twice as much time living with married parents compared to children of lowly educated mothers (Jalovaara and Andersson, 2018).

4. Research Methodology

A large part of the study consisted of compiling and summarizing previous research done on fertility in Finland since 1950. The results, explanations, and theories from this literature review was analysed, structured, and compiled in a logical order. In order to make an original contribution the author also performed his own longitudinal econometric analysis on factors influencing fertility differences between 18 regions in Finland (excluding Åland Islands) during the 1990-2018 time period.

4.1 Data collection

All data for the econometric analysis of this study was on the aggregate level and collected from Statistics Finland's 'StatFin' and 'StatFin archive' databases. This study was limited to aggregate-level data, which was open-access, due to the restrictions and expenses of acquiring tailored individual-level registry data or pre-tailored datasets. The aggregate data was not usable for analysis in its raw form, as each indicator was a separate dataset and the formatting differed between indicators. The datasets therefore had to be reformatted, and merged into one panel dataset. The availability of data was also limited to the 1990-2018 time period, which set the time-frame for the econometric analysis.

4.2 Variables and Hypotheses

Based on the theoretical literature and previous studies related to fertility, a number of variables were chosen for the econometric analysis of this study. As the analysis relates to the question of which indicatos impacted fertility in Finland over the 1990-2018 time period; two obvious variables were time

and fertility. As the analysis uses aggregate data, the data was organized into a panel where 'region' served as the panel variable and 'year' as the time variable in a longitudinal analysis. The data was split into regions as this allowed for comparisons between the changes in different variables on the change in fertility. The variables, how they were generated, and their corresponding hypotheses (if relevant) are as follows:

Total population of 15/18/20-49 year-olds: In order to compare the values of variables between the regions, the variable values must be expressed as fractions of the total populations of the regions, as the population sizes between the regions are different. Each variable counting a number of individuals was therefore divided by the corresponding total population for each region depending on the age interval.

Dependent variable

Fertility (TFR) was chosen as the dependent variable, as the aim of the study is to analyze the impact of different indicators on the change in fertility in Finland during the 1990-2018 time period. TFR was calculated by summing the age-specific fertility rates for women ages 15-49.

Panel variable

Region: The data was split into 18 Finnish regions (Åland Islands was excluded as the region constitutes an exception among the regions in Finland, being much smaller than the other regions, and also an autonomous island group with a history of higher standards of living and higher fertility levels than the mainland regions) in order to compare how different indicators have impacted fertility differently between the regions in Finland. As will be noted later, Uusimaa is also somewhat of an outlier among the regions, particularly for average earned total income. Uusimaa was however kept in the dataset, as it contains by far the largest share of the Finnish population and is therefore essential for the analyses.

Time variable

Year: The aim of the study is to analyze the decline in fertility over time, thus years was the chosen unit of time as it was the only time unit that covered all indicators across regions. As mentioned earlier, the time period was 1990-2018, but due to some key variables (total income, GINI, and share of low income households) not having data for that entire time period two additional time periods were

analysed; namely 1995-2018 and 2006-2018. A time trend variable was also added to the models as the effects on fertility are expected to extend across years.

Independent variables

Shares of primary and tertiary educated individuals: The raw data had 7 educational categories, which were combined into: primary, secondary, and tertiary education categories. Based on the literature as well as significance and multicollinearity tests between the categories and the dependent variable, the share of primary and tertiary educated were chosen for the analyses. Important to note here is that as the data is on the aggregate level and structured into a panel, the categories of primary and tertiary educated become independent variables and will referred to as such from now on. The same applies for the share of married and divorced. Moreover the share of primary and tertiary educated were split into variables for men and women, younger men and women (ages 20-34), as well as older men and women (ages 35-49) for the sake of comparison. It should be mentioned that there were a number of '0' values (ranging between 2 and 53) for the share of tertiary educated individuals in all sex-specific age-groups (men and women ages 20-49, 20-34, and 35-49), and also for primary educated women ages 20-34 (9 '0' values). As the models were logged these observations were dropped as it is impossible to take the natural logarithm of zero. It is not likely that these '0' values actually mean that there were no individuals with tertiary or primary education in a region in a particular year, rather there was missing data. As the base model for the total population was unaffected, and the 'men ages 20-49' and 'women ages 20-49' had only 2 and 4 '0' values respectively; dropping observations with '0' values was not considered to be a problem for the analysis. Previous studies both on the Finnish population and other countries have shown a clear impact of educational attainment on fertility levels. The prevailing theory has indicated that the educational attainment impact on women's fertility is negative (Becker, 2009; Joshi, 1990), but there are also studies arguing that the more equal educational attainment between the sexes becomes, and as social and economic roles become more similar, the differences associated with education and fertility would also be reduced (Kneale and Joshi, 2008; Winkler-Dworak and Toulemon, 2007). Recent studies done on Finland have shown a negative relationship between higher educational attainment and fertility for women, and a positive relationship for men (Hiilamo, 2017; Jalovaara et al., 2019; Rotkirch and Miettinen, 2017; Rønsen, 2004; Nisén et al., 2014).

The hypotheses for this study's econometric analysis are that there is a negative association between the share of primary educated and TFR for both sexes, whereas there is a negative association between the share of tertiary educated women and TFR, but a positive association between the share of tertiary educated men and TFR.

Shares of married and divorced individuals: The civil status of a person is an important indicator when measuring fertility. In the raw data four categories of: single, married, divorced, and widowed were available. Based on the literature as well as significance and multicollinearity tests between the categories and the control variable, the share of married and share of divorced were selected to be included in the analyses. As with the shares of primary and tertiary educated the share of married and divorced were also split into separate variables for men and women, younger men and women (ages 20 – 34), as well as older men and women (ages 35 – 49). Marriage has been shown to increase the risk of fertility, while being single, divorced or widowed is expected to reduce fertility risks (Rønsen, 2004; Erlandsson, 2017; Hoem et al., 2013; Jalovaara and Andersson, 2018; Jalovaara and Fasang, 2017).

The hypothesis is that higher shares of married individuals has a positive impact on TFR for both sexes; while higher shares of divorced has a negative impacts on fertility for both sexes.

Share of unemployed individuals: As with the above mentioned independent variables, the share of unemployed was also split into separate variables for men and women, younger men and women (ages 18-29), as well as older men and women (ages 40-49). Unemployment on the aggregate level has been found to have a negative impact on fertility across several studies done on both local and national levels in developed countries for both sexes (Sobotka et al., 2011; Comolli, 2017; Goldstein et al., 2013; Hiilamo, 2017; Lainiala, 2012). Data on the individual level has shown negative impacts for male unemployment with no impact for female unemployment in France using survey data for the year 2005 (Pailhé and Solaz, 2012), while in the US for the years 1975-2010 female unemployment was shown to have a negative impact on fertility especially for younger women (Currie and Schwandt, 2014). A study done on Finland for the years 2008-2011 using individual level data also found a negative impact of unemployment on fertility (Jalovaara et al., 2019). Studies done on the Nordic countries, including Finland, have found that unemployment not only resulted in lower income, which has been shown to negatively impact relationship stability; it reduced the chances of an individual to find a partner by making them less desirable and more prone to shame and depression, (Lyngstad and Jalovaara, 2010).

The hypothesis is that the share of unemployed has a negative association with TFR for both sexes.

Average total earned income in constant 2006 euro: The income variable was created by transforming annual average income into constant prices using the percentage change in the consumer price index, with 2006 as the base year. Earned income has been shown to have a positive impact on fertility in Nordic countries, especially for first births, for both sexes as it increases the household resources and thus reduces the initial economic constraint on fertility. A stable income also promotes union stability, which in turn has a positive association with fertility (Andersson et al., 2009a; Hank, 2001; Vikat, 2004; Andersson, 2000; Hoem, 2000; Rotkirch and Miettinen, 2017; Jalovaara and Miettinen, 2013). Higher income for women may however mean a stronger emphasis on career development; which may reduce fertility (Rønsen, 2004).

The hypothesis is that a higher income increases fertility for both sexes based on recent studies done on Finland and the Nordic countries.

Control variables

Sex ratio: The sex ratio (males per female) for the regions was included as a control variable, as a substantially higher share of men or women may reduce the TFR of a region due to the lower number of potential heterosexual unions.

Average age: The average age variable was split into male and female average age. Average age in the different regions is used as an indicator for how old the population is. It is well established that increases in age reduces fertility after around age 30 for women, and after around age 40 for men for purely biological reasons. We would therefore expect that an increase in average age in a region would have a negative impact on fertility. Moreover, as many younger individuals who grow up in more rural areas tend to seek education and employment in the larger cities, less densely populated regions tend to have lower concentrations of young individuals; and thereby higher average ages.

GINI for disposable cash income: Higher levels of income inequality could skew fertility towards higher income groups, and thereby reduce total fertility in a region. The literature on the impact of inequality on fertility is somewhat inconclusive. One study by Bar et al. (2018) state that while some theories argue that there is a negative relationship between income and fertility, the U.S. saw a flattening in the relationship between income and fertility between 1980 and 2010; with high income

families increasing their fertility during a time of rapid increase in income inequality. They propose that the marketization of parental time costs explains this change in the relationship between income and fertility (Bar et al., 2018). A study by Guest and Swift (2008) showed a positive relationship between GINI and TFR in the long-run for the US, Japan and Sweden, a negative relationship in the long-run for the UK, and a slightly negative relationship in the short-run for Australia (Guest and Swift, 2008). De La Croix and Doepke (2003) found a positive relationship between income inequality and fertility with the model they put forth in their study. They argued that when inequality is high, large fertility differentials cause the growth in human capital to decline, as poor families that invest little in education make up a large share of the population for the following generation (De La Croix and Doepke, 2003). Deaton and Paxson (1997) on the other hand found a negative relationship between fertility and inequality, with the causation running the other way from fertility to inequality. In their empirical analysis they found that cohort inequality increased substantially with age in the US, UK, Taiwan, and Thailand (Deaton and Paxson, 1997). Based on the mentioned studies the expectation is that the relationship between GINI and TFR is positive; but as GINI has remained quite stable in Finland over the chosen time-period the relationship is not expected to be strong.

Share of low income households: The share of low-income earners in a region is here used as a measure to control for relative poverty in regions. As the hypothesis for income is a positive relationship, the relationship between the share of low income households and TFR is expected to be negative.

4.3 Econometric model

The fixed effects model was chosen for the data analysis. The data in the analysis was formatted into a panel with 'region' as the panel variable and 'year' as the time variable, and all data was on the aggregate level. Moreover, none of the independent or control variables used in the models were time-constant. The author thereby surmised that a random- or a fixed effects model would fit the data best. As a similar study to this on sub-regions in Finland also used fixed effects models to assess how changes in unemployment was linked to fertility in Finland the years 1991-2014 (Hiilamo, 2017), so the fixed effects model seemed like the better fit. Running F-tests and Breusch and Pagan Lagrangian multiplier tests on the three models presented below for the total population all gave probabilities of 0. The F-test test null hypothesis is that all model parameters are 0, while the Breusch and Pagan Lagrangian multiplier test null hypothesis is that the variance of the random effect is zero. As both

these hypotheses were rejected the Hausman test was run. Running the Hausman test comparing the fixed effects and random effects models for all three time periods (1990-2018, 1995-2018, 2006-2018) gave the probability of 0. This means that the null hypothesis that the difference in coefficients is not systematic was rejected; whereby the random effects model was not appropriate for the data (jesper, 2016; Kissell and Poserina, 2017; Park, 2010; StatisticsHowTo, 2020e). Instead the fixed effects model was chosen as appropriate. A fixed effects model treats random variables as though they were non-random, that is fixed, as the name of the model implies. The model thereby holds constant the average effects of all independent and control variables (StatisticsHowTo, 2020d). This 'fixing' of the between-context contrasts means that the contexts are assumed to be fixed, in that statistical inference is conditional on the selection of contexts present in the data. As these contrasts can be defined as coefficients of a set of dummy variables that assign individuals to the contexts, the fixed effects model does not require orthogonality (when two lines or planes are at 90 degree angles to each other) between the context membership and the independent variable (Mason, 2015). The model is written as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_{k,it} X_{k,it} + \alpha_i + u_{it}$$

Where entity $i = 1,\ldots,n$ and time-point $t = 1,\ldots,T$. The entity-specific intercepts α_i capture heterogeneities across entities (Hanck et al., 2019). The error term u_{it} is assumed to be a classical Gaussian error (Mason, 2015).

As previously mentioned, Heikki Hiilamo (2017) did a similar analysis to this one on the impact of unemployment on fertility across sub-regions in Finland the years 1991-2014, also using a fixed effects model. He used log-log models, log-transforming all variables in order to estimate the association between fertility and recession in terms of the elasticity of fertility to each indicator. These models also allowed smoothing of large variations in the variable values and detection of non-linear relationships (Hiilamo, 2017). Based on these observations, log-log models were also used in this study. Logging the models means that the coefficients of independent or control variables indicate the percentage change in the dependent variable of a 1 percent increase in the independent or control variable; rather than unit changes seen in non-logged models. This is because the relationship between the variables becomes logarithmic when logging a model, as opposed to linear in non-logged models.

Thereby the specified models for the analyses are as follows:

1990-2018 models

$$lnfertility_{it} = \beta_0 + \beta_1 lnmarried_{it} + \beta_2 lndivorced_{it} + \beta_3 lnprimaryeducated_{it} + \beta_4 lntertiaryeducated_{it} + \beta_5 lnunemployed_{it} + \beta_6 lnaverageage_{it} + \beta_7 lnsexratio_{it} + \alpha_i + \lambda t + u_{it}$$

1995-2018 models

$$lnfertility_{it} = \beta_0 + \beta_1 lnmarried_{it} + \beta_2 lndivorced_{it} + \beta_3 lnprimaryeducated_{it} + \beta_4 lntertiaryeducated_{it} + \beta_5 lnunemployed_{it} + \beta_6 lnaverageage_{it} + \beta_7 lnsexratio_{it} + \beta_8 lngini_{it} + \beta_9 lnshareoflowincomehouseholds_{it} + \alpha_i + \lambda t + u_{it}$$

2006-2018 models

$$lnfertility_{it} = \beta_0 + \beta_1 lnmarried_{it} + \beta_2 lndivorced_{it} + \beta_3 lnprimaryeducated_{it} + \beta_4 lntertiaryeducated_{it} + \beta_5 lnunemployed_{it} + \beta_6 lnaverageage_{it} + \beta_7 lnsexratio_{it} + \beta_8 lngini_{it} + \beta_9 lnshareoflowincomehouseholds_{it} + \beta_{10} lntotalincome_{it} + \alpha_i + \lambda t + u_{it}$$

where λ is the coefficient on the time trend t, which in this case is years.

5. Data analysis

5.1 Descriptive analysis of the data

The descriptive tables over the variables used in the different models are provided in the appendix (**Figures 9-15**). Variables that were identical between models were omitted in for each consecutive model. All models had independent variables specified to the age group of the model. Moreover the models for men had male-specific independent variables, and the models for women had female-specific independent variables. The 'sexratio' control variable was used for all models, while the 'gini' and 'share of low income households' control variables were used for the 1995-2018 and 2006-2018 models. Moreover, 'men's total income' and 'men's average age' were used for the three models on the male population and the corresponding variables for women for the three models on the female population. As can be noted from the observation counts; they are lower for 'gini',

‘shareoflowincomehouseholds’ and ‘totalincome’ as the former two had data only for the years 1995-2018 and the latter only for the years 2006-2018. This is also why three models were created per sex- and age group; where the ‘gini’ and ‘share of low income households’ control variables were added from the 1995-2018 models, and then ‘average total earned income’ independent variable for the 2006-2018 models. Just by quickly looking at the descriptive statistics one notices that there are noticeable differences between the sexes and age groups; whereby it seems intuitive to perform separate analyses for different sex and age groups.

The descriptive trends in the dependent and independent variables across time gives a clearer image over what has been happening in terms of quantitative change over the past three decades. Firstly, the graph on TFR of course mirrors the first graph of this paper; fluctuating up and down and up again until 2010, after which there is the sharp decline which shows no sign of slowing down as of 2018 (**Figure 16**). The graph also shows the large differences between regions in Finland that is close to 0.4 between the lowest and highest fertility region for a single year.

Looking at the share of married 20-49 year olds over time (**Figure 17**), there was a steep decline from around 60 percent to around 40 percent for women, and from just above 50 percent to a bit over 30 perecent for men from 1990 to 2018; an almost 20 percentage point decline in less than three decades for both sexes. Notable is also that there is a persistent 10 percentage point gap between the share of married women and men. The shares of divorced women and men follow largely the same trend, with divorce shares being a couple of percentage points higher for women (**Figure 18**). The differences between regions are substantial, being as large as 5 percentage points (considering that the highest shares are around 12.5 percent).

