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The effects of the parental leave reform and the economic crisis on childbearing behavior in Iceland at the dawn of a new millennium

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The effects of the parental leave reform and the economic crisis on childbearing behavior in Iceland at the dawn of a new millennium*

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Abstract:
In the first decade of the 21st century, two potentially influential events took place in Iceland in relation to subsequent fertility outcomes: a reform was enacted in the parental leave scheme between 2001 and 2003, and a deep economic crisis came ashore in late 2008. The purpose of this study is to evaluate the effects these two events had on first-, second-, and third-birth intensities. By means of event history analysis we analyse individual longitudinal register data, consisting of the total female population of relevant ages. We find that after the parental leave reform was implemented a declining trend in the age-standardized first-birth rate came to a halt and first-birth intensities stabilized. The development in the standardized second- and third-birth rates indicates that the reform had a positive influence on continued childbearing. After the reform, the propensity to have a second and a third child increased constantly until 2010. After the onset of the economic crisis, a trend of decreasing first-birth intensities re-emerged. In 2011, three years into the crisis, we see a turnaround in second- and third-birth rates, which began to decline and continued to do so until the end of the study period.

Keywords: Family policy, parental leave, economic crisis, fertility, Iceland

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1. Introduction

In the first decade of the 21st century, two major events took place in Iceland that may have been instrumental in shaping subsequent fertility trends. In the year 2000 the Icelandic Parliament passed progressive legislation that transformed the country's parental leave scheme, with fathers being granted three of the total nine months parents are entitled to after childbirth. At the time, the legislation was considered to be one of the most generous parental leave laws in the world, in terms of both the father's share of the leave and the economic compensation (Moss and O'Brien 2006). Roughly eight years later, Iceland was hit by the most severe economic crisis in the country's modern history. Its currency – the Icelandic Krona (ISK) – fell sharply, unemployment skyrocketed (by Icelandic standards), the purchasing power of the general public dropped considerably, and certain social benefits were cut – including parental leave benefits.

With regard to increased interest in how institutional settings, gender relations, and economic factors intervene in shaping childbearing decisions (e.g. Neyer et al. 2013; Goldscheider et al. 2015; McDonald 2013a; 2013b), Icelandic fertility in the first decade of the new Millennium is intriguing to explore. Iceland, with its population of around 330,000, is one of the Nordic countries in which institutional settings are characterized by a universal welfare system and strong egalitarian emphasis – settings that have been among the catalysts for theoretical frameworks set out to explain changes in childbearing trends and other family-related affairs in recent times (Goldscheider et al. 2015; McDonald 2000; 2013a; Esping-Andersen & Billari 2015). Iceland is one of the most gender-equal countries in the world (Hausmann et al. 2006-2014), few countries have a higher female employment rate (around 80%), a vast majority of children are born outside marriage (close to 70%), and a large portion of the population is in registered but non-marital cohabitation. During the period under investigation (1998-2013) the Total Fertility Rate (TFR) remained relatively high and stable, averaging around a replacement level of 2.1 children per woman (Statistics Iceland 2016).

In the present study we focus on the two events mentioned above – the parental leave reform and the economic crisis – within the context of the Nordic welfare regime, and assess the impact they may have had on parity-specific birth intensities. This allows us to discuss how the interplay between social policies and economic factors may have affected childbearing trends in Iceland. In order to achieve our goals, we apply event history analysis to longitudinal

individual register data and present our findings as the relative risks of giving birth during 1998-2013. The childbearing history of the total female population born in Iceland and of childbearing age (15-46 years) is analysed.

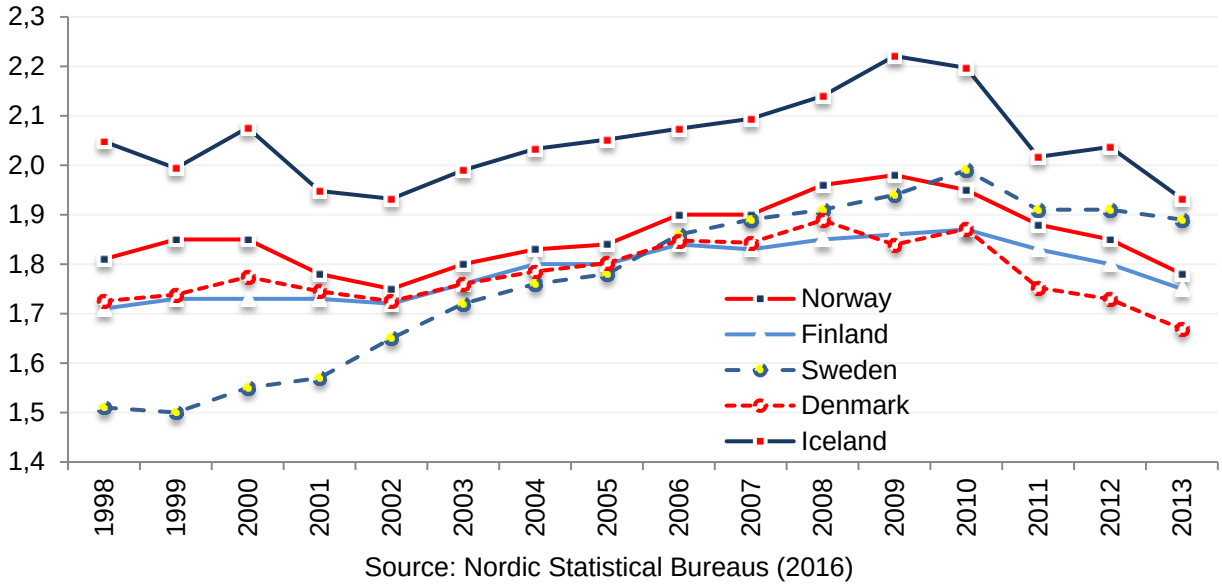
We begin our story with a discussion of how an egalitarian emphasis in social policies has been associated with fertility in the literature, with a main focus on the proposed association between parental leave policies and childbearing. Subsequently we turn our attention to the relationship between economic recessions and childbearing decisions, and deliberate on how social policies may intervene in this relationship. This deliberation is intertwined with a discussion of empirical findings from the other Nordic countries, as Iceland has social and institutional settings similar to its neighbours in the east but limited literature on its own. Before providing an overview of the data and methods, we describe the main points of the parental leave legislation and some of the consequences of the economic crisis. We conclude with the results and a discussion.

2. Literature Review and Argument

2.1. Gender Relations, Parental Leave, Labour Market and Fertility

Parallel to the widespread fertility recuperation in Europe at the turn of the century, and the changing macro- and micro-level relationships between female labour force participation and fertility, the possible association between social policies and childbearing behaviour has gained considerable attention (Adsera 2004; Neyer and Andersson 2008; Andersson 2008; Luci and Thévenon 2012; McDonald 2013a; Neyer 2013). The universal welfare regime in the Nordic countries, whereby social policies are formulated to enable women to combine work and family life, has commonly been associated with the relatively high fertility in the region, displayed in the figure below (e.g. Esping-Andersen and Billari 2015; Goldscheider et al. 2015; McDonald 2013a; 2000; Duvander et al. 2010; Andersson 2008; Garðarsdóttir 2008; Rønsen and Skrede 2008; Neyer 2006; Neyer 2003).