For the share of primary educated individuals the trends look very similar at a first glance (**Figure 19**). The share of primary educated individuals declined from a bit over 25 to a bit under 10 percent for women and from a bit over 30 percent to around 15 percent for men the years 1990-2018. These numbers however tell us that the decline in the share of primary educated has been more rapid for women than for men, dropping to almost a third for women but only to two-fifths for men resulting in an almost twice as high share of primary educated men than women in 2018, compared to the 5 percentage point difference in 1990. Unsurprisingly, the data on the share of tertiary educated looks similar to that of primary educated (**Figure 20**). The share of tertiary educated women increased from around 5 to over 30 percent while the increase for men was from around 5 to around 15 percent. The

difference in both relative and absolute growth are astounding; the share of tertiary educated women grew six-fold, by 25 percentage points; while the share of tertiary educated men only grew three-fold, by 10 percentage points. The differences in shares of tertiary educated between regions varied greatly for both men and women, by as much as 25 percentage points for a single year.

The unemployment graphs look more similar between the sexes, with the share of unemployed men persistently being a few percentage points higher than the share of unemployed women across the 1990-2018 time period (**Figure 21**). The differences between regions for both sexes are large, as much as 15 percentage points for a single year.

Lastly, looking at the income data 2006-2018 there are a couple of things to observe (**Figure 22**). One is that there is a gap in income between men and women; the gender pay gap. The second thing is that one of the regions is a clear outlier with much higher levels of income, namely Uusimaa, which hosts Finland's capital city Helsinki with its metropolitan area containing a large share of Finland's total population. The increase in income over time is quite similar for men and women, with female income increasing from a bit over €2,200 to €2,500 while the male income increased from a bit over €2,700 to around €2,900; so the increase for women was slightly greater in both relative and absolute terms.

5.2 Constructing the models

As mentioned in the previous section, three separate models were constructed due to the shorter timespans for the 'totalincome' independent variable, as well as the 'gini' and 'shareoflowincomehouseholds' control variables. The models were first constructed as OLS models, and then compared to fixed effects models. These processes are illustrated in **Figures 23-25** and **Figures 26-28**.

From what can be seen from the construction process, adding the control variables to the models increased, or at least did not decrease the significance of the independent variables. The fit of the models also improved somewhat with the addition of the control variables. When comparing the OLS models with their fixed effects counterparts there was an improvement in the fit of the 1995-2018 and 2006-2018 models, but not in the 1990-2018 model. This was however not particularly relevant as it was already established that fixed effects models were more suitable for the data based on the tests stated previously.

5.3 Testing for multicollinearity

Multicollinearity refers to the situation where two or more independent variables are strongly linearly correlated with each other. Perfect multicollinearity occurs when the variables have a correlation of -1 or 1. High multicollinearity can be an issue as it undermines the statistical significance of the independent variables (Allen, 1997). The Variance Inflation Factors (VIF) test is a common test used when checking whether an econometric model has a problem with multicollinearity. It takes an independent variable and regresses it against every other independent variable in a model. The formula is as follows:

$$VIF = \frac{1}{1 - R_i^2}$$

Where R^2 is the statistical measure representing the proportion of variance for the dependent variable that is explained by one or more independent variables in the regression model, and *i* is the independent variable. A rule of thumb with VIF is that a value of 1 means no correlation, 1 to 5 means moderate correlation, and more than 5 means high correlation. Generally speaking a VIF above 10 is a cause of concern, while some suggest a more conservative limit of 2.5 (StatisticsHowTo, 2020h; 2020a; Hayes, 2020). The 2006-2018 model for the total population containing all control variables was run as a linear regression and tested for multicollinearity using VIF. The mean VIF for the model was 3.00 with the 'average age' control variable having a VIF above 5. Removing the mentioned variable resulted in a mean VIF of 2.25; but as average age serves as an important control variable for the models, the author deemed a VIF score of 3.00 to be an acceptable level of multicollinearity. The 2006-2018 models for the total male and total female populations had similar mean VIFs at 2.85 and 3.28 respectively. As the mean VIF was well below 5 and only the 'averageage' control variable had a VIF above 5; the level of multicollinearity was deemed acceptable.

5.4 Testing for normality

Normality refers to the normal distribution of residuals in a regression model. If the sample size is large enough (over 30) the Central Limit Theorem (CLT) should ensure that departures from normality in residuals is not be a problem. In this study's regression models the sample size was substantially greater than 30 at 234-522 observations (Nuzzo, 2018; StatisticsHowTo, 2020c). Normality is often tested graphically in a histogram and quintile plot, as well as with statistical tests like the Skewness and Kurtosis test as well as the Jarque-Bera test. Skewness is a measure of asymmetry in a dataset, while

kurtosis is a measure of how light- or heavy-tailed the data is relative to normal distribution. The Jarque-Bera test is an improved version of the Skewness and Kurtosis test as it tests if both the skewness and kurtosis of the sample data match a normal distribution (NIST, 2012; StatisticsHowTo, 2020g). From the histogram and normal quantile plot the residuals look fairly normally distributed for the 1990-2018 model (**Figure 29**), but the Skewness and Kurtosis test as well as the Jarque-Bera test both have probabilities well below the chosen significance level of p>0.05 (0 and 0). The null hypothesis of non-normality could not be rejected, and the residuals are thereby non-normally distributed. For the 1995-2018 model where the control variables for GINI and share of low income households were included and the time period reduced to the years 1995-2018 the histogram and normal quantile plot look somewhat better than in the 1990-2018 model (**Figure 30**). Both the Skewness and Kurtosis as well as the Jarque-Bera test still gave probabilities well below 0.05 (0.01 and 0.01). The null hypothesis of normality in the residuals could therefore not be rejected. For the 2006-2018 model the histogram and normal quantile plot show that the residuals have become even more normally distributed when adding the 'total income' variable and limiting the time period to the years 2006-2018 (**Figure 31**). The probabilities for the Skewness and Kurtosis as well as Jarque-Bera tests increased, and this time normal distribution of the residuals could be assumed as the probabilities were well above 0.05 (0.19 and 0.23). From these results it can be observed that the residuals were not normally distributed for the 1995-2018 and 2006-2018 models, but were normal for the 2006-2018 model. As mentioned in the beginning of this section, non-normality in the 1990-2018 and 1995-2018 models were not considered to be issues due to the CLT.

5.5 Testing for heteroskedasticity

Heteroskedasticity is when the variance in the errors of the data is not constant. The opposite case where the errors are constant is called homoskedasticity. A common way to check whether there is heteroskedasticity in a model is to do a graphical residuals-versus-fitted plot, as well as running one or more statistical tests such as the Breusch-Pagan test and White's test. The Breusch-Pagan test formula is:

$$N * R^2$$

Where N is the sample size and R^2 is the coefficient of determination of the regression of squared residuals. Moreover there is k (number of independent variables) degrees of freedom. White's test is a special case of the simpler Breush-Pagan test (StatisticsHowTo, 2020b; 2020f; 2020i). For all three

models (1990-2018, 1995-2018, 2006-2018) we reject the null hypothesis of homoskedasticity in both the Breusch-Pagan and White's tests. This means that there is an issue of heteroskedasticity in the data. When doing residuals-versus-fitted plots (**Figures 32-34**) we can observe somewhat of a pattern in all three models. From these tests we can conclude that heteroskedasticity may indeed be an issue in the data; therefore robust standard errors were used to address this issue. Robust standard errors are standard errors that have been computed with the sandwich estimator of variance and are commonly used in econometric analysis to address heteroskedasticity in a dataset (Yamano, 2009).

5.6 Results

To reduce confusion and in order to stick to the most relevant results, the author decided to look at only the 1990-2018 and 2006-2018 time periods for results and comparisons between the sexes and age groups; 1990-2018 in order to get longest possible time-period, and 2006-2018 as it was the most comprehensive model. The level of statistical significance was chosen to be 0.05, as is commonly the case in econometric analyses; which means a 95 percent confidence in the statistically significant results. The results are found in **Figures 35-41**.

Share of married

The share of married individuals had a statistically significant positive impact on fertility for both sexes in all age groups except for the total population (1990-2018), older men (1990-2018) and older women (1990-2018 and 2006-2018). A 1 percent increase in the share of married resulted in a 1.52 percent increase in TFR for the total population 2006-2018. Comparing the impact of a 1 percent increase in the share of married men and women 1990-2018, it was almost identical for both total and young populations at roughly 0.5 and 0.6 percent respectively. For the 2006-2018 time period the increase was slightly stronger for all men compared to all women at 1.23 and 1.00 percent respectively, but slightly weaker for young men compared to young women at 0.42 and 0.56 percent respectively.

Share of divorced

The share of divorced was only statistically significant for all men, younger men, and younger women 1990-2018, and older women 2006-2018. A 1 percent increase in the share of divorced individuals was associated with an almost identical 0.21 percent decrease in TFR for both young men and women 1990-2018, with a similar coefficient for all men at -0.27. For older women 2006-2018 the coefficient was -0.46.

Share of primary educated

The share of primary educated had a significant impact on TFR for the total population as well as both sexes and all age groups except young women the years 1990-2018, but was only significant for younger women and older men the years 2006-2018. The coefficient was negative for all cases except younger women 2006-2018; where it was only slightly positive (0.02). For the 1990-2018 total population a 1 percent increase in the share of primary educated was associated with a 0.17 percent decrease in TFR. The decrease associated with all men was more than 6 times stronger than for all women at 0.26 and 0.04 percent respectively. For older men the decrease was more than 4 times stronger than for older women at 0.36 and 0.08 percent respectively. For 2006-2018 older men the associated decrease in TFR was 0.16 percent.

Share of tertiary educated

The impact of the share of tertiary educated individuals on TFR was significant for the total population, all women, and young men and women 1990-2018. For 2006-2018 it was only significant for young men. The coefficient was positive in all cases. For the 1990-2018 total population a 1 percent increase in the share of tertiary educated was associated with a 0.04 percent increase in TFR, with the increase being almost identical at 0.04 for all women, as well as young men and women. For 2006-2018 a 1 percent increase in the share of tertiary educated young men was associated with a 0.02 percent increase in TFR.

Share of unemployed

The impact of the share of unemployed was statistically significant only for older men in 1990-2018. In 2006-2018 it was significant in the total population, for all men, young men and women, as well as older men. Contrary to expectations the coefficient was weakly positive in all cases. In 1990-2018 a 1 percent increase in the share of unemployed older men was associated with a 0.03 percent increase in TFR. In 2006-2018 a 1 percent increase in the share of unemployed individuals was associated with a 0.06 percent increase in TFR for the total population, and for all men a 0.07 percent increase. The associated increase in TFR was slightly stronger for young men than for young women at 0.07 and 0.05 respectively. For older men the associated increase in TFR was 0.09 percent.

Average total earned income

As total income was controlled for by sex but not by age, only the results from the total population, as well as all men and women were looked at and compared. For the 2006-2018 total population a 1 percent increase in average total earned income was associated with a 0.6 percent increase in TFR. A 1 percent increase in female wages was associated with an almost 4 times stronger increase in TFR compared to male wages at 1.26 and 0.34 percent respectively.

Other variables

The only control variable that had a significant impact for the total population was the average age of a region in 2006-2018. A 1 percent increase in the average age of a region was associated with a 4.45 percent decrease in TFR. For the time trend variable we see a significant negative coefficient of around -0.02 in the 2006-2018 total population model; which means that the passing of 1 year was associated with a 1.69 percent (logged dependent and non-logged independent variable
→ $(\exp^{coefficient} - 1) * 100\%)$ decrease in TFR during that time period.

5.7 Discussion of results

As expected the share of married had a strong positive association with TFR, seemingly being slightly stronger for men overall, but weaker for younger men compared to younger women. The share of divorced had a negative association with TFR, which was also expected, and seems to have been equally strong for both sexes. An increase in the share of primary educated was according to expectations associated with a decrease in TFR. The associated decrease in TFR was much stronger for the share of primary educated men than for women, which was also expected based on the studies examining the relationship between education and fertility in Finland (Jalovaara and Fasang, 2017; Jalovaara et al., 2019; Rotkirch and Miettinen, 2017). For the share of tertiary educated the association with TFR was quite weak and, contrary to expectation, positive for both sexes. The effect was however slightly stronger for men, which was in line with expectations. The share of unemployed gave the most unexpected results out of all the independent variables, having a slightly positive association with TFR rather than the expected clearer negative association. Moreover the association seems to have been stronger for men than for women, which was also unexpected. However, with the shortness in the time period for the 2006-2018 models and the lack of variables in the models for the 1990-2018 time period; the author hesitates to draw the conclusion that higher rates of unemployment actually had a positive

impact on TFR during the studied periods of time. For average total earned income the results were as expected, with there being a positive association with TFR for both sexes. While the association was expected to be stronger for women's income; the difference between the sexes was stronger than expected, even though one study on Finland hinted at the effect of the woman's economic resources being equal or stronger than the man's (Jalovaara and Miettinen, 2013). The associations of the average age control variable and the time trend variable were not unexpected considering the connection between age and fertility and the steep downward trend in fertility in Finland since 2010.

5.8 Biases and Limitations

An important limitation to the approach used for the econometric analysis in this study relates to the data. Aggregate data leads to the risk of ecological fallacy, as the subject of analysis were regions rather than individuals. Regions do not give birth to children, women do. It is also impossible to determine if the individuals who were unemployed were also the ones experiencing reduced fertility. In order to gain a more holistic understanding of the factors influencing fertility in the regions, longitudinal individual level data as well as region-specific contextual factors would have to be included in the analysis (Hiilamo, 2017). The short time-period of the analysis means that only the short-term change is being analysed in isolation from the historical long-term development. This is a major drawback, as fertility and population change is a gradual process than runs across generations. The data itself also was not optimal; with the raw data not being fully harmonizable across variables and time periods, with none of the variables capturing the qualitative aspects of fertility decisions, and with some missing data. The author has also not encountered any previous study attempting to harmonize a longitudinal data panel out of individual sets of aggregate data from the StatFin database before, and there may well be some issues both with how suitable the individual datasets are for longitudinal analysis between regions, as well as with how well suited they are for cross-dataset analysis.

6. Conclusion

First, let us look at how fertility has developed. The early decline from around 1900 to the early 1970s, with a temporary increase during the post-war baby boom, seems to have been the result of a decline across all birth orders; in other words what would be expected from a fertility transition from high levels of natural fertility (not controlled by contraceptive methods) to below replacement level

controlled fertility. The recent decline in TFR since 2010, after a 40 years of stagnation, does not seem to be a temporary fluctuation; data on cohort fertility shows that the CFR has been declining from 1.89 in the 1980 cohort, with the optimistic CFR for late 1980s cohorts being 1.65 and less optimistic ones 1.60. The predicted trends also give no sign of recuperation in CFR. Furthermore mothers mean age by all child births has increased by roughly two years over the past three decades to 30.9 years in 2017. This would indicate that there has been a substantial change in the secular fertility trend. Moreover, first-births have accounted for the overwhelming majority of the recent decline with only a fifth of the decline being in second and third-order births, and higher order births having a negligible effect. The steep decline in first-order births means that childlessness has increased from already high levels to almost 70 percent for 25-29 year olds and 40 percent for 30-34 year olds in 2017. Concerning the childlessness, studies have found that educational attainment has had a strong impact on differences between the sexes. It has been found that highly educated men have had substantially higher levels of fertility than lowly educated men, with the gap increasing over time; whereas the trend has been the opposite for women. The recent decline in first-order births was also found to be strongest for highly educated women. This is worrying considering that higher education of the mother is linked to lower risks of family dissolution and single motherhood; whereas the opposite is the case for lowly educated mothers. Reduced concentrations of fertility among highly educated mothers could therefore have a negative impact on the well-being, educational attainment, and job market success of coming generations. In addition, the share of tertiary educated women has remained much higher than the share for men, and increased at a faster rate; while a fairly strong albeit declining homogamy in education and social-class has been prevalent among Finnish couples. These factors taken together mean that the share of childlessness among less educated men, who already have the highest levels of childlessness, is likely to continue to grow. Now we have to keep in mind that these developments are taking place in the context of generous subsidies and benefits for parents, as well as fairly a flexible parental leave system. Finland also has among the highest levels of gender equality in the world, and a generous social security system.

If lack of government support and incentives cannot explain the decline in fertility, apart from a counter-intuitive incentive structure in child benefits, what drivers could then be at play? The literature and data point towards two set of factors; economic and social. Economic factors that have been at play relate to the overall macroeconomic situation in Finland since the Great Recession 2007-2009, and how this has effected micro-level decisions within couples and families. First, there are the economic

recessions of the early 1970s, early-1990s, and late 2000s. The 1990s recession left Finland not only with staggeringly high levels of short-term unemployment, but the country has had difficulties reducing its high level of long-term unemployment that has been fluctuating between 6 and 11 percent since the shock of the 1990s recession receded. As theory and previous studies have shown; unemployment on the aggregate level as well as the most recent recession had negative impacts on fertility. This is not surprising as a high level of long-term unemployment is an indication of a struggling economy, and Finland has indeed had difficulties recovering from the last two recessions. Moreover, unemployment has been found to reduce chances of finding a partner as well as the stability of unions; both having detrimental effects on fertility. Earned income has however increased at least during 2006-2018, meaning that fertile age Finns earning an income should be better off than previous generations. It is possible that the impact of youth unemployment has simply outweighed the positive impact of increased wages.

On the social side, Finnish women have since as early as the 1980s not put a very strong emphasis on childbearing being necessary in order to be fulfilled; and recent surveys have shown that today's young Finnish women choose to postpone parenting in favour of pursuing other life goals. Finland, like most other developed countries, has also had a trend of fertility postponement among women due to increasing shares of tertiary educated; in other words more years spent on education. Furthermore, it is a social norm in Finland for both sexes to achieve economic independence and a stable income before having children. Due to increasing difficulties for young Finns to find employment, especially stable employment, childbearing intentions get postponed even further. Marriage has in Finland, as in many other countries, been found to have a strong fertility-promoting effect. The problem is that the CMR has been declining since the late 1960s, with the fraction of married individuals in fertile age declining sharply since the 1990s. On the other hand CDR tripled between 1960 and 1989, and has remained stable since then; divorce according to this study's results and previous studies having a negative impact on TFR. Only looking at the numbers and statistics makes it easy to forget the impacts on mental well-being that things like a gloomy economic outlook, an insecure labour market, long-term unemployment, and difficulty finding a partner have. Poor mental well-being and social exclusion among young Finns have become increasing causes of concern in Finland recently (Hewlett and Cornford, April 2019; yle, November 2018; Tilastokeskus, 2020b; 2019b).

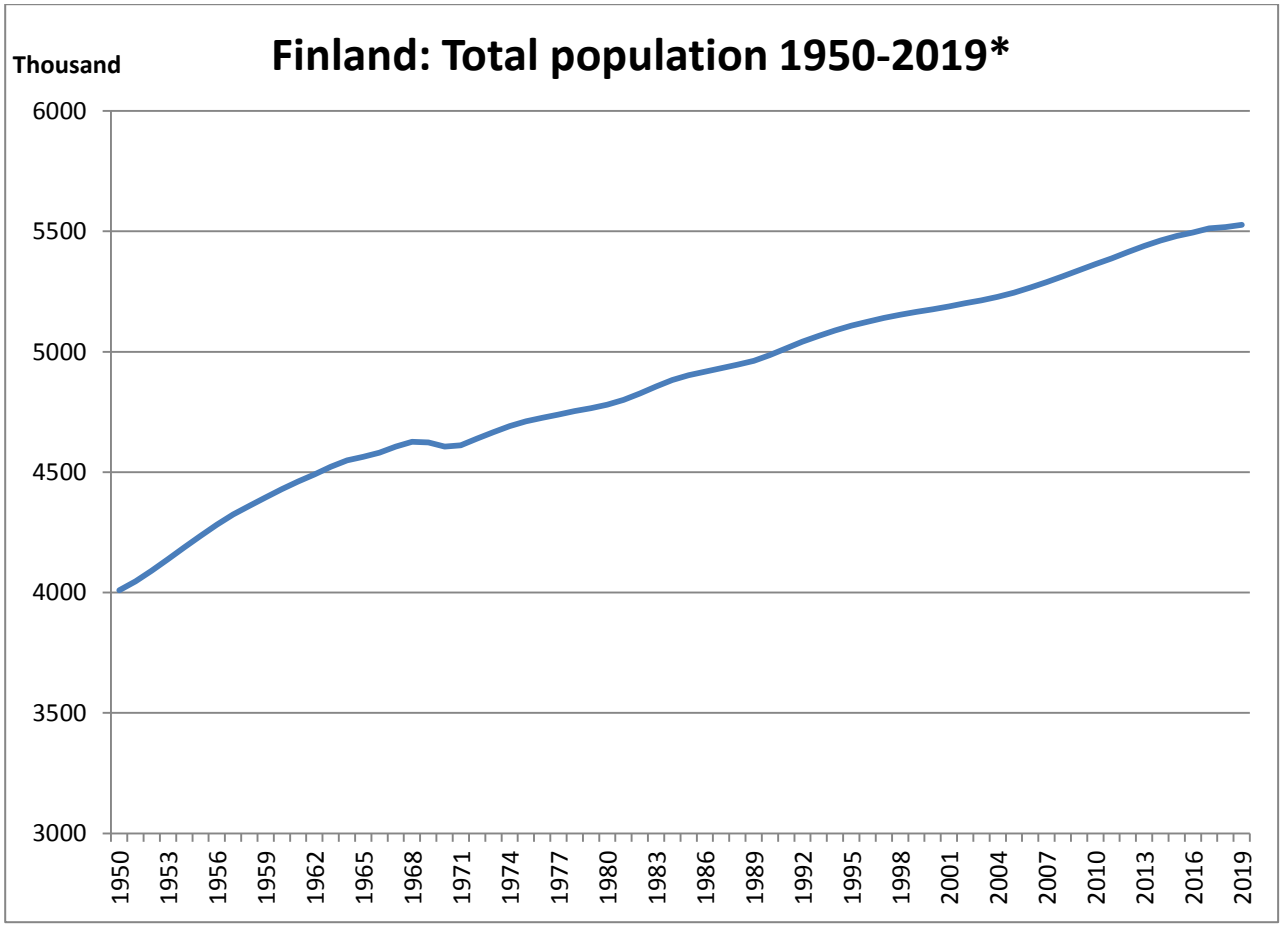
The steep decline in fertility in Finland since 2010 is not to be taken lightly, as it could spell a demographic disaster for Finland's already rapidly aging population unless there is recuperation in fertility within the next decade or two. While the main drivers behind this negative change have been identified; the timing and severity of the fertility decline does not quite seem to match the trends in these drivers. The author therefore suspects that some of the social aspects influencing the fertility decline have not yet been fully uncovered; particularly those related to the well-being of young Finns.

7. Future Studies

One aspect that thus far seems understudied is the impact that the recent development of unemployment, physical and mental well-being, as well as educational achievement among young Finns, especially young Finnish men, has had on fertility. Another aspect that does not seem to be well-studied is the difference in recent fertility patterns between native Finns and foreign born (including second generation migrants) individuals in Finland. A third aspect that could be interesting topic of study would be a comparison of all the modern economic crises (mid-1970s, early 1990s, 2007-2009, 2020-?) on fertility development in Finland.

Appendix

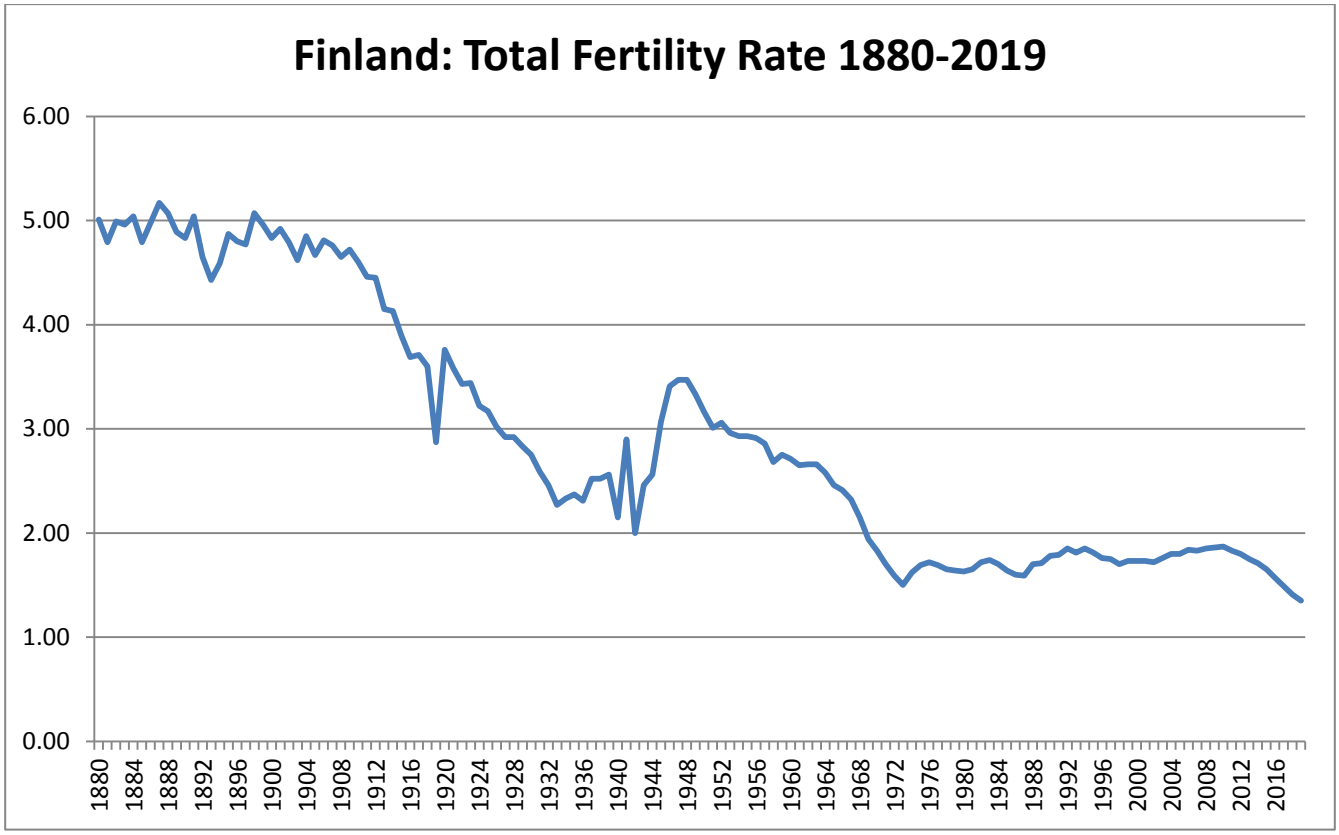
Figure 1



Source: Data from (Bolt et al., 2018; Tilastokeskus, 2019f; 2019d)

*Data on 2019 from November (other years 31. December)

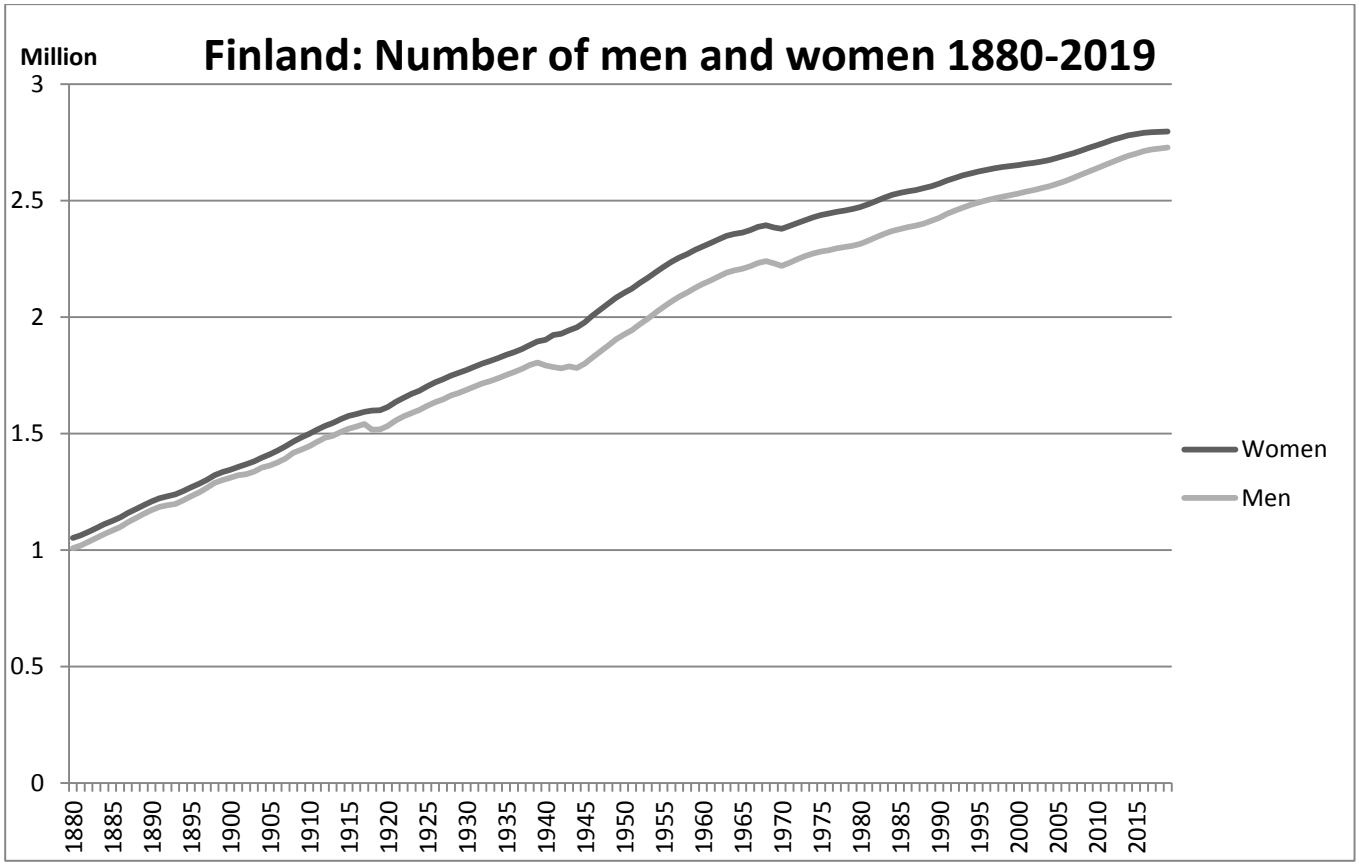
Figure 2



Source: Data from (Tilastokeskus, 2019c)

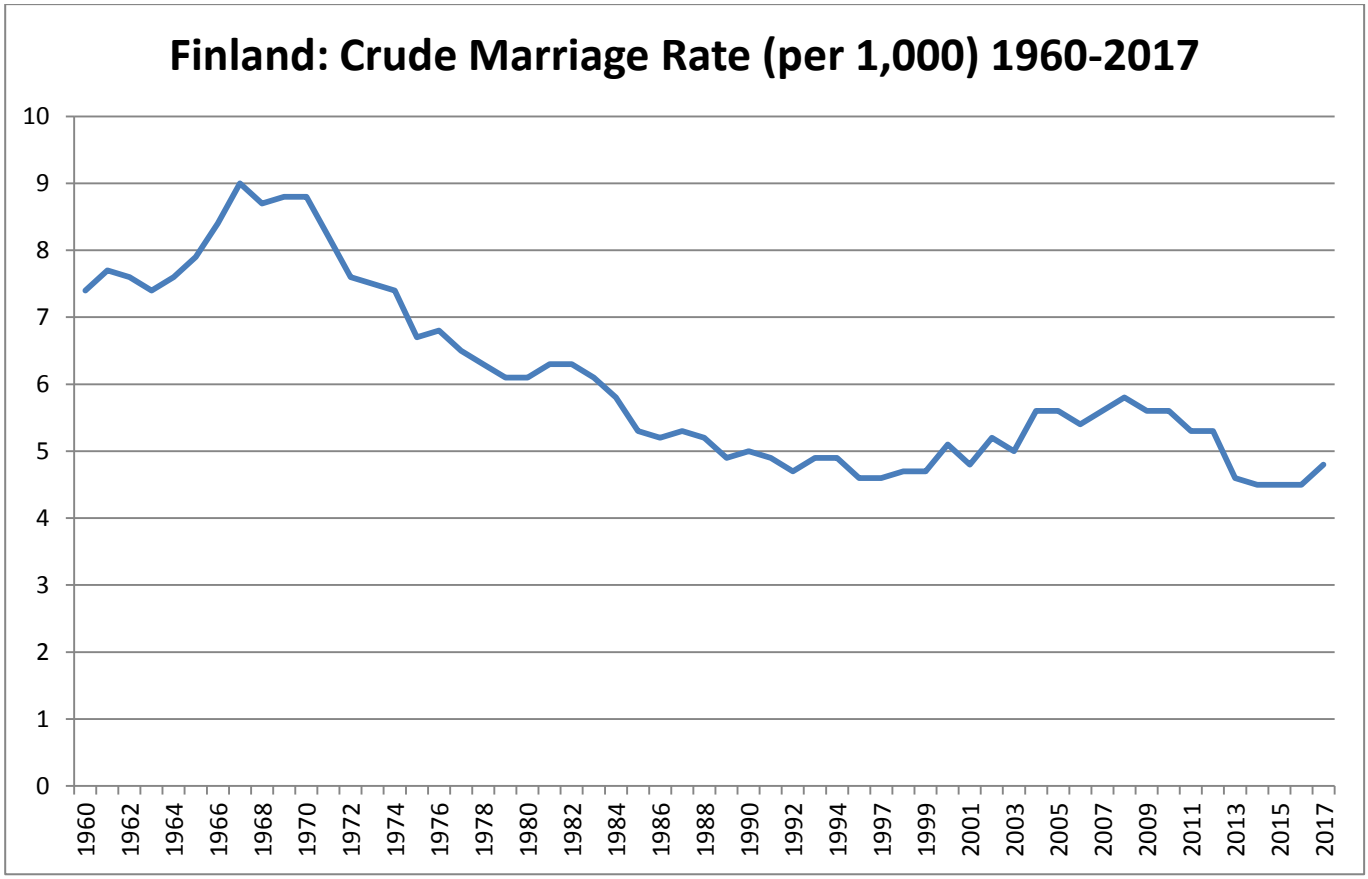
*Total fertility rate for 2019 is estimated by Statistics Finland