Figure 1 Total Fertility Rate in the Nordic Countries 1998-2013



Source: Nordic Statistical Bureaus (2016)

Family policies – such as parental leave benefits, available and highly subsidized childcare for young children, and flexible employment opportunities – have been found to dampen the negative effects of childbearing on women's labour force opportunities (Mandel 2012, p. 242). Policies that provide women with increased labour market security and enable them to combine work and family life tend to reduce the opportunity cost of having children, and may thus have a considerable impact on fertility (Luci and Thévenon 2012).

2.1.1. Gender Relations and Fertility

Recently, a body of literature has emerged that seeks explanations not only in the institutional settings of a country but in the private sphere as well, highlighting the importance of gender relations in general in explaining different levels of fertility between westernized countries. According to this type of literature, it is not only the formal institutional settings that are important for fertility outcomes; one also needs to differentiate between the gender equality in public institutions and private institutions. Social policies aimed specifically at the mother are thus thought to prove unsuccessful in increasing fertility if gender inequality persists in the home sphere.

McDonald's *Gender Equity Theory* draws its reasoning from this perspective – i.e., that one needs to consider the social structure and gender relations – and claims that modern fertility outcomes are the product of how individuals perceive their opportunities and the actual

possibilities mothers have to combine work and family life (McDonald 2000; McDonald 2013a). "According to the theory, perceptions of unfairness arise because individually oriented institutions such as education and market employment open up new opportunities for women. However, if those new opportunities are not supported if they become mothers – by family-oriented institutions – many women will reduce the number of children that they might otherwise have had" (McDonald 2013a, p. 983). From a similar standpoint, Esping-Andersen and Billari argue for a framework that considers the importance of gender roles in society, the importance of egalitarianism, and how changes in norms related to these issues affect the family. When the role of women changes within a society and women have more opportunities in terms of education and work, the normative confusion leads to decreased fertility (Esping-Andersen & Billari 2015, p. 6). It is not until egalitarian norms become the dominant normative status in a society, and the social institutions and accepted gender roles reconcile with women's opportunity to combine work and family, that fertility trends may reverse. Hence, "gender egalitarianism becomes a precondition for higher fertility" (Esping-Andersen & Billari 2015, p. 6). Goldscheider and her colleagues argue for a notion of a two-phased gender revolution. The first part of the revolution entailed women entering the labour market and becoming full participants in the public sphere while still holding the main responsibility of taking care of home and family – resulting in low fertility (e.g. the present development in Southern Europe and the past development in Scandinavia). The second part of the revolution is already underway in several countries, according to the authors, constituted of men entering and participating in the private sphere to a larger extent, i.e. in home and family life (the Nordic countries would be a prime example of this). As men take on more responsibility with regard to domestic work and the upbringing of their children, fertility will increase again, according to the framework (Goldscheider et al. 2015).

2.1.2. Parental Leave

Evidence has started to surface indicating that the father's participation in household chores and childrearing is positively related to increased fertility (Goldscheider et al. 2015). Gender equality is a clear policy goal in the Nordic countries, and one of the most important social policies the government has in order to promote and/or reinforce gender equality in the home is parental leave, alongside accessible and subsidized public childcare. The Nordic parental leave model reserves part of the leave for the father (popularly called a father's quota), in

order to encourage fathers to participate more in the private sphere (Valdimarsdóttir 2005; Duvander et al. 2010). Although there are no guarantees that men will contribute more to household chores if they use their right to parental leave, Almqvist and Duvander (2014) found that Swedish fathers who take long parental leave are also likely to share household work more equally with their spouses. More equal work distribution at home makes it easier for the mother to combine childrearing and work and, arguably, makes the decision to have another child easier.

Parental leave, as it is constructed in the Nordic countries, also provides financial incentives for men to contribute more to the childrearing – an inducement that has commonly been lacking (Goldscheider et al. 2015). The Nordic model thus addresses two aspects of parenting – "practical parenting" and "economic parenting", to use the terminology of Lappegård and her colleagues (2011). The first term relates to childrearing and the availability to take care of one's child (leave length and parent's quota), while the second relates to the parents' financial obligations to the family (manifested in income-related parental leave benefits). Although the possibilities for economic parenting are important for both men and women in the Nordic dual-earner model, the breadwinning role appears to still be more important for men. For example, in Norway "men are still the main providers in most couples and are also expected to be so" (Lappegård et al. 2011, p. 107). Hence, policies that also target economic parenting are presumably more likely to encourage fathers to use parental leave than policies that do not.

An association between fathers' use of the parental leave in the Nordics and elevated birth risks has repeatedly been found, although the duration of the leave matters, as does its role in second and third births, respectively (e.g. Duvander et al. 2016; Duvander et al. 2010; Duvander and Andersson 2006; Oláh 2003). In general, findings indicate that families in which the father takes advantage of parental leave are more likely to continue their childbearing. However, the relationship is far from straightforward. In the case of Iceland, Duvander and her colleagues (2016) found that the second-birth risk increased with increases in the father's parental leave use. For Norway and Sweden, fathers who used moderate leave had the highest risk of having a second child. However, fathers who used parental leave for their second child in Norway and Sweden had a lower risk of having a third child than those who did not. For Iceland, no statistically significant association was found for third births (Duvander et al. 2016).

2.2. The Business Cycle, Economic Recessions and Fertility

McDonald speculates that the upswing in most economies before the recession of 2008 may have reversed the foregoing trend of movement to later childbearing (McDonald 2013b); thus, in part, leading to the observable increase in the TFR in the post-2000s after decades of declining fertility before that. However, just as favourable economic circumstances can have a positive effect on childbearing decisions, a downward trend in the economy can have negative consequences. Following the recession of 2008, fertility rates in Europe reversed again and fell in most countries (Sobotka et al. 2011). Hence, in order to explain different childbearing patterns, one should consider explanations based not only on institutional factors but also on economic trends throughout the business cycle, the interaction between the two, and people's perceptions of their present possibilities and future risks.

Although findings on how economic recessions influence fertility in developed countries are not unanimous, many indicate a negative influence, at least in the short-term perspective. The impact may depend to some extent upon parity, gender, the individual's social and economic status, governmental support during recessions, and the nature of the recession itself (e.g. Andersson 2000; Neyer 2006; Adsera 2011; Sobotka et al. 2011; Kreyenfeld et al. 2012; Pailhé and Solaz 2012; Kreyenfeld and Andersson 2014; Kreyenfeld 2015). Economic recessions usually entail increased unemployment and a less secure working environment, and at the same time may result in a decrease in affordable housing, scarcer employment opportunities, and cuts in government-sponsored social policies. The potential effects of recessions can be manifested in various ways, ranging from direct loss of income to decreased opportunities in life – which again will have consequences on childbearing decisions. Furthermore, a downward trend in the economy can also have negative effects through the perception of harder times to come, which might have consequences on the postponement of entry into motherhood and progression to higher-order births, as women and men will wait with childbearing until the prospects are better (Andersson 2000; Hoem 2000; Sobotka et al. 2011; Adsera 2011).