Figure 3



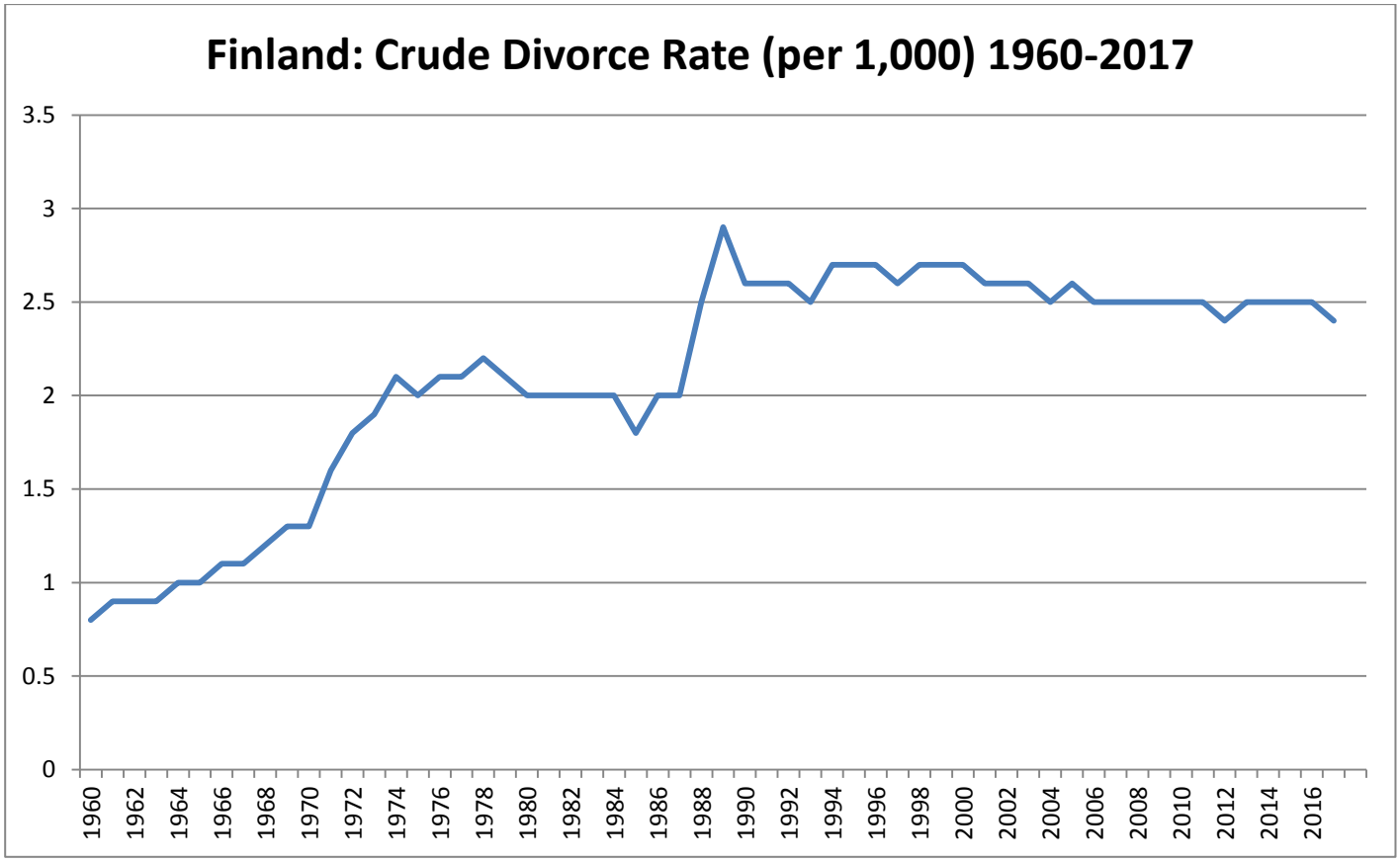
Source: Data from (Tilastokeskus, 2019e)

Figure 4



Source: Data from (OECD, 2020b)

Figure 5



Source: Data from (OECD, 2020b)

Figure 6: Age structure for women in Finland

Year/Age	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49
1880	9.16	8.29	7.90	7.16	6.74	5.64	4.79
1900	9.33	8.28	7.60	5.92	6.15	5.45	5.14
1920	9.86	8.70	7.40	6.91	6.33	5.70	5.15
1940	8.97	8.11	8.53	8.53	7.38	6.55	5.55
1960	7.94	6.67	6.14	6.65	6.70	6.02	6.37
1980	7.53	7.52	7.95	8.69	6.54	5.72	5.41
2000	6.12	6.04	5.63	6.41	7.00	7.10	7.45
2019	5.16	5.44	6.17	6.07	6.24	6.03	5.52

Source: Data from (Tilastokeskus, 2019a)

Figure 7: Age structure for men in Finland

Year/Age	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49
1880	9.54	8.65	8.09	7.14	6.69	5.56	4.59
1900	9.70	8.51	7.70	5.97	6.17	5.42	5.04
1920	10.57	8.86	7.35	6.67	6.07	5.49	5.00
1940	9.79	8.53	8.83	8.80	7.47	6.31	5.27
1960	8.84	7.42	6.91	7.25	6.54	5.48	5.91
1980	8.38	8.44	8.94	9.88	7.34	6.22	5.79
2000	6.71	6.61	6.20	6.99	7.63	7.67	7.98
2019	5.58	5.93	6.71	6.64	6.82	6.52	5.86

Source: Data from (Tilastokeskus, 2019a)

Figure 8: The unemployment rate in Finland the years 1987-2018

Source: Data from (Tilastokeskus, 2020a)

Figures 9-15

Figure 9: Model for Total population

	count	mean	sd	min	max
fertility	522	1.72	0.12	1.32	1.99
marriedtotal2049	522	0.45	0.06	0.32	0.63
divorcedtotal2049	522	0.08	0.01	0.05	0.11
primaryeducatedtot 2049	522	0.18	0.06	0.05	0.34
tertiaryeducatedtot 2049	522	0.12	0.07	0.01	0.34
unemptotal1849	522	0.11	0.04	0.02	0.24
totalaverageage	522	35.10	0.56	33.83	36.39
sexratio	522	1.07	0.03	0.96	1.14
gini	432	24.95	2.14	19.00	32.90
shareoflowincome households	432	0.14	0.03	0.07	0.22
totalincome	234	2627.06	148.84	2340.00	3192.45

Figure 10: Model for all men

	count	mean	sd	min	max
mm2049	522	0.41	0.06	0.29	0.59
dm2049	522	0.07	0.01	0.04	0.10
primaryeducated men2049	522	0.21	0.05	0.09	0.37
tertiaryeducatedm en2049	522	0.09	0.05	**0.00**	0.28
unemploymentme n1849	522	0.12	0.05	0.02	0.26
menaverageage	522	35.17	0.57	33.84	36.48
menincome	234	2876.78	175.33	2553.00	3487.37

Figure 11: Model for all women

	count	mean	sd	min	max
mw2049	522	0.49	0.07	0.36	0.68
dw2049	522	0.10	0.01	0.05	0.13
primaryeducatedwomen2049	522	0.15	0.06	0.01	0.31
tertiaryeducatedwomen2049	522	0.15	0.10	**0.00**	0.40
unempwomen1849	522	0.10	0.04	0.01	0.21
womenaverageage	522	35.03	0.57	33.81	36.32
womenincome	234	2383.49	127.54	2144.00	2899.20

Figure 12: Model for younger men

	count	mean	sd	min	max
marriedmen2034	522	0.23	0.05	0.12	0.38
divorcedmen2034	522	0.02	0.00	0.01	0.03
primaryeducatedmen2034	522	0.19	0.04	0.04	0.27
tertiaryeducatedmen2034	522	0.07	0.05	**0.00**	0.21
unemploymentmen1829	522	0.14	0.06	0.03	0.32

Figure 13: Model for younger women

	count	mean	sd	min	max
mw2034	522	0.33	0.06	0.21	0.53
dw2034	522	0.04	0.01	0.02	0.05
primaryeducatedwomen2034	522	0.12	0.04	**0.00**	0.21
tertiaryeducatedwomen2034	522	0.15	0.10	**0.00**	0.36
unempwomen1829	522	0.11	0.04	0.01	0.25

Figure 14: Model for older men

	count	mean	sd	min	max
marriedmen3549	522	0.56	0.07	0.45	0.78
divorcedmen3549	522	0.12	0.02	0.07	0.15
primaryeducatedmen3549	522	0.24	0.08	0.11	0.47
tertiaryeducatedmen3549	522	0.10	0.06	**0.00**	0.36
unemploymentmen4049	522	0.12	0.04	0.02	0.24

Figure 15: Model for older women

	count	mean	sd	min	max
mw3549	522	0.63	0.07	0.53	0.81
dw3549	522	0.15	0.02	0.07	0.18
primaryeducatedwomen3549	522	0.17	0.10	0.02	0.44
tertiaryeducatedwomen3549	522	0.15	0.11	**0.00**	0.49
unempwomen4049	522	0.09	0.03	0.01	0.17

Figure 16: TFR 1990-2018

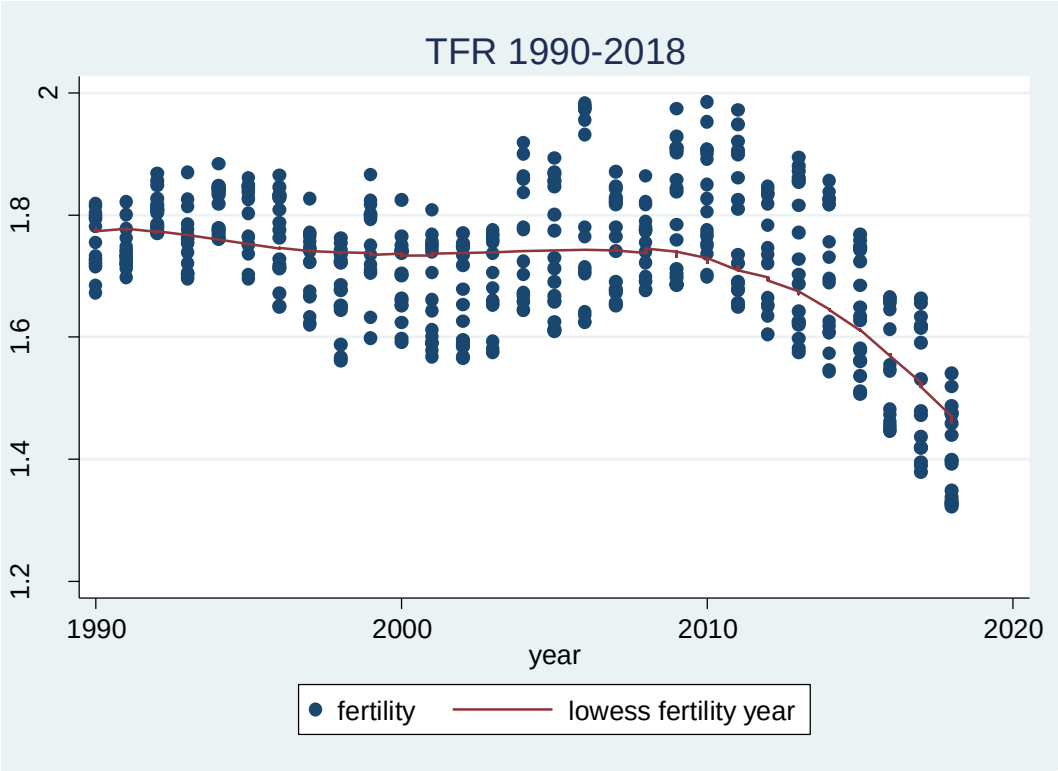
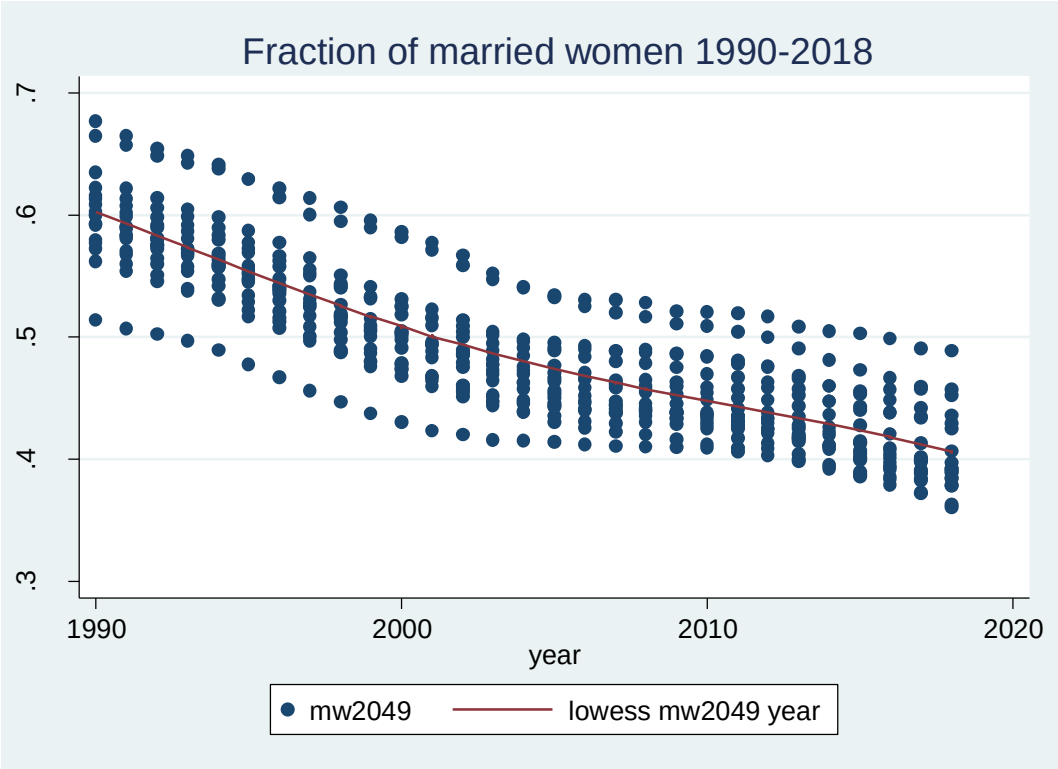


Figure 17: Fraction of married individuals 1990-2018



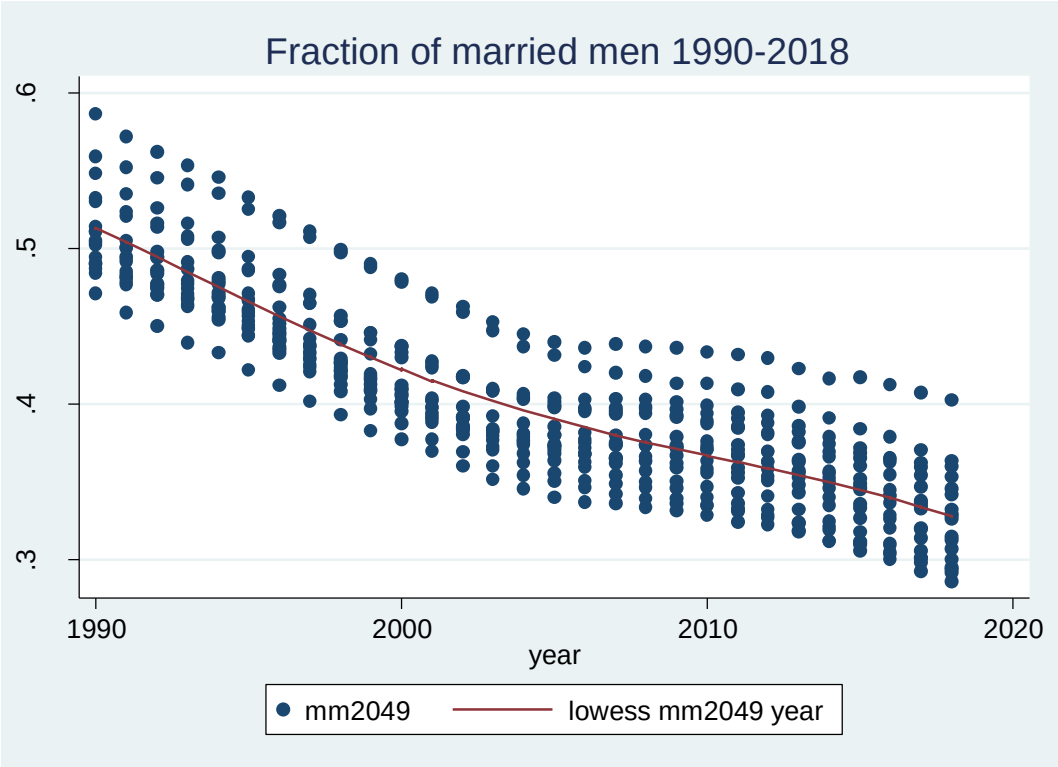
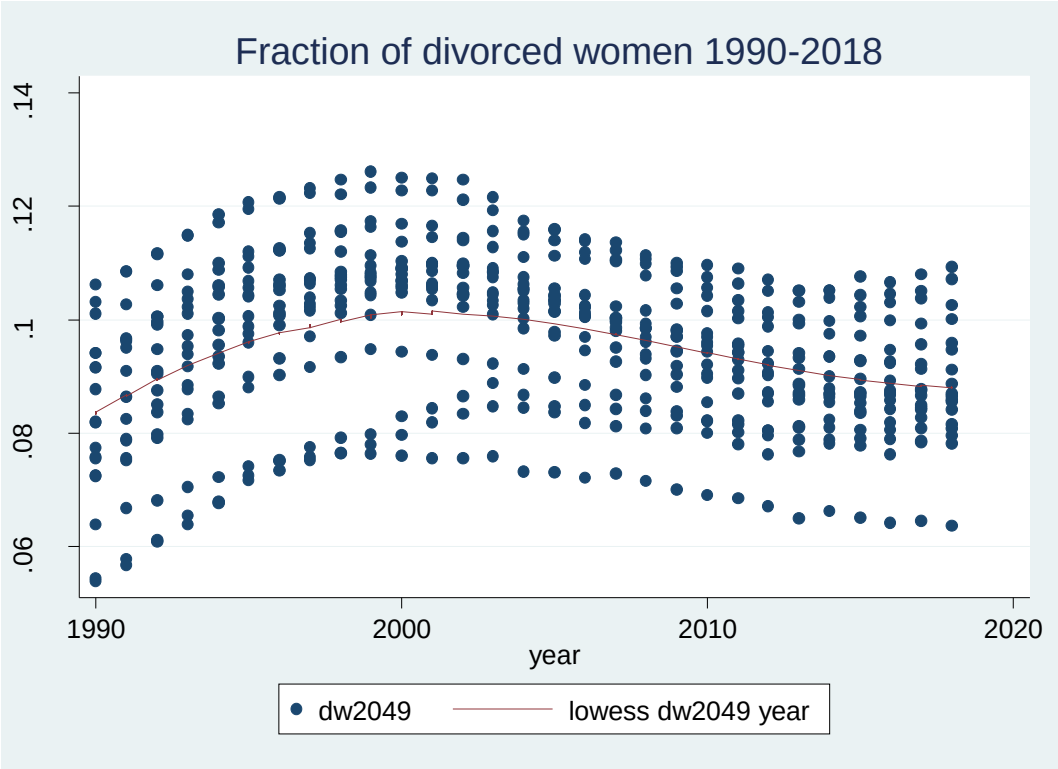


Figure 18: Fraction of divorced individuals 1990-2018



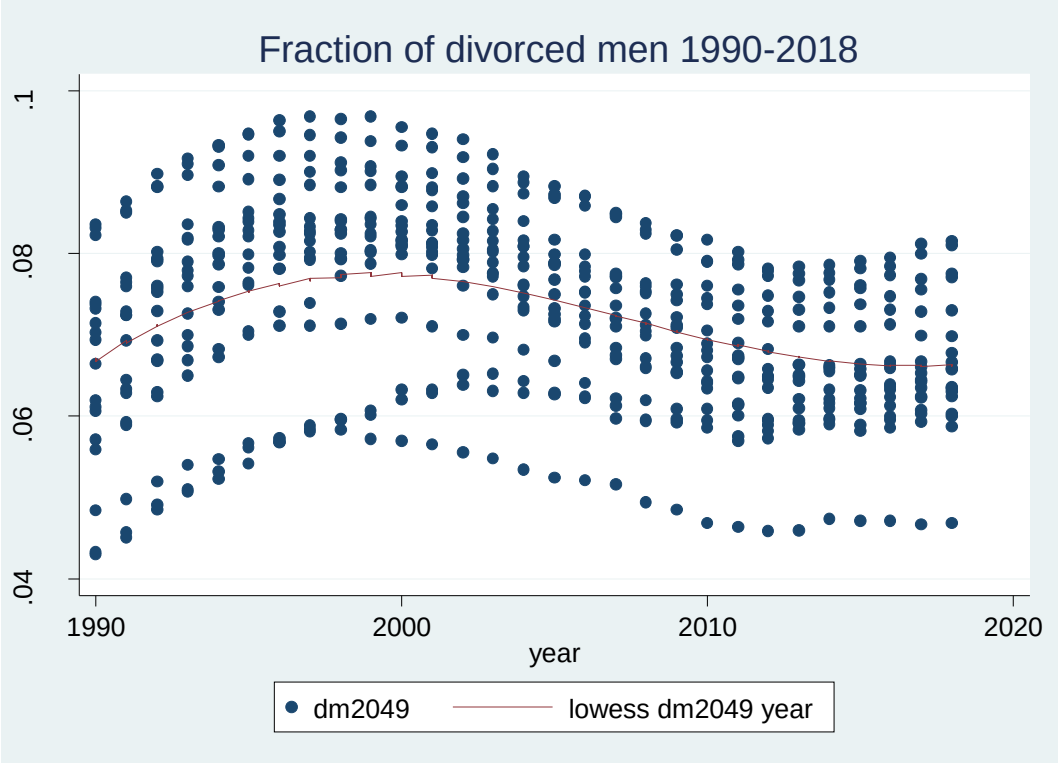
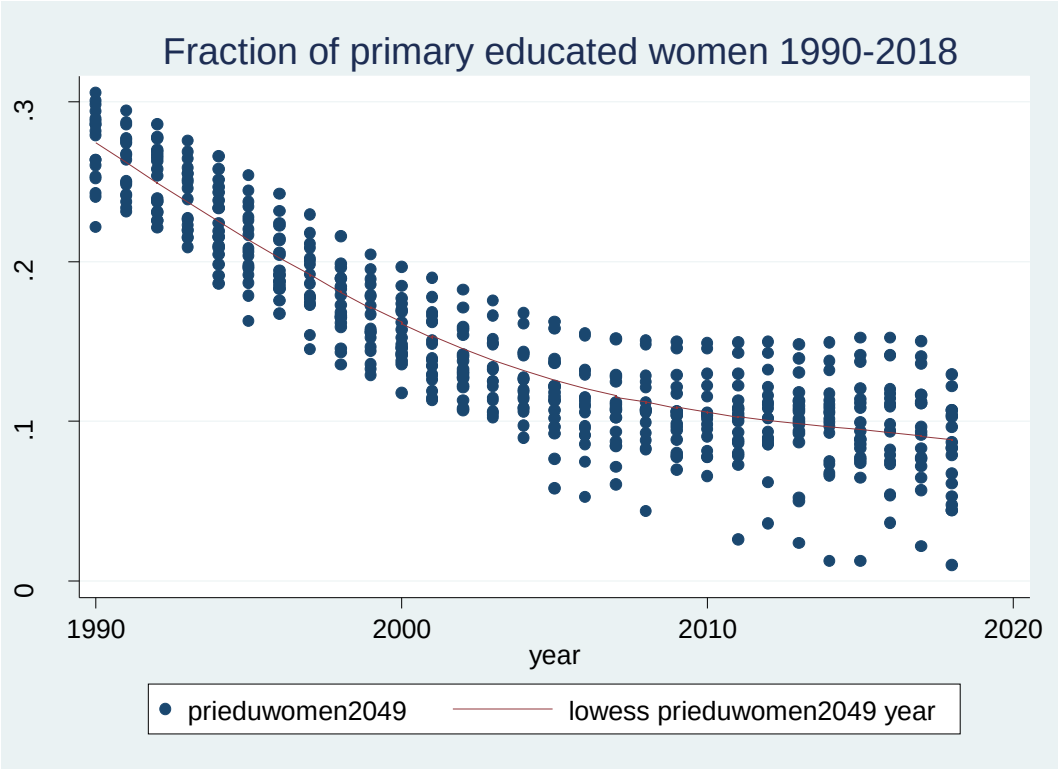


Figure 19: Fraction of primary educated individuals 1990-2018



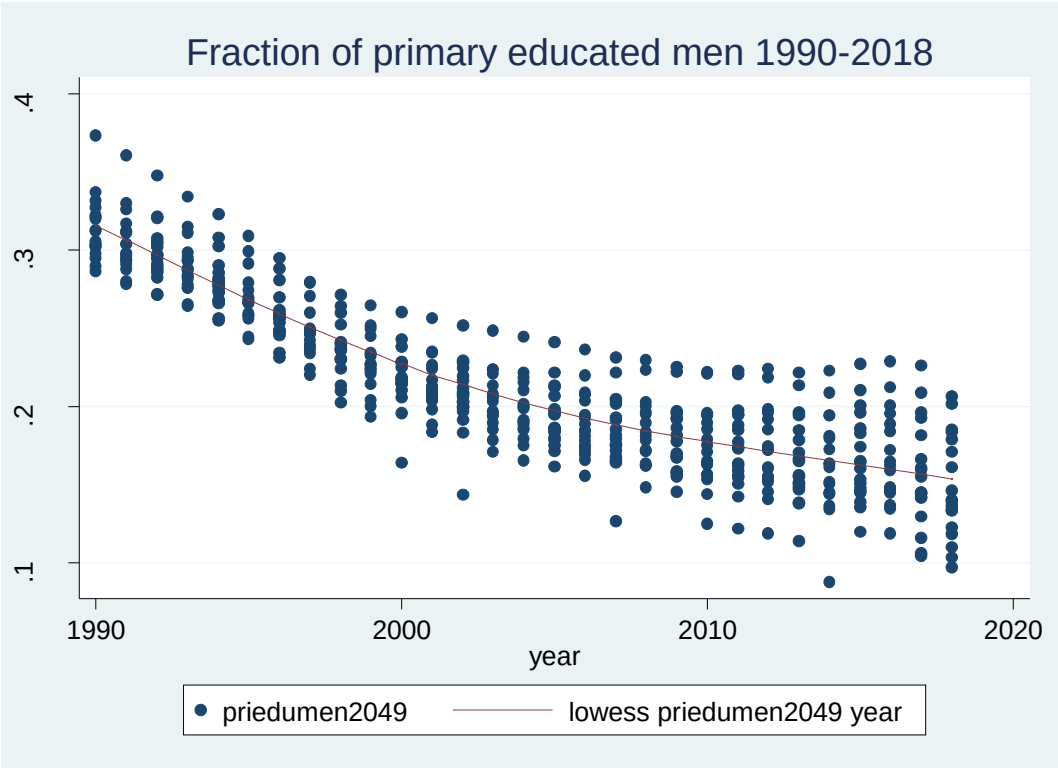
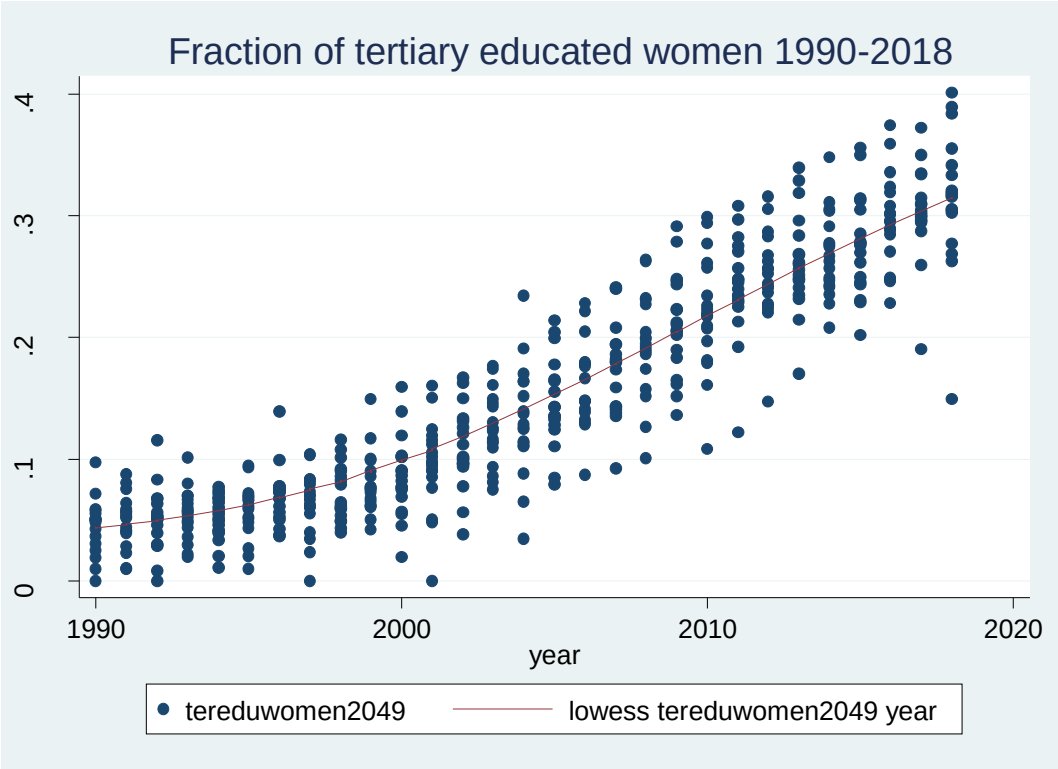


Figure 20: Fraction of tertiary educated individuals 1990-2018



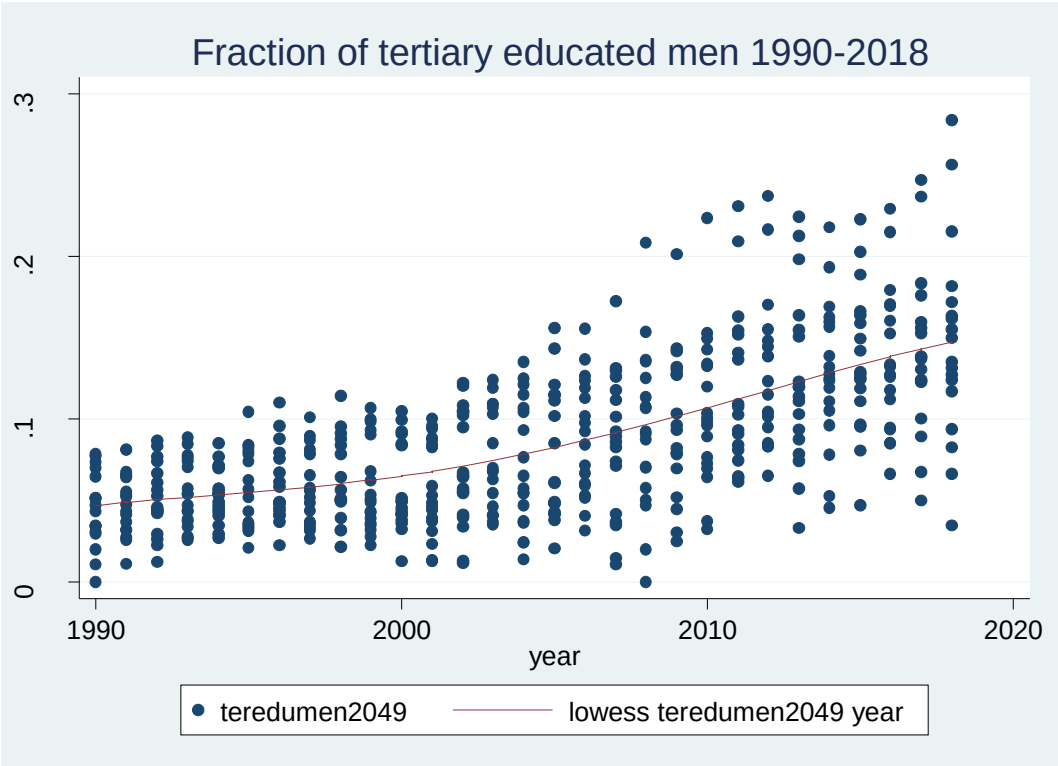
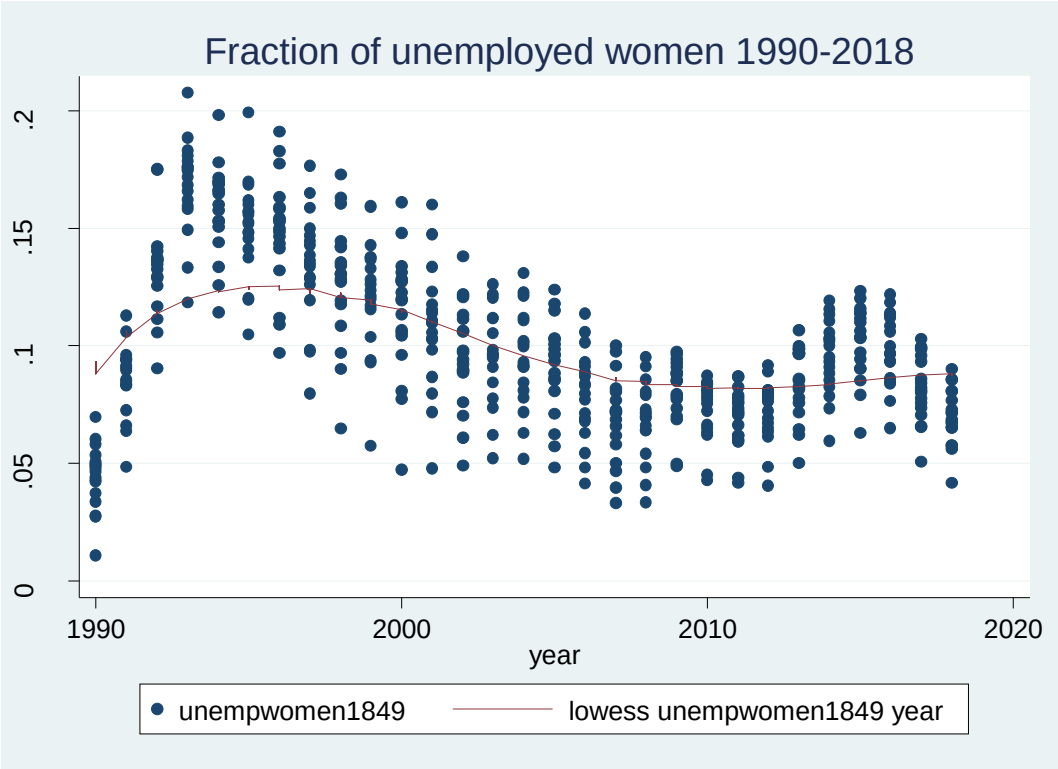