From a Nordic perspective, Sweden is the key example of a country found to have a clearly pro-cyclical fertility, or "roller-coaster fertility", as fluctuations in its business cycle and fertility rate have been found to be strongly positively associated (Hoem and Hoem 1996; Andersson 2000). In Norway, a rise in the aggregate unemployment rate during the economic

downswing of the early 1990s was found to have negative impact on fertility (Kravdal 2002). Furthermore, and from a broader perspective, Vikat's findings for Finland suggest that women's earnings are positively correlated with their propensity to become a mother (2004); and the same applies to Sweden, where both men's and women's earnings are positively related to becoming a parent (Andersson 2000). In particular, Swedish women have been found to have a higher propensity to become a mother after having established themselves on the labour market (Andersson 2000; Andersson and Scott 2005).

2.3. The Interaction between Social Policies and the Economy

Despite the strong association between the business cycle and fertility in Sweden, Andersson found relatively high first-birth rates among unemployed women in Sweden (2000) and Vikat observed a similar pattern for women in Finland (2004). The relatively high fertility among unemployed women in Sweden and Finland may be associated with social policies and the financial and social protection the Nordic welfare system provides (e.g. Andersson 2000; Vikat 2002; 2004; Sobotka et al. 2011). It also reflects socio-economic differentials in the association between unemployment and fertility (Kreyenfeldt and Andersson 2014). Repeated findings suggest that the differences in the respective family policies of Finland and Sweden are also to blame for different outcomes in fertility between the two countries during an economic recession in the countries in the 1990s. In Finland, the TFR was higher during the recession than in the years preceding it. Third-birth intensities increased alongside second-birth intensities, while first-birth intensities declined, a development that has been attributed to the home care allowance scheme, which allowed mothers to stay at home with their young children while not active on the labour market (Vikat 2002; Hoem 2005). Sweden, on the other hand, experienced an overall decrease in fertility. The poor labour market developments that made fewer people eligible for parental leave, combined with public cutbacks and a decline in the parental leave benefits during the downswing of the business cycle, have been associated with this decrease (Andersson 2000; Hoem and Hoem 1996).

The negative effects of changes in the economy are thus likely to be filtered through the institutional settings of a country as economic factors interact with the underlying mechanisms of the welfare policies; "institutional factors and policies intervene at every step in the link between economic downturn and fertility behavior" (Sobotka et al. 2011, p. 293). Such interaction might result in more 'negative' or more 'positive' outcomes of childbearing

behaviour, and have more effects on some groups of the population than others. Governmental support – such as parental leave and unemployment benefits – can reduce the negative effects of economic recessions on fertility, depending on how they are designed. However, a reduction in social benefits resulting from governmental retrenchment during recessions, such as in the parental leave benefits, may on the other hand discourage reproductive behaviour (e.g. Hoem and Hoem 1996; Andersson 1999; Sobotka et al. 2011).

2.4. Reforms in the Icelandic Parental Leave Scheme

In the year 2000, legislation from 1981 on a universal right for all mothers to paid parental leave was revised and a new Act was passed, fundamentally transforming the parental leave scheme in Iceland (Eydal and Gíslason 2008b). The new legislation was explicitly aimed at enabling mothers as well as fathers to be active participants in childrearing and offering them equal opportunities to coordinate family and working life (Eydal and Gíslason 2008a). The purpose of the legislation was not pro-natalist, or simply to compensate parents economically after childbirth and facilitate a balance between family and work – but rather to promote gender equality. The reforms to the legislation were met with almost universal acceptance both in Parliament and in society (Eydal and Gíslason 2008a).

The main points of the legislation were that parental leave was extended in steps from six to nine months – with the father's entitlements gradually increased over a period of three years through the addition of one month per year during 2001-2003. At the end of the implementation period, mothers and fathers were entitled to an individual right of three months' leave each after childbirth, in addition to three months of joint entitlement (Eydal and Gíslason 2008a). Parents had up to 18 months from the childbirth to utilize the leave, and both could be on leave at the same time if they so wished. The benefits available to parents active on the labour market were 80% of their pre-birth average salaries, and initially there was no ceiling on these benefits. In 2004, however, a ceiling was introduced at 480,000 ISK (ca. 2,800 EUR) per month before income tax, but this ceiling was gradually raised over the following years. A birth grant, a considerably lower amount, was paid to those not active on the labour market (as defined by the Act) and to students. Parents could not be fired during the leave (unless under specific circumstances), and maintained all occupational rights while on leave (Eydal and Gíslason 2008b).

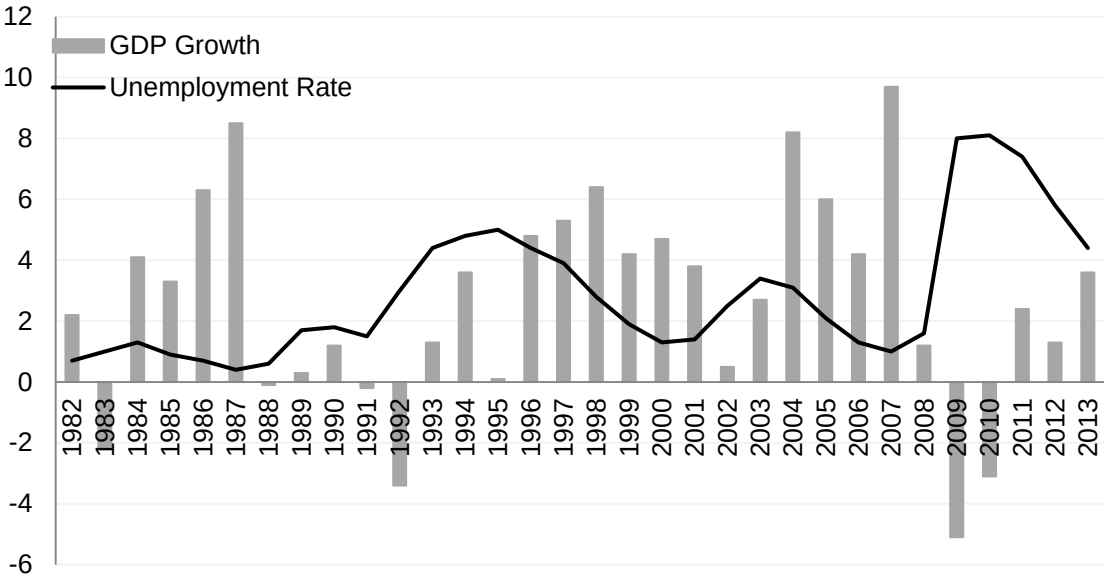
With the Act, Iceland not only adhered to the Swedish model and tied as large a part of the leave to the father as to the mother (inalienable individual right of either parent), but the legislation allotted one third of the leave to the father (e.g. Moss and O'Brien 2006; Gíslason 2007; Eydal and Gíslason 2008b). The entitlements to fathers were seen as an increase in the parental leave benefits, as the mother's entitlements were not affected by the reform. Already in the first year of implementation, 2001, 82% of fathers used either part of their leave or their full quota. The proportion of fathers who took leave increased from one year to the next, and in 2004 90% of fathers took advantage of their right to paid parental leave, and with a longer duration than before (Gíslason 2007). Fathers have occupied a relatively large portion of parental leave days; they used 29% of the total days in 2013, the highest in the world to my knowledge, but this was still a decrease from 2008, when they used 34% of all leave days (Nordic Statistics 2016). However, this is a vast increase since the year 2000, when fathers took only 3% of the leave, which at that time was the lowest in the Nordic countries (Nordic Statistics 2016); Table 1 contains year-by-year information on fathers' use of parental leave.

The high proportion of days used by fathers after the reform may thus be interpreted as an indication of parents wanting to use the extension in leave length that would otherwise be lost (Eydal and Gíslason 2008b). Hence, the equal sharing became real and not merely nominal. Furthermore, a lag in developing extensive rights to parental leave benefits for both parents in Iceland, compared to the other Nordics, has been interpreted as "one of the key explanations to why Iceland could enforce equal independent rights of mothers and fathers to paid parental leave" (Eydal and Gíslason 2008b, p. 35).

2.5. The Economic Crises in Iceland

Iceland has somewhat of a 'roller-coaster' economy, with financial recessions occurring an average of every 15 years (Einarsson et al. 2015). However, the economic crisis that hit in 2008 far exceeded its predecessors in terms of magnitude and complexity.

Figure 2. Unemployment and GDP growth in Iceland 1982-2013



Source: Statistics Iceland 2015b and Directorate of Labour 2015

Prior to the crisis the country had seen over a decade of nearly constant upswing in its economy, as indicated by the GDP growth as well as the low unemployment rates (Figure 2). The years between 2004 and 2007 were some of the most prosperous during the period of interest. The onset of the economic crisis in late 2008 was thus even more dramatic than would otherwise have been the case; it was without precedent in Iceland, and was even impressive from an international perspective. The exchange rate of the ISK fell by 50%, resulting in a massive decrease in the general public's purchasing power. At the same time, roughly 90% of the country's financial system collapsed. The GDP contracted by 12%, domestic demand decreased by 30%, and the number of reported households claiming it was hard to make ends meet financially almost doubled between 2007 and 2011, from 28% to 51%. The portion of households in arrears with mortgage or rent grew from 5% in 2008 to 10% in 2011 (Statistics Iceland 2016; Einarsson et al. 2015). Between September 2008 and April 2009 unemployment increased by almost eight percentage points, from 1.3% to 9.1% (Directorate of Labour 2015). Such an increase in the unemployment rate is unprecedented in Iceland, and an unemployment rate of roughly 8% on an annual basis is by far the highest recorded in modern Icelandic history.

During the recession, financial changes were also made to the parental leave scheme and benefits were cut. During 2008 the benefit ceiling was lowered from 535,700 ISK to 400,000 ISK before income tax (ca. 3,100 and 2,300 EUR, respectively). Mid-year 2009 the ceiling

was set at 350,000 ISK (ca. 2,020 EUR), and in December 2009 it was scaled down even further and reached its bottom at 300,000 ISK (ca. 1,730 EUR) (Eydal and Gíslason 2014). In order to put these amounts in perspective, the gross average total monthly salaries in Iceland in 2009 were 391,000-423,000 ISK[2] (ca. 2,260-2,450 EUR[3]) (Statistical Series 2010:6).

Combined with a drop in income and increased insecurity on the labour market in general, the decrements in benefits seem to have had negative effects on fathers' use of parental leave. In Table 1 we can see that the absolute number of parental leave days occupied by fathers fell by more than 20% between 2008 and 2013 – from 102 to 80 days. Mothers, on the other hand, still occupied the same levels of parental leave days in 2013 as in 2008.

Table 1. Average number of parental leave days in Iceland 2005-2013 by parent

Year	Fathers	Mothers
2005	101	187
2006	100	185
2007	100	181
2008	102	178
2009	99	178
2010	92	179
2011	88	179
2012	84	179
2013	80	181

Source: Guðjónsdóttir 2015.

2.6. Expectations

The parental leave reform secured more rights for parents, increased financial support, and gave longer leave times. At the same time, fathers began to use as much as around a third of the leave. Based on arguments in the literature, we can expect to find signs of increases in the second-birth rate – particularly in the years after the parental leave reform was implemented. Studies from the other Nordics suggest that parental leave is likely to have an impact on continued childbearing, as well as being associated with shorter intervals between first and second births, in Sweden (e.g. Hoem 1993; Andersson 1999; Duvander and Andersson 2006). During the first months of the economic crisis, unemployment rose with unprecedented force. Alongside decrements in the parental leave benefits during the crisis, an overall loss of income and the uncertainty following a recession of this magnitude, we can expect to find a

[2] The amount depends on the definition of the term 'total average salaries'.
[3] We used the 2009 average exchange rate between ISK and EUR in our calculations.

decrease in the birth rates. Nevertheless, we should not expect the crisis to have had homogenous influence on all three birth orders under study. While first-birth intensities have commonly been found to decrease during recessions in the Nordic countries, continued childbearing seems less affected, although the magnitude of the effects may depend on actual birth order and the country of concern. Thus, we expect to see more changes in the first-birth intensities than in the second, due to the strong norm of having at least two children in Iceland, while the influence on third-birth intensities is less clear-cut.

3. Data and Method

Official longitudinal register data from the Icelandic National Registry are used in the analyses. Every person born and/or residing in Iceland is given a personal identification number, and through this number it is possible to link data from different administrative registers. Hence, we have access to the full childbearing history of the total female population born in Iceland between 1953 and 1997, and where appropriate, the birth order and sex of every child born to these women, as well as their complete migration history and time of any death with monthly precision.