Figure 21: Fraction of unemployed individuals 1990-2018



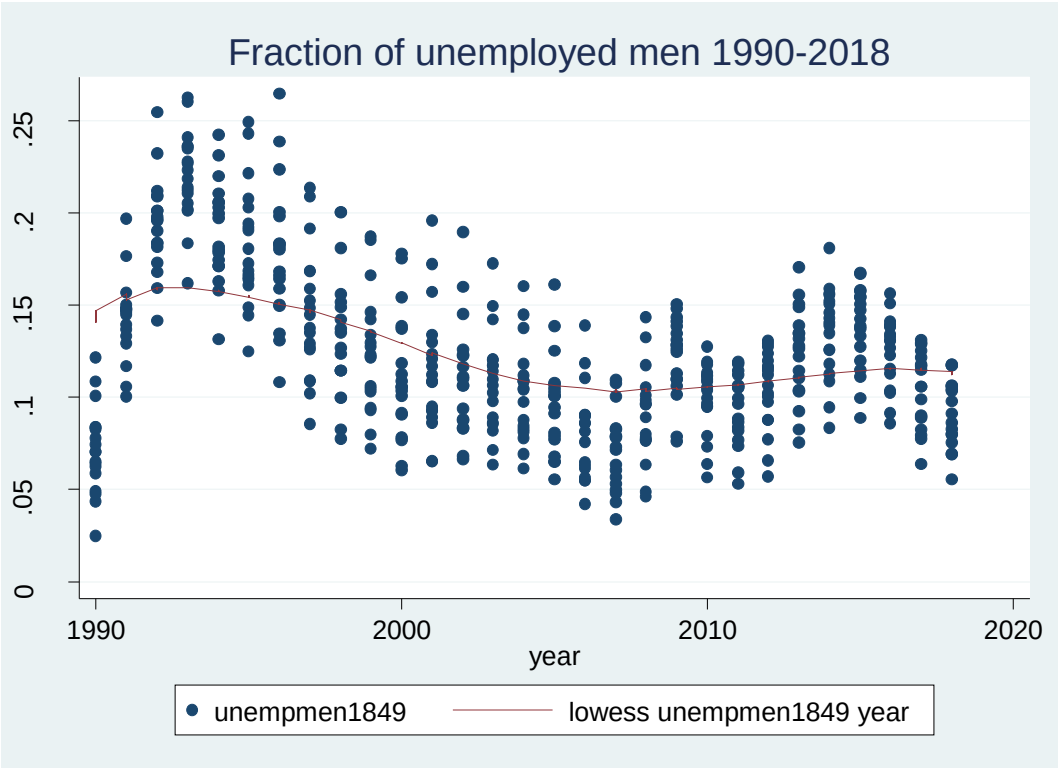
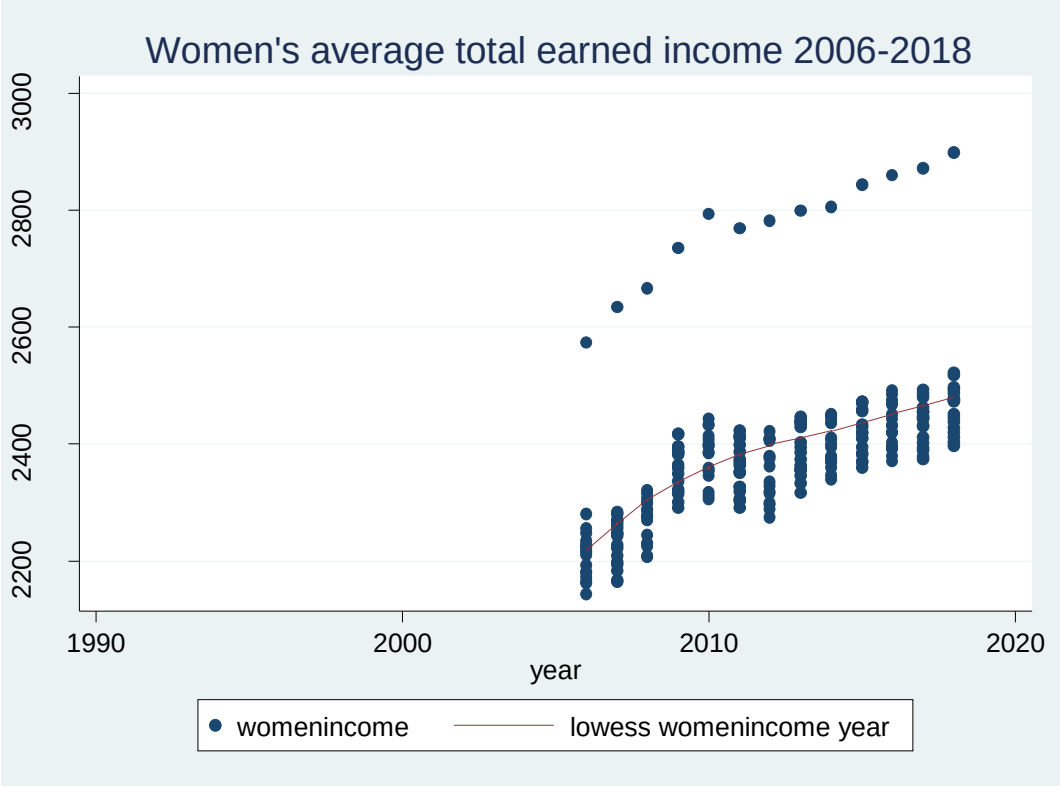
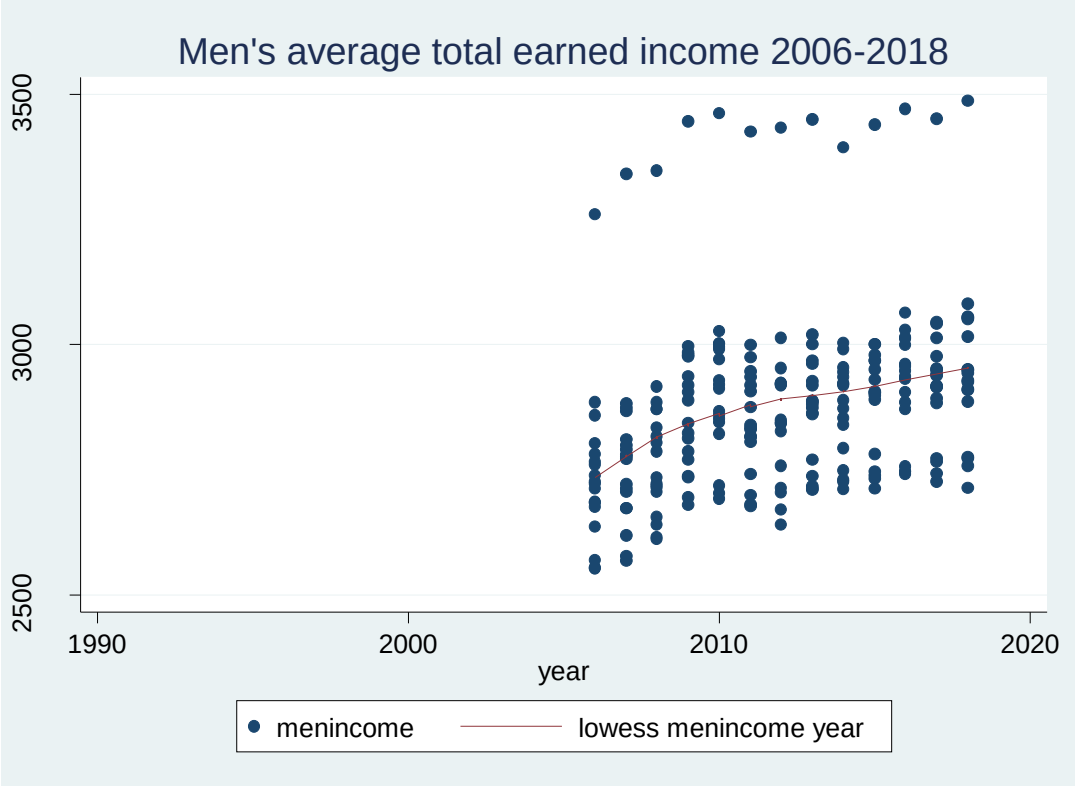


Figure 22: Average total earned income 2006-2018





Figures 23-25: Constructing the OLS base model for the total population

Figure 23: 1990-2018 OLS Model

VARIABLES	(1) 1990-2018	(2) 1990-2018
region	0.00378***	0.00512***
	(0.000678)	(0.000876)
year	-0.00963***	-0.00951***
	(0.00119)	(0.00118)
lnmarriedtotal2049	0.124**	0.126**
	(0.0542)	(0.0565)
lndivorcedtotal2049	-0.00887	-0.0586*
	(0.0255)	(0.0335)
lnprimaryeducatedtot2049	-0.176***	-0.182***
	(0.0208)	(0.0200)
lntertiaryeducatedtot2049	0.0317***	0.0354***
	(0.00626)	(0.00649)
lnunemploymenttotal1849	0.000565	0.0107
	(0.00673)	(0.00716)
lntotalaverageage		0.600***
		(0.227)
lnsexratio		-0.508***
		(0.111)
Constant	19.65***	17.20***
	(2.319)	(2.262)
Observations	522	522
R-squared	0.471	0.495

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 24: 1995-2018 OLS Model

VARIABLES	(1) 1995-2018	(2) 1995-2018	(3) 1995-2018
region	0.00471***	0.00619***	0.00635***
	(0.000751)	(0.00105)	(0.000979)
year	-0.0104***	-0.0100***	-0.00977***
	(0.00134)	(0.00133)	(0.00127)
lnmarriedtotal2049	0.0669	0.0871	0.202***
	(0.0568)	(0.0600)	(0.0614)
lndivorcedtotal2049	-0.0656*	-0.113***	-0.0929**
	(0.0346)	(0.0430)	(0.0416)
lnprimaryeducatedtot2049	-0.141***	-0.165***	-0.123***
	(0.0225)	(0.0241)	(0.0256)
lntertiaryeducatedtot2049	0.0310***	0.0412***	0.0469***
	(0.00866)	(0.00976)	(0.00952)
lnunemploymenttotal1849	-0.0138	0.00740	0.0629***
	(0.00955)	(0.0110)	(0.0174)
lntotalaverageage		0.792**	0.147
		(0.310)	(0.354)
lnsexratio		-0.633***	-0.584***
		(0.155)	(0.150)
lngini			0.192***
			(0.0709)
lnshareoflowincomehouseholds			0.0741***
			(0.0215)
Constant	20.94***	17.38***	19.09***
	(2.621)	(2.702)	(2.845)
Observations	432	432	432
R-squared	0.494	0.516	0.546

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 25: 2006-2018 OLS Model

VARIABLES	(1) 2006-2018	(2) 2006-2018	(3) 2006-2018	(4) 2006-2018
region	0.00160**	0.00201***	0.00428***	0.00289***
	(0.000720)	(0.000759)	(0.000901)	(0.000966)
year	-0.0232***	-0.0234***	-0.0233***	-0.0272***
	(0.00134)	(0.00135)	(0.00125)	(0.00150)
lnmarriedtotal2049	0.202***	0.215***	0.241***	0.141***
	(0.0426)	(0.0447)	(0.0448)	(0.0488)
lndivorcedtotal2049	-0.312***	-0.301***	-0.280***	-0.307***
	(0.0392)	(0.0411)	(0.0538)	(0.0533)
lnprimaryeducatedtot2049	-0.0462***	-0.0471***	-0.0483***	-0.0572***
	(0.0172)	(0.0172)	(0.0186)	(0.0178)
lntertiaryeducatedtot2049	0.0306**	0.0267**	0.0480***	0.0472***
	(0.0130)	(0.0130)	(0.0137)	(0.0129)
lnunemploymenttotal1849	0.121***	0.124***	0.133***	0.110***
	(0.0131)	(0.0131)	(0.0127)	(0.0137)
lntotalincome		0.101	0.0226	0.120
		(0.0684)	(0.0736)	(0.0800)
lntotalaverageage			-0.156	-0.248
			(0.486)	(0.442)
lnsexratio			-0.572***	-0.726***
			(0.133)	(0.144)
lngini				-0.354***
				(0.0887)
lnshareoflowincomehouseholds				-0.0352
				(0.0236)
Constant	46.75***	46.57***	47.65***	55.79***
	(2.684)	(2.718)	(3.607)	(3.925)
Observations	234	234	234	234
R-squared	0.809	0.811	0.827	0.840

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figures 26-28: Comparing OLS with fixed effects models

Figure 26: 1990-2018 OLS versus fixed effects model

VARIABLES	(1) 1990-2018	(2) 1990-2018
region	0.00512***	
	(0.000876)	
year	-0.00951***	-0.00557*
	(0.00118)	(0.00269)
lnmarriedtotal2049	0.126**	0.393*
	(0.0565)	(0.193)
lndivorcedtotal2049	-0.0586*	-0.125
	(0.0335)	(0.0934)
lnprimaryeducatedtot2049	-0.182***	-0.170***
	(0.0200)	(0.0512)
lntertiaryeducatedtot2049	0.0354***	0.0397***
	(0.00649)	(0.0129)
lnunemploymenttotal1849	0.0107	-0.00628
	(0.00716)	(0.00964)
lntotalaverageage	0.600***	1.078
	(0.227)	(0.717)
lnsexratio	-0.508***	-1.033
	(0.111)	(0.678)
Constant	17.20***	7.720
	(2.262)	(5.129)
Observations	522	522
R-squared	0.495	0.378
Number of regions		18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 27: 1995-2018 OLS versus fixed effects model

VARIABLES	(1) 1995-2018	(2) 1995-2018
region	0.00635***	
	(0.000979)	
year	-0.00977***	0.000135
	(0.00127)	(0.00325)
lnmarriedtotal2049	0.202***	1.384***
	(0.0614)	(0.265)
lndivorcedtotal2049	-0.0929**	-0.0312
	(0.0416)	(0.142)
lnprimaryeducatedtot2049	-0.123***	-0.00625
	(0.0256)	(0.0288)
lntertiaryeducatedtot2049	0.0469***	0.0516**
	(0.00952)	(0.0188)
lnunemploymenttotal1849	0.0629***	0.00206
	(0.0174)	(0.0182)
lntotalaverageage	0.147	-3.710***
	(0.354)	(1.194)
lnsexratio	-0.584***	-0.975
	(0.150)	(0.747)
lngini	0.192***	0.156
	(0.0709)	(0.151)
lnshareoflowincomehouseholds	0.0741***	0.221***
	(0.0215)	(0.0494)
Constant	19.09***	14.69**
	(2.845)	(5.416)
Observations	432	432
R-squared	0.546	0.551
Number of regions		18