By the means of event history analysis, we estimate the relative risks of giving birth derived from piecewise constant exponential models. The risk of giving birth in any given year is presented relative to the risk in the year 2000, unless otherwise specified, and is standardized for age and, when appropriate, duration since previous birth. The risk is dependent on both the time under exposure and number of births. In later sections the risk is interchangeably referred to as hazard, birth intensity, standardized birth rate, or propensity to give birth. We follow women between 1998 and 2013, and in the analysis of first-birth intensities, women become exposed at age 15 and stay exposed until they give birth, and are censored or reach the end of the study period on December 31st 2013, whichever comes first. For second- and third-birth intensities, the ‘exposure clock’ starts running at the time of previous birth and stops when women give birth the second/third time, when they are censored, or at the end of the study period as before. When analysing first-birth intensities, women are pre-censored if they gave birth before 1998, before turning 15, or on the grounds of international migration if they did not return before their 15th birthday. With regard to second and third births, mothers are pre-censored if they had multiple births the first/second time, gave birth to a second/third child before 1998, emigrated before having their first/second child, or if they gave birth to their

first/second child after age 46. In all the parity-specific analyses, women are right-censored at time of death or emigration, or when they turn 46.

3.1. Models

For first births, age is the basic time variable, included as 31 categories ranging between 15 and 45, and the basic time unit is woman-months. For second births, age is a time-varying covariate and is included as 12 groups: 18 years or younger; ages 19-24, categorized into two three-year groups; ages 25-40, categorized into eight two-year groups; and ages 41-45, categorized into one group. Duration since last birth is the basic time variable, measured in months, and is included as nine groups: the first six years, given in single year groups; duration 73-96 months, categorized into one group; duration 97-120 months, categorized into one group; and 121 months or more, categorized into one group. For third births, the time-varying covariate age is included in 12 groups: 20 years old or younger; ages 21-26, categorized into two three-year groups; ages 27-42, categorized into eight two-year groups; and ages 43-45, categorized into one group. The variable 'duration' is included in the same nine groups as for second births, but with regard to the age of the second-born instead of the first-born. Calendar year is a time-varying covariate in all three models, included as 16 categories, one for each calendar year between 1998 and 2013. Background statistics and the full models' estimates are available in Appendix, Table A1.

4. Results

We begin our presentation with a broad overview of the birth intensities in four sub-periods during 1998-2013: 1) 1998-2000, the years before the new parental leave legislation was implemented; 2) 2001-2003, during which time the parental leave reforms came into effect; 3) 2004-2009, a six-year period following the years of implementation and ending before the potential effects of the economic crisis materialized; and 4) 2010-2013, the recession years. In January 2009, the unemployment rate exceeded 5.0% for the first time during the period. Hence, if we allow nine months of pregnancy to pass before we expect a potential change in fertility as a result of the crisis, 2010 marks the first year of crisis in our fertility study.

Table 2. Relative risks of first, second and third births in Iceland 1998-2013. Standardized for age of woman and (where applicable) age of youngest child. Rates are relative to each of the specific birth order's intensities in 1998-2000.

Period	First Births	Second Births	Third Births
1998-2000	1	1	1
2001-2003	0.91	0.98	0.94
2004-2009	0.87	1.13	1.11
2010-2013	0.75	1.14	1.26

Source: Icelandic register data, author's calculations

Three things stand out in Table 2. First, all three parity-specific birth intensities declined during the implementation period. Second, we detect a notable increase in the second and third-birth intensities after the parental leave reform was implemented in full, but a small and ongoing decline in the first-birth intensities over the entire period. Third, the second-birth intensities were basically the same after the economic shock as they were in the sub-period leading up to it, while the propensity to have a third child increased. The first-birth intensities continued to fall, but with more force than before.

Based on this, there are indications that the economic crisis may have had a negative influence on the already declining propensity to become a mother. When it comes to second and third births, the force of fertility increased after the parental leave reform and rose even more during the recession. At this stage, we could infer that parental leave, perhaps in combination with certain elements brought forth by the economic crisis, had positive effects on continued childbearing, especially when it comes to third births. In order to enhance our understanding of the development, it is imperative to look at birth intensities by age of the previously born child and investigate the extent to which the findings relate to changes in tempo between calendar-year periods.

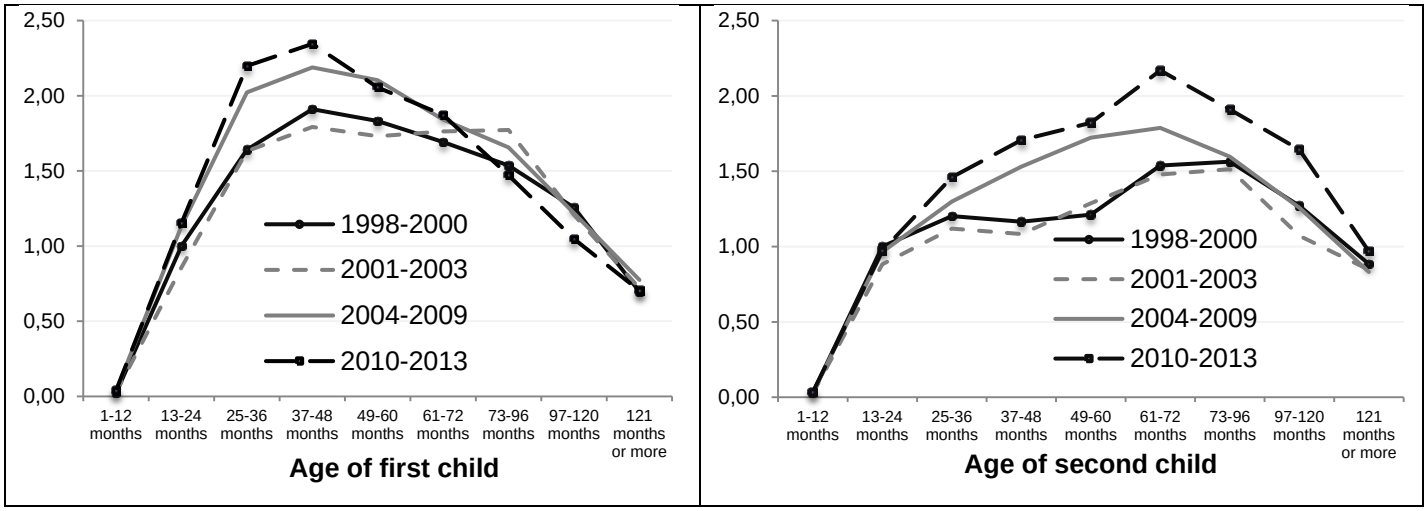
4.1. Second- and Third-Birth Rates by Age of Last Born

When we compare similar groups with respect to the mother's age over time, it is evident that the birth spacing patterns between the first and the second child changed after the implementation of the reform of the parental leave (diagram on the left in Figure 3). With regard to the birth risks over duration since first birth, the interval between the first and the second child was smaller after the implementation of the reform than before or during it,

indicating a change in tempo. The new birth spacing patterns do not seem to have vanished during the economic crisis but rather to have been reinforced.

We can see changes over time in birth spacing between the second and third births as well, but these changes are more extensive and also relate to the levels of fertility (graph on the right in Figure 3). The relative third-birth rate increased during the first two to eight years from the birth of the second child after the implementation of the parental leave reform, and throughout the period in the years after 2010. Hence, we see strong indications of a change in tempo and also clear indications of changes in levels in the third-birth rate when we adjust for compositional changes in age during the calendar periods.