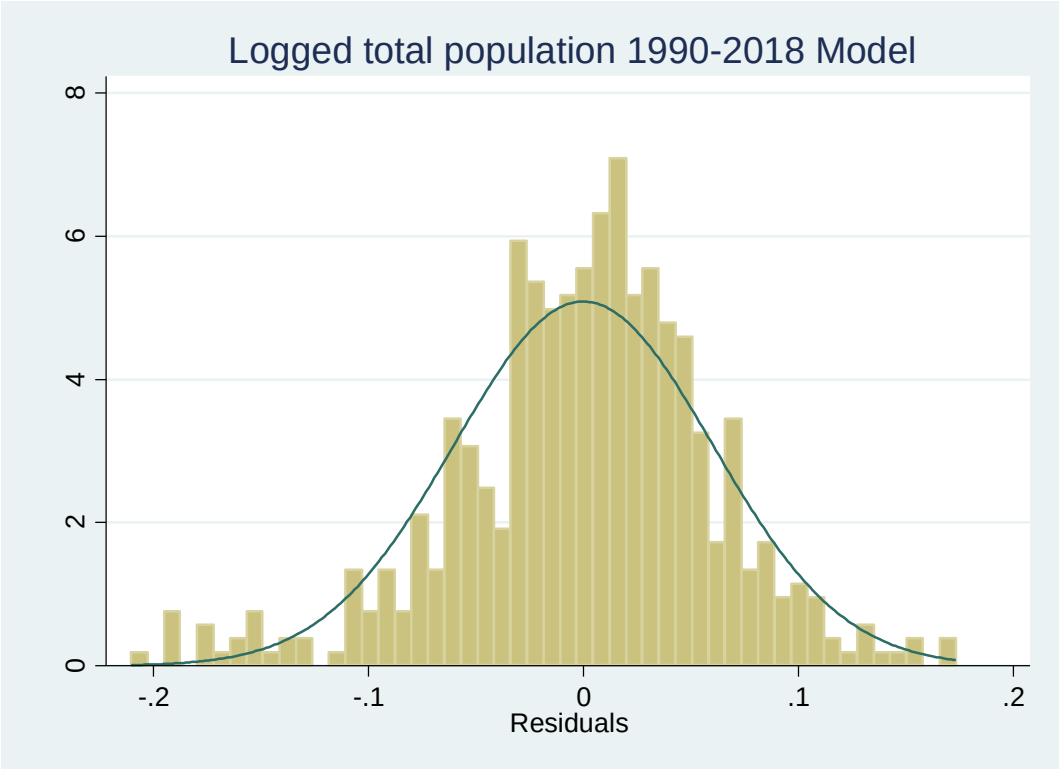
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 28: 2006-2018 OLS versus fixed effects model

VARIABLES	(1) 2006-2018	(2) 2006-2018
region	0.00289***	
	(0.000966)	
year	-0.0272***	-0.0170***
	(0.00150)	(0.00476)
lnmarriedtotal2049	0.141***	1.518***
	(0.0488)	(0.354)
lndivorcedtotal2049	-0.307***	-0.0243
	(0.0533)	(0.151)
lnprimaryeducatedtot2049	-0.0572***	0.000591
	(0.0178)	(0.0175)
lntertiaryeducatedtot2049	0.0472***	0.0246
	(0.0129)	(0.0220)
lnunemploymenttotal1849	0.110***	0.0630***
	(0.0137)	(0.0154)
lntotalincome	0.120	0.602***
	(0.0800)	(0.157)
lntotalaverageage	-0.248	-4.454***
	(0.442)	(1.527)
lnsexratio	-0.726***	0.569
	(0.144)	(0.579)
lngini	-0.354***	-0.0802
	(0.0887)	(0.103)
lnshareoflowincomehouseholds	-0.0352	-0.103
	(0.0236)	(0.0738)
Constant	55.79***	47.41***
	(3.925)	(7.052)
Observations	234	234
R-squared	0.840	0.890
Number of regions		18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 29: Normality tests for the 1990-2018 total population model



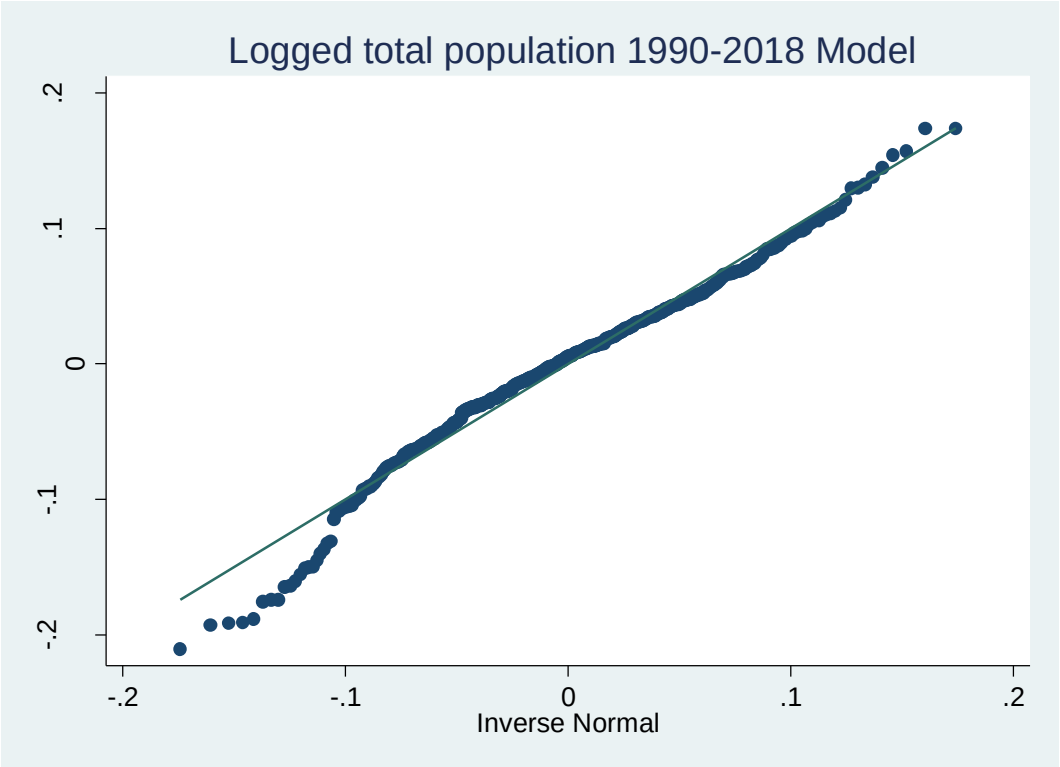
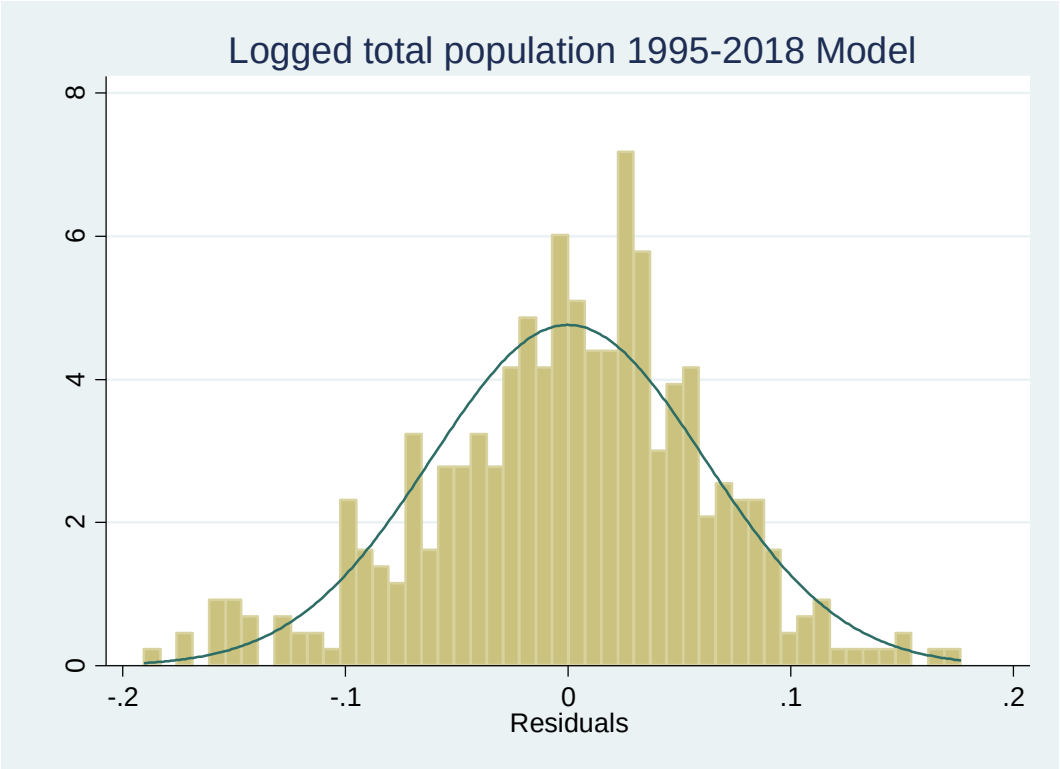


Figure 30: Normality tests for the 1995-2018 total population model



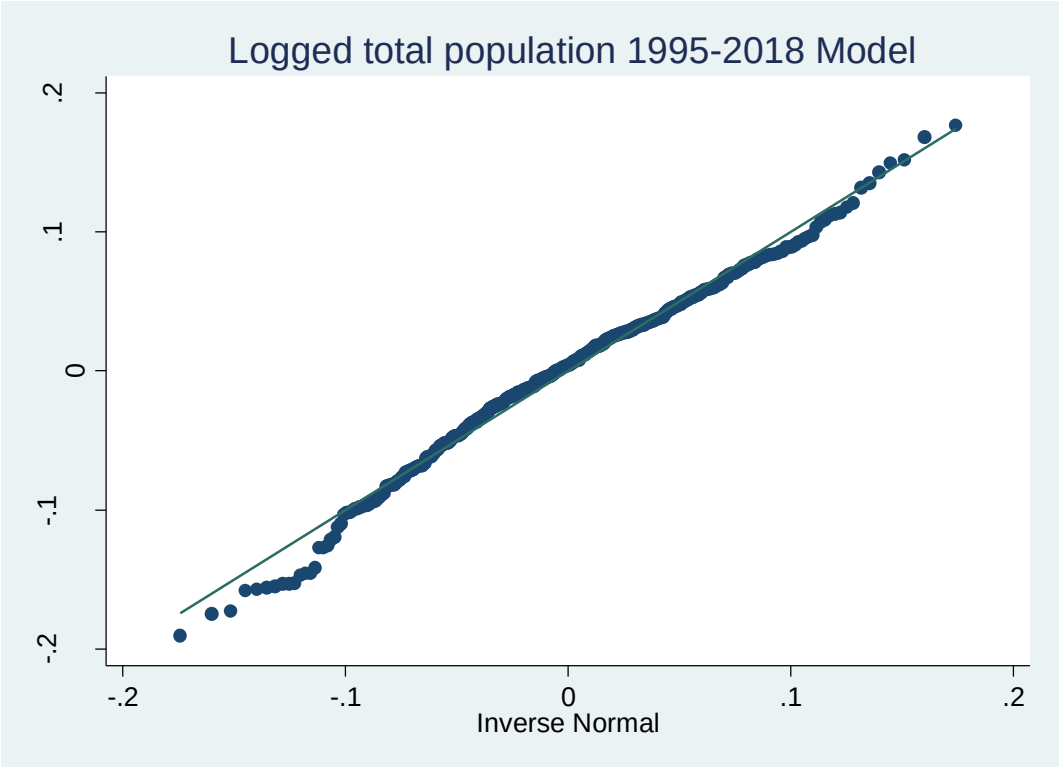
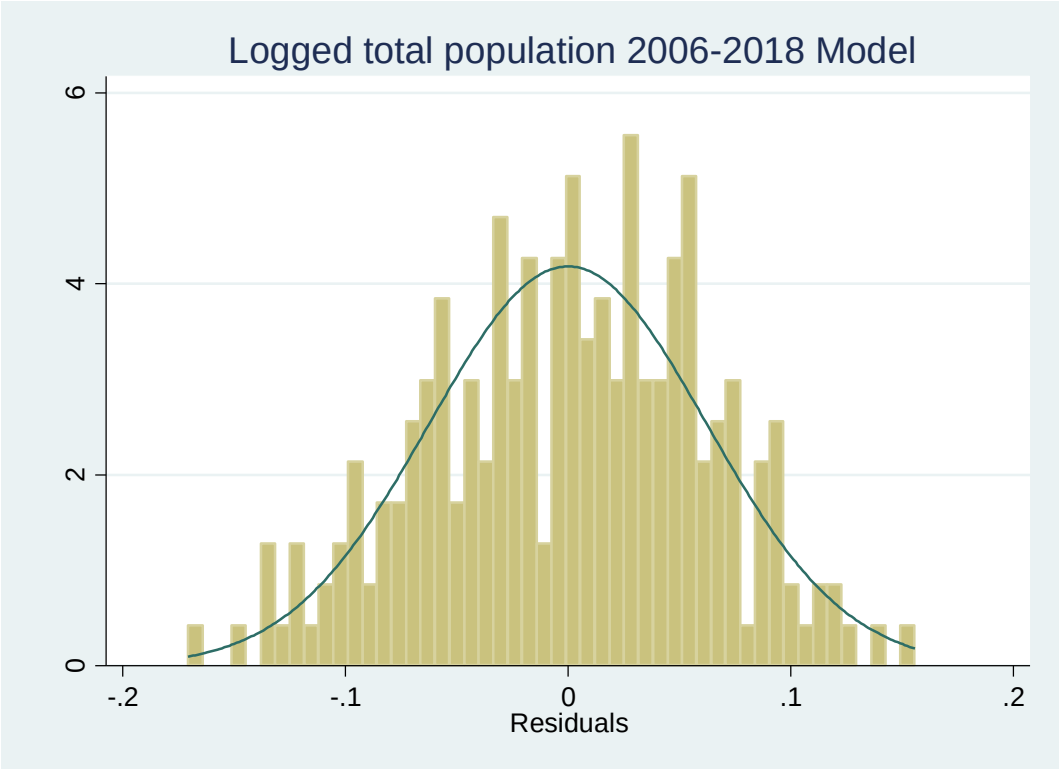
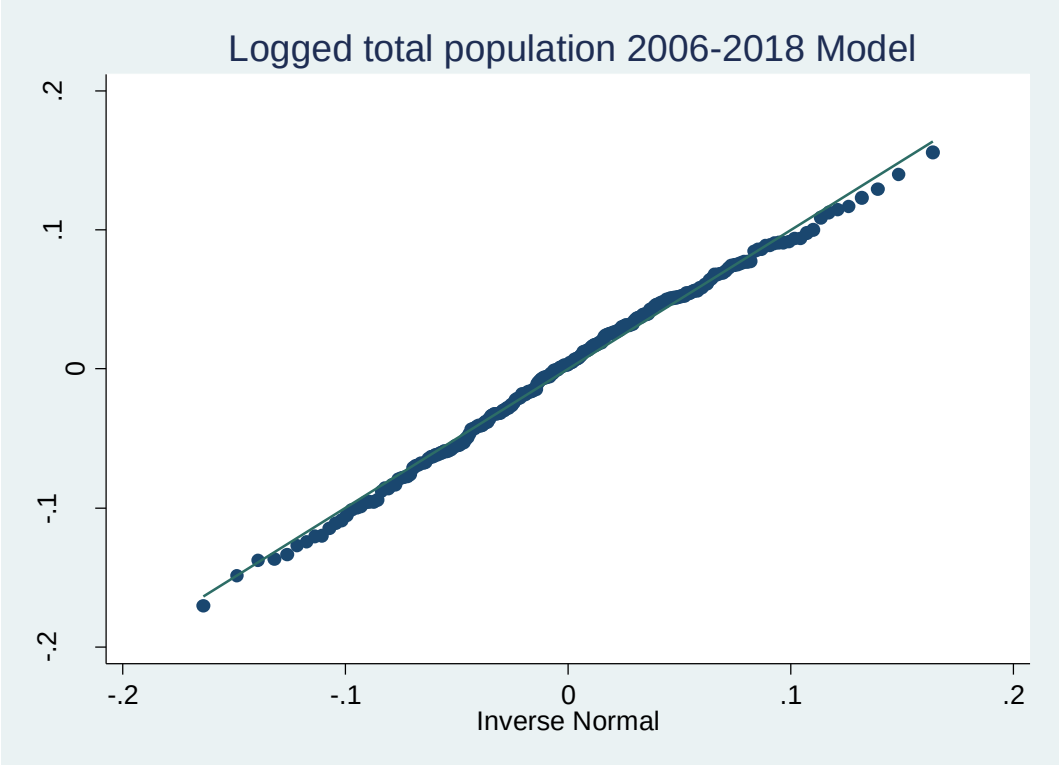