Figure 3. Second- and third-birth rates in Iceland 1998-2013 by age of previous child. Standardized for age of mother. Rates are relative to 13-24-month-olds in 1998-2000.



Source: Icelandic register data, author's calculations

When it comes to both parities, the hazard is lowest during the implementation of the reform (2001-2003). The difference between 1998-2000 and 2001-2003 is only minor; the risk is generally somewhat lower during the latter than the former period, but the rates are still highly similar. In contrast, subsequent patterns are very different. This can be taken as a strong indication that the parental leave reform is, at least in part, responsible for the new patterns.

It is worth noting that the second-birth intensities are highest when the previously born child is in its fourth year, and the third-birth intensities are highest after the second child turns five. We can also see that the birth intensities are relatively low during the first 24 months from

previous birth. Apart from other considerations, the timing of the peak in the hazards could partly be linked to the time it takes parents to accumulate full parental leave benefits; having less than two years apart between births would entail an increased reduction in income. As the benefits are calculated based on previous earnings, prior parental leave would negatively affect the parental leave benefits for the next child. This is related to the modus operandi when it comes to calculating the amount defrayed in benefits[4] (see Gíslason 2007 for a detailed overview).

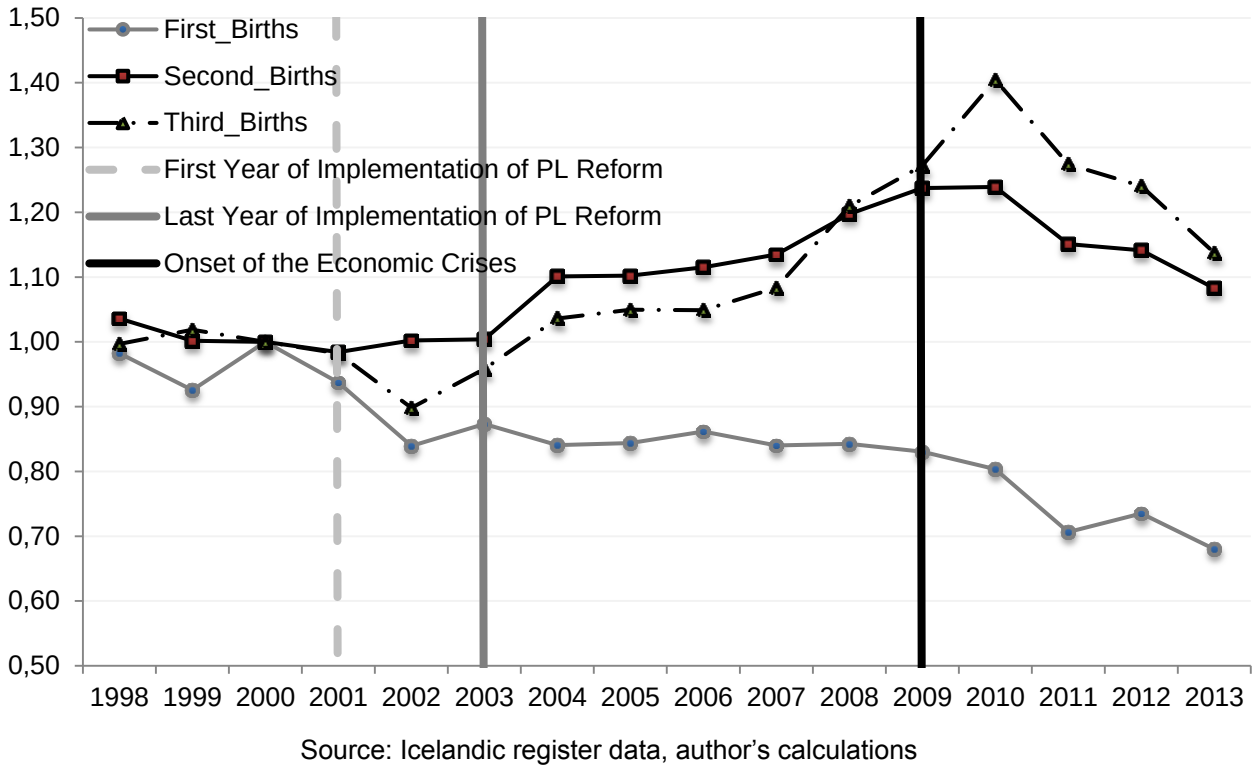
4.2. Annual Indices of First, Second and Third Births

Figure 4 features the standardized annual indices of first-, second- and third-birth rates between 1998 and 2013. These annual indices allow us to estimate changes in the force of fertility from one year to the next, and thus make it possible to detect period changes in childbearing behaviour with more precision than what we have produced so far. The rates are derived from three parity-specific birth models. The relative risks are comparable within each specific birth order, but offer no information on the absolute differences between the propensity to give birth to a first, second and third child. The indices are presented relative to those of the year 2000, and are standardized for the age of the mother and the duration since the previous birth (applicable to the second and the third child) over the calendar year. Hence, we are comparing similar demographic groups of women over time.

Albeit with some random variation from one year to the next, the first-birth intensities declined between 1998 and 2002, when they were 84% of what they had been in 2000. After this, a period of stability took over. Almost nothing happened in the first-birth rate between 2004 and 2009; in 2009 the propensity to become a mother was 17% lower than in 2000, compared to 16% lower in 2004. However, in 2010 the birth intensities again began to decline, and in 2013 they were 32% lower than in 2000 and 18% lower than in 2009.

[4] The time period on which the benefits' calculations are based has changed over time. For a more detailed overview see, e.g., Gíslason 2007; Eydal and Gíslason 2008b; Eydal and Gíslason 2014.

Figure 4. Relative risk of first, second and third births in Iceland 1998-2013. Standardized for age of woman and age of youngest child. Rates are relative to birth rates in 2000 for each birth order (separate models).



The developments over time in the second- and the third-birth rates follow almost a uniform trend, and we observe much deeper waves than in the first-birth rate (Figure 4). The second-birth rate starts rising in 2004, after a relatively stable period of six years. The upward trend continues for six years with a similar intensification, before coming to a halt in 2010, when the propensity to have a second child was 24% higher than in 2000. The third-birth rate shows a similar pattern but the elevation in the rate takes off a year earlier, in 2003. Compared to the year 2000, the propensity to have a third child was almost 40% stronger in 2010, after continuous intensification from 2002 onward. The rise in both rates conforms to the timing of the reform, and they continue to climb until 2010. In 2011 the second and third-birth rates begin to decline, and continue to do so until the end of the study period in 2013, when the rates are 8 and 14% higher than in 2000, respectively, but 13 and 19% lower than in 2010.