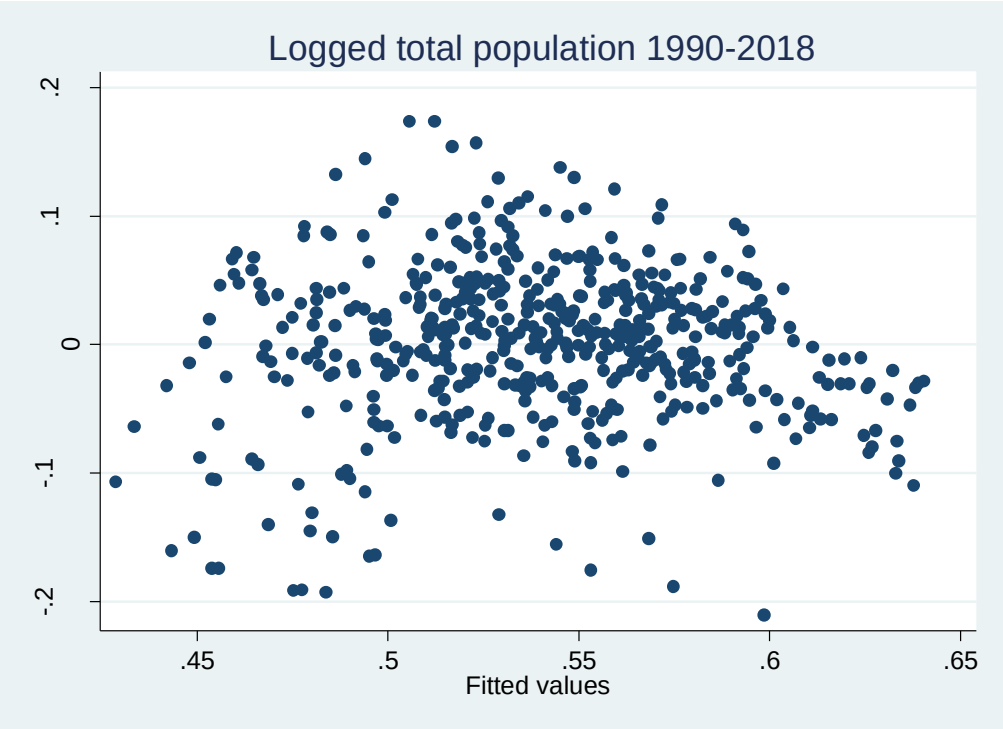
Figure 31: Normality tests for the 2006-2018 total population model



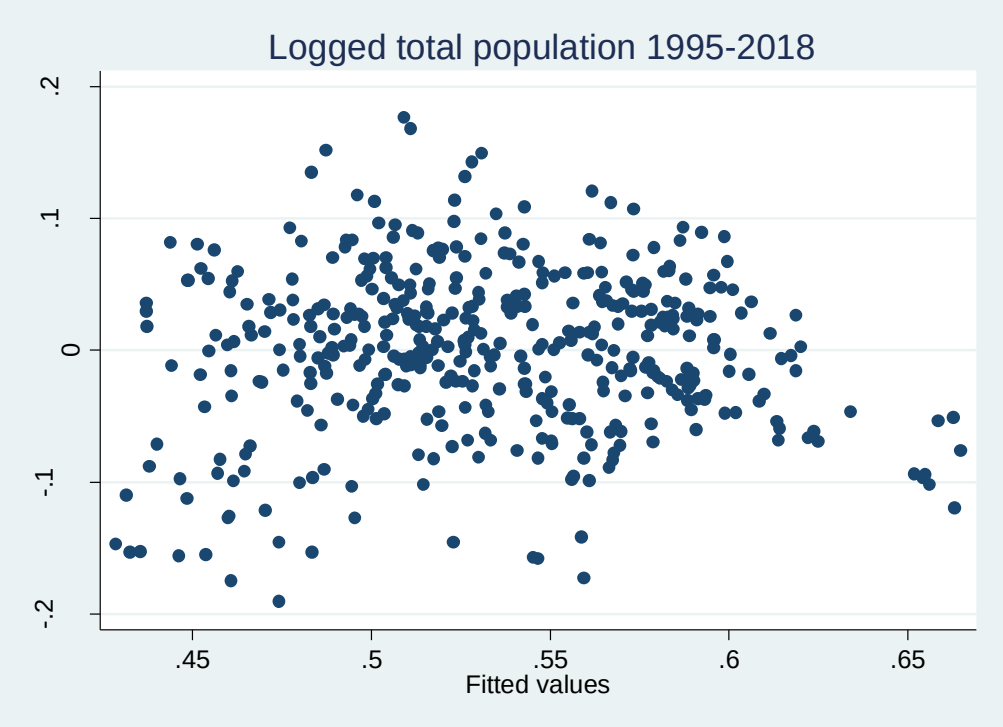


Figures 32-34: residual versus fitted plots for the total population models

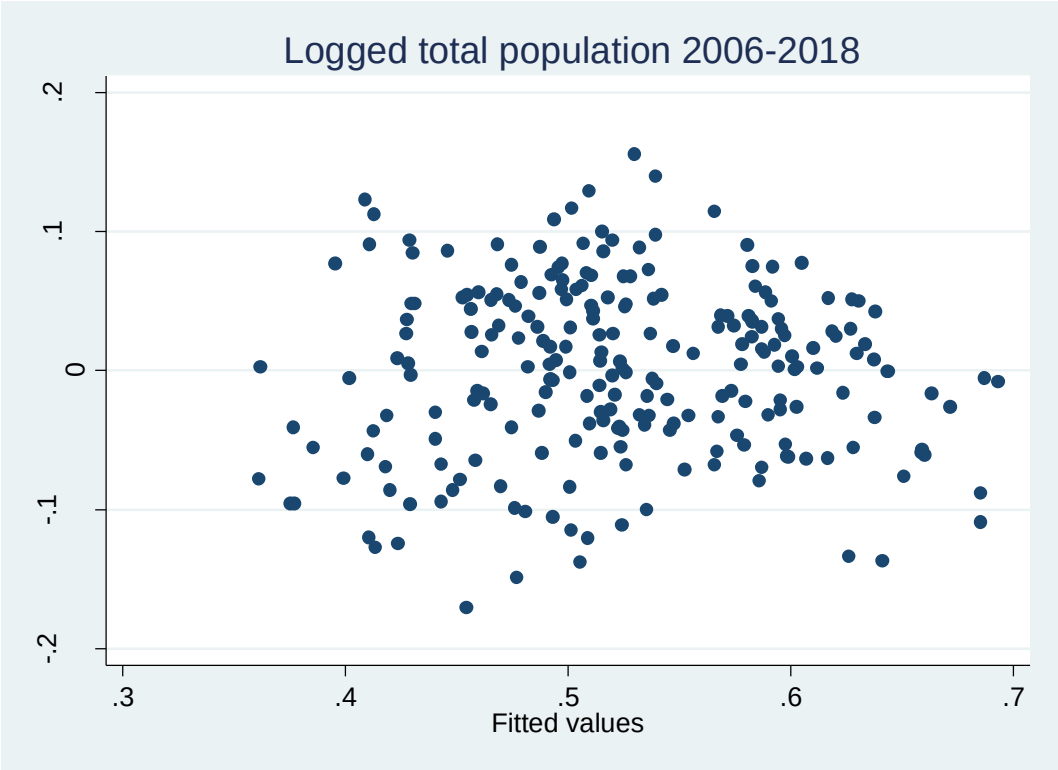
Figures 32: Residuals versus fitted plot for the 1990-2018 total population model



Figures 33: Residuals versus fitted plot for the 1995-2018 total population model



Figures 34: Residuals versus fitted plot for the 2006-2018 total population model



Figures 35-41: Final fixed effects models

Figure 35: Total population ages 18/20-49

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	-0.00557*	0.000135	-0.0170***
	(0.00269)	(0.00325)	(0.00476)
lnmarriedtotal2049	0.393*	1.384***	1.518***
	(0.193)	(0.265)	(0.354)
lndivorcedtotal2049	-0.125	-0.0312	-0.0243
	(0.0934)	(0.142)	(0.151)
lnprimaryeducatedtot2049	-0.170***	-0.00625	0.000591
	(0.0512)	(0.0288)	(0.0175)
lntertiaryeducatedtot2049	0.0397***	0.0516**	0.0246
	(0.0129)	(0.0188)	(0.0220)
lnunemploymenttotal1849	-0.00628	0.00206	0.0630***
	(0.00964)	(0.0182)	(0.0154)
lntotalaverageage	1.078	-3.710***	-4.454***
	(0.717)	(1.194)	(1.527)
lnsexratio	-1.033	-0.975	0.569
	(0.678)	(0.747)	(0.579)
lngini		0.156	-0.0802
		(0.151)	(0.103)
lnshareoflowincomehouseholds		0.221***	-0.103
		(0.0494)	(0.0738)
lntotalincome			0.602***
			(0.157)
Constant	7.720	14.69**	47.41***
	(5.129)	(5.416)	(7.052)
Observations	522	432	234
R-squared	0.378	0.551	0.890
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 36: Men ages 18/20-49

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	-0.00332	-0.00324	-0.0160***
	(0.00253)	(0.00286)	(0.00379)
lnmarriedmen2049	0.499**	0.878***	1.226***
	(0.181)	(0.185)	(0.218)
lndivorcedmen2049	-0.274***	-0.341**	-0.158
	(0.0935)	(0.139)	(0.100)
lnprimaryeducatedmen2049	-0.264***	-0.0924*	0.0179
	(0.0539)	(0.0522)	(0.0281)
lntertiaryeducatedmen2049	0.0147	0.0190	0.00751
	(0.0123)	(0.0115)	(0.00937)
lnunemploymentmen1849	-0.00399	0.0516***	0.0650***
	(0.00902)	(0.0175)	(0.0123)
lnmenaverageage	2.025***	-0.849	-2.867***
	(0.627)	(0.918)	(0.737)
lnsexratio	-1.065*	-1.032	1.184*
	(0.571)	(0.665)	(0.615)
lngini		0.342**	-0.0641
		(0.154)	(0.0829)
lnshareoflowincomehouseholds		0.154***	-0.125*
		(0.0525)	(0.0598)
lnmenincome			0.336**
			(0.125)
Constant	-0.594	9.281	41.09***
	(5.337)	(5.344)	(7.024)
Observations	520	431	233
R-squared	0.392	0.551	0.895
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 37: Women ages 18/20-49

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	-0.00282	0.00463*	-0.0286***
	(0.00278)	(0.00249)	(0.00490)
lnmarriedwomen2049	0.479**	1.979***	0.996***
	(0.225)	(0.214)	(0.310)
lndivorcedwomen2049	0.108*	0.129	-0.206*
	(0.0593)	(0.113)	(0.104)
lnprimaryeducatedwomen2049	-0.0442**	-0.00323	0.00198
	(0.0176)	(0.00839)	(0.00944)
lntertiaryeducatedwomen2049	0.0447***	0.0443***	0.0162
	(0.0128)	(0.0122)	(0.0239)
lnunemploymentwomen1849	-0.0163	-0.0483***	0.0182
	(0.00955)	(0.0143)	(0.0178)
lnwomenaverageage	-0.247	-5.210***	-2.618**
	(0.695)	(0.714)	(1.113)
lnsexratio	-1.093	-1.340*	-0.711
	(0.749)	(0.749)	(0.634)
lngini		0.0292	-0.227**
		(0.113)	(0.0805)
lnshareoflowincomehouseholds		0.215***	-0.279***
		(0.0419)	(0.0886)
lnwomenincome			1.257***
			(0.133)
Constant	7.711	11.97**	58.33***
	(5.128)	(4.340)	(7.053)
Observations	518	430	234
R-squared	0.355	0.579	0.886
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 38: Men ages 18/20-29/34

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	0.00476**	0.000231	-0.0168***
	(0.00204)	(0.00228)	(0.00429)
lnmarriedmen2034	0.594***	0.625***	0.421***
	(0.0748)	(0.0642)	(0.0726)
lndivorcedmen2034	-0.205***	-0.118***	-0.0491
	(0.0340)	(0.0251)	(0.0531)
lnprimaryeducatedmen2034	-0.0485**	0.0138	0.0187
	(0.0217)	(0.0258)	(0.0192)
lntertiaryeducatedmen2034	0.0359***	0.0358***	0.0214***
	(0.00938)	(0.00697)	(0.00574)
lnunemploymentmen1829	0.00868	0.0628***	0.0699***
	(0.00882)	(0.0137)	(0.0136)
lnmenaverageage	1.682***	-0.402	-1.128*
	(0.421)	(0.514)	(0.538)
lnsexratio	-0.688	-0.380	0.477
	(0.552)	(0.494)	(0.605)
lngini		0.355***	-0.0129
		(0.115)	(0.0818)
lnshareoflowincomehouseholds		0.0928**	-0.134**
		(0.0394)	(0.0507)
lnmenincome			0.249*
			(0.121)
Constant	-14.79***	1.355	36.82***
	(5.051)	(6.012)	(9.981)
Observations	469	391	224
R-squared	0.599	0.728	0.881
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 39: Women ages 18/20-29/34

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	0.00316	0.00243	-0.0216***
	(0.00186)	(0.00182)	(0.00432)
lnmarriedwomen2034	0.600***	0.871***	0.563***
	(0.0827)	(0.0800)	(0.0727)
lndivorcedwomen2034	-0.210***	-0.0843	-0.0531
	(0.0510)	(0.0535)	(0.0592)
lnprimaryeducatedwomen2034	-0.000680	0.0292*	0.0204**
	(0.0174)	(0.0159)	(0.00840)
lntertiaryeducatedwomen2034	0.0374***	0.0338***	0.000874
	(0.00834)	(0.00671)	(0.00790)
lnunemploymentwomen1829	0.0124	0.0244*	0.0467***
	(0.0104)	(0.0131)	(0.0127)
lnwomenaverageage	0.939**	-1.428***	-1.908***
	(0.392)	(0.451)	(0.571)
lnsexratio	-1.533**	-1.229**	-0.742
	(0.640)	(0.521)	(0.559)
lngini		0.216**	-0.0997
		(0.102)	(0.0749)
lnshareoflowincomehouseholds		0.0808*	-0.223***
		(0.0442)	(0.0759)
lnwomenincome			0.933***
			(0.127)
Constant	-8.940*	1.221	44.04***
	(4.432)	(4.675)	(8.705)
Observations	496	416	226
R-squared	0.545	0.714	0.897
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 40: Men ages 35/40-49

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	-0.0107***	-0.0129***	-0.0214***
	(0.00247)	(0.00289)	(0.00302)
lnmarriedmen3549	0.360	0.405	1.538***
	(0.214)	(0.302)	(0.433)
lndivorcedmen3549	-0.191*	-0.371**	0.0677
	(0.102)	(0.145)	(0.152)
lnprimaryeducatedmen3549	-0.362***	-0.284***	-0.159***
	(0.0520)	(0.0458)	(0.0407)
lntertiaryeducatedmen3549	-0.0277*	-0.0259**	-0.00818
	(0.0132)	(0.0113)	(0.00692)
lnunemploymentmen4049	0.0341***	0.0690***	0.0899***
	(0.0108)	(0.0199)	(0.0149)
lnmenaverageage	0.426	-0.912	-2.097**
	(0.660)	(0.650)	(0.728)
lnsexratio	-0.466	-0.629	1.171**
	(0.428)	(0.459)	(0.548)
lngini		0.0449	-0.0750
		(0.136)	(0.0727)
lnshareoflowincomehouseholds		0.138**	-0.0745
		(0.0546)	(0.0762)
lnmenincome			0.347**
			(0.158)
Constant	19.73***	28.84***	49.45***
	(5.542)	(6.332)	(4.946)
Observations	509	421	224
R-squared	0.460	0.536	0.892
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 41: Women ages 35/40-49

VARIABLES	(1) 1990-2018	(2) 1995-2018	(3) 2006-2018
year	-0.0103***	-0.0120***	-0.0429***
	(0.00202)	(0.00272)	(0.00275)
lnmarriedwomen3549	-0.206	0.136	-0.0744
	(0.180)	(0.314)	(0.376)
lndivorcedwomen3549	0.0442	-0.145	-0.457**
	(0.0573)	(0.138)	(0.174)
lnprimaryeducatedwomen3549	-0.0839***	-0.0607**	-0.00382
	(0.0240)	(0.0216)	(0.0118)
lntertiaryeducatedwomen3549	-0.0185	-0.00659	0.0146
	(0.0115)	(0.0117)	(0.0107)
lnunemploymentwomen4049	0.00314	-0.0522**	0.0100
	(0.00668)	(0.0210)	(0.0171)
lnwomenaverageage	-0.689	-1.501***	-0.915
	(0.409)	(0.470)	(0.560)
lnsexratio	-0.355	-0.371	-0.512
	(0.563)	(0.684)	(0.569)
lngini		-0.253*	-0.430***
		(0.124)	(0.107)
lnshareoflowincomehouseholds		0.214***	-0.301***
		(0.0550)	(0.0796)
lnwomenincome			1.554***
			(0.124)
Constant	23.54***	30.81***	77.96***
	(4.409)	(5.110)	(5.014)
Observations	514	429	234
R-squared	0.357	0.407	0.872
Number of regions	18	18	18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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