5. Discussion

Our findings indicate that the parental leave legislation seems to be associated with an increase in both the second- and the third-birth intensities. The timing of the escalation in the rates coincides with the implementation of the reform. After the legislation was implemented in full in 2003, the pace of continued childbearing increased and the propensity to have a second and a third child intensified constantly from one year to the next until 2010. With some good will, one can see indications of changes in the development of the first-birth rate as well. The birth intensities were quite stable during 2004 and 2009, after a declining trend before this, and did not decrease again until after the crisis hit. The economic incentives in the form of income-related benefits, and the three extra months of parental leave offered to parents after the reform, lend support to the proposed association and leave the reform as a major culprit. Furthermore, decreases in the third-birth intensities during 2002 and 2003, as compared to earlier years, as well as the stability in the second-birth intensities until 2004, also add validity to the proposed association. The trend during 2001 and 2003 indicates that some parents may have postponed childbearing until their right to full benefits came into effect.

From a theoretical point of view, the findings suggest that the reform may have acted as a facilitator in making the social and family-oriented institutions more reconcilable with the prevailing gender roles and women's opportunities. After the reform's implementation, around a third of the total leave days were used by fathers, as compared to just 3% in 2000. Hence, the reform succeeded in increasing fathers' participation in early childrearing, and likely led to higher levels of gender equality in the family-oriented institutions. At the same time, fertility increased. However, the reform can better be regarded as a consequence of changes in egalitarian norms, rather than the cause of them, given that the changes were met with almost universal acceptance in society when they were introduced. Attached to the legislation were hopes, both in the political arena and among the public, that it would increase gender equality and even reduce the gender wage gap (Eydal and Gíslason 2008a; Gíslason 2007). Nevertheless, it appears that the reform strengthened the already developing norms of increased gender equality.

During the crisis, parental leave benefits were cut in steps, and in 2010 the benefit ceiling was 43% lower than it had been in 2008. A turnaround in all the parity-specific birth rates is

evident in 2011. With regard to the timing of the change in the parity-specific childbearing trends, allowing for the subtraction of nine months of pregnancy, it is hard to ignore the possible effects of these decrements on the turnaround. We also observe that the average number of parental leave days used by fathers began to decrease around the same time: fathers used 20% fewer days in 2013 than in 2008. This could be related to 'breadwinner sensitivity', a reaction to economic hardship triggered by the crisis, and an indication that more couples decided to postpone or discontinue their childbearing, as parents, and especially fathers, could not afford the cut in income the use of leave would entail. This may suggest that the monetary part of the benefits is no less important than the quota given to fathers in terms of benefit days, and that the former influences the number of days fathers will exploit (see e.g. Eydal and Gíslason 2014 for discussion). Furthermore, this could be seen as an intimation that policies that exclusively go in the direction of practical parenting (of fathers) but neglect the part of economic parenting may prove to be insufficient.

We should keep in mind that, even though the timeline of events corresponds fairly well to changes in the birth rates, we cannot with certainty distinguish between the influence the two interventions of interest had on fertility and other potential influences of the economy – or any other unobserved determinants, for that matter. Almost parallel to the parental leave reform there was an upswing in the economy, which cannot be disregarded as a possible additional influence. As an example, the TFR in the other Nordics rose at the same time, and most of Europe experienced increased fertility during this period of economic upswing. It has been proposed that the positive economic situation and the family policies worked together in elevating the TFR in Sweden in the 1980s (Hoem 2005), and the findings here suggest that a similar development may have taken place in Iceland.

Similar to the development in fathers' parental leave use after the economic crisis hit in 2008, which is characterized by a gradual decrease rather than a sharp decline, the birth intensities do not seem to have responded to the crisis right away. It is not until 2011, three years into the crisis, that a new trend emerges which replaces the continuous and steady increase in the second- and third-birth intensities that was evident for almost a decade before that. All the parity-specific birth rates drop around the same time, and continue to do so until the end of the study period in 2013. We cannot with full conviction explain why the turnaround occurred when it did, i.e. in 2011 but not in, for instance, 2010 or 2012. It may be that the social policies, including the parental leave scheme and unemployment benefits, contributed to the

lag between the onset of the crisis and the decrease in the birth intensities, in line with the argument presented above. The unemployment benefits are based on previous earnings and the parental leave benefits were, at least partially, based on pre-crisis earnings at the time, and may thus also have acted as an incentive for people to initially speed up their childbearing in times of economic hardship and bleaker career prospects. However, the decision to have a child is hardly equivalent to the decision to, say, buy a car. The downward trend is likely to be a consequence of a slower and more laborious process. Hence, we cannot claim an unconditional relationship between any specific elements of the recession and the trend of falling birth rates, especially if we consider the similarities in fertility developments in the other Nordics from 2010 onward (Figure 1). The recession was much less severe in Scandinavia, and seems to have hardly had any consequences in Norway. Nevertheless, the total fertility rates in the other Nordic countries declined in parallel to the total fertility rate in Iceland. It would be simplistic not to take into account this broader picture. During the recession a process may have started, characterized by a rise in unemployment (2009), or in more general terms, increased financial insecurity and sceptical views about the future; a period of time to react to the changes (2010); and, finally, nine months of pregnancy (2011).

Given the severity of the crisis, it is interesting to observe that the fertility decline was not more drastic. Moreover, there are indications that the long-term effects of the crisis were of a different nature than the short-term effects, and some of the potential effects may still be evolving. In fact, the second- and third-birth intensities were the strongest in the first years of the crisis (2009-2010). While this could simply be a reasonable continuation of the previous trend, we also observed that the propensity to have a second and a third child was higher in 2012 than it had been in 2007. Regardless, our findings demonstrate that during the crisis the trend reversed and, according to official statistics, the total fertility rate continued to decrease in 2014. In 2015, it fell below 1.9 for the first time in history (Statistics Iceland 2016). This is happening regardless of all the economic indicators turning from red to green. Thus, it seems that a process that started during the recession has not come to a halt. Further, new parental leave legislation is underway, which, presumably, will increase both the benefits and the leave length. It will be interesting to see whether the reform and the now improving economic situation will be successful in turning the fertility decline around. The Icelandic case thus remains an interesting one to explore for the foreseeable future.

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Appendix

Table A1. Background Statistics: Distribution of live births and exposure time under risk by variable and birth order

Age	First Birth			Second Birth			Third Birth		
	Live births	Woman-months	%	Live births	Woman-months	%	Live births	Woman-months	%
15	19	337,457	7.9%	0	149	0.0%	0	0	0.0%
16	129	377,482	8.8%	0	846	0.1%	0	20	0.0%
17	364	373,444	8.7%	3	3,511	0.2%	0	43	0.0%
18	700	365,295	8.5%	27	10,170	0.7%	1	187	0.0%
19	1,018	350,670	8.2%	75	20,733	1.4%	0	815	0.0%
20	1,356	324,698	7.6%	203	34,374	2.3%	8	2,389	0.1%
21	1,430	293,367	6.9%	340	48,562	3.2%	28	5,685	0.3%
22	1,538	264,675	6.2%	544	61,550	4.1%	47	10,720	0.6%
23	1,629	233,940	5.5%	763	72,985	4.9%	94	18,318	1.0%
24	1,687	203,144	4.7%	857	82,923	5.5%	154	26,734	1.4%
25	1,717	173,784	4.1%	1,049	92,522	6.2%	237	36,781	1.9%
26	1,639	146,843	3.4%	1,288	98,893	6.6%	319	47,806	2.5%
27	1,459	122,588	2.9%	1,480	99,569	6.7%	423	60,927	3.2%
28	1,277	101,721	2.4%	1,588	96,954	6.5%	565	73,345	3.8%
29	972	84,445	2.0%	1,596	89,879	6.0%	686	84,901	4.4%
30	822	70,190	1.6%	1,440	81,138	5.4%	733	93,753	4.9%
31	588	58,327	1.4%	1,340	71,348	4.8%	876	100,814	5.3%
32	491	50,086	1.2%	1,134	61,944	4.1%	847	105,644	5.5%
33	365	43,505	1.0%	935	53,957	3.6%	910	107,233	5.6%
34	291	38,257	0.9%	700	47,445	3.2%	894	105,718	5.5%
35	248	33,907	0.8%	551	42,453	2.8%	821	102,508	5.3%
36	207	30,125	0.7%	415	39,474	2.6%	657	100,078	5.2%
37	138	27,417	0.6%	336	36,847	2.5%	510	97,646	5.1%
38	114	25,510	0.6%	274	34,259	2.3%	378	95,145	5.0%
39	106	23,731	0.6%	175	32,501	2.2%	290	94,212	4.9%
40	57	22,370	0.5%	122	31,621	2.1%	171	92,650	4.8%
41	53	21,386	0.5%	94	30,583	2.0%	119	91,796	4.8%
42	31	20,619	0.5%	52	29,943	2.0%	53	91,484	4.8%
43	13	20,129	0.5%	33	29,636	2.0%	59	91,319	4.8%
44	9	19,779	0.5%	10	29,458	2.0%	18	90,116	4.7%
45	15	19,459	0.5%	12	29,081	1.9%	16	89,252	4.7%

Calendar year	First Birth			Second Birth			Third Birth		
	Live births	Woman-months	%	Live births	Woman-months	%	Live births	Woman-months	%
1998	1,378	254,366	5.9%	1,150	102,703	6.9%	634	125,087	6.5%
1999	1,317	256,139	6.0%	1,097	101,731	6.8%	638	125,029	6.5%
2000	1,444	256,440	6.0%	1,097	101,682	6.8%	617	124,696	6.5%
2001	1,361	255,770	6.0%	1,078	102,197	6.8%	596	123,805	6.5%
2002	1,230	255,745	6.0%	1,100	100,700	6.7%	537	123,277	6.4%
2003	1,291	257,790	6.0%	1,090	98,448	6.6%	568	123,015	6.4%
2004	1,249	260,688	6.1%	1,165	96,869	6.5%	606	122,995	6.4%
2005	1,265	265,642	6.2%	1,132	94,469	6.3%	605	122,497	6.4%
2006	1,307	269,891	6.3%	1,113	92,904	6.2%	596	121,828	6.4%
2007	1,284	272,381	6.4%	1,100	91,424	6.1%	605	121,285	6.3%
2008	1,305	276,342	6.5%	1,126	89,356	6.0%	662	120,579	6.3%
2009	1,298	278,858	6.5%	1,138	88,063	5.9%	682	118,593	6.2%
2010	1,268	279,799	6.5%	1,104	86,150	5.8%	732	115,908	6.0%
2011	1,130	280,634	6.6%	1,015	84,711	5.7%	648	112,376	5.9%
2012	1,206	283,273	6.6%	998	82,404	5.5%	625	109,852	5.7%
2013	1,149	274,592	6.4%	933	81,497	5.5%	563	107,217	5.6%

Age of youngest child	First Birth			Second Birth			Third Birth		
	Live births	Woman-months	%	Live births	Woman-months	%	Live births	Woman-months	%
1-12 mo~s	N/A	N/A	N/A	70	240,018	16.1%	43	208,454	10.9
13-24 m~s	N/A	N/A	N/A	2,322	225,885	15.1%	1,298	200,010	10.4
25-36 m~s	N/A	N/A	N/A	3,560	186,796	12.5%	1,498	179,203	9.3
37-48 m~s	N/A	N/A	N/A	3,072	145,205	9.7%	1,396	159,527	8.3
49-60 m~s	N/A	N/A	N/A	2,256	111,867	7.5%	1,281	141,805	7.4
61-72 m~s	N/A	N/A	N/A	1,666	88,686	5.9%	1,192	126,067	6.6
73-96 m~s	N/A	N/A	N/A	2,159	126,824	8.5%	1,604	210,381	11.0
97-120 ~s	N/A	N/A	N/A	1,075	88,280	5.9%	825	173,628	9.1
121 mon~e	N/A	N/A	N/A	1,256	281,747	18.8%	777	518,964	27.1

Parity, total number of	Subjects	Live births	Woman-months
0	50,873	20,482	4,278,350
1	28,638	17,436	1,495,308
2	27,799	9,914	1,918,039

Table A2. Results from Main Effects Models

	First Birth			Second Birth			Third Birth	
	Hazard Ratio	P>z		Hazard Ratio	P>z		Hazard Ratio	P>z
Age			Age group			Age group		
15	0.01	0.000	15-18	0.42	0.000	16-20	1.04	0.913
16	0.08	0.000	19-21	0.57	0.000	21-23	1.10	0.275
17	0.23	0.000	22-24	0.70	0.000	24-26	0.99	0.842
18	0.46	0.000	25-26	0.80	0.000	27-28	1	---
19	0.69	0.000	27-28	1.00	---	29-30	0.98	0.624
20	1	---	29-30	1.13	0.000	31-32	0.94	0.153
21	1.17	0.000	31-32	1.20	0.000	33-34	0.90	0.008
22	1.39	0.000	33-34	1.10	0.002	35-36	0.76	0.000
23	1.67	0.000	35-36	0.87	0.000	37-38	0.49	0.000
24	1.99	0.000	37-38	0.68	0.000	39-40	0.28	0.000
25	2.36	0.000	39-40	0.40	0.000	41-42	0.11	0.000
26	2.67	0.000	41-45	0.13	0.000	43-45	0.04	0.000
27	2.84	0.000						
28	3.00	0.000						
29	2.76	0.000	Duration			Duration		
30	2.81	0.000	1-12 months	0.03	0.000	1-12 months	0.03	0.000
31	2.42	0.000	13-24 months	1	---	13-24 months	1	---
32	2.35	0.000	25-36 months	1.81	0.000	25-36 months	1.34	0.000
33	2.01	0.000	37-48 months	1.98	0.000	37-48 months	1.48	0.000
34	1.82	0.000	49-60 months	1.86	0.000	49-60 months	1.63	0.000
35	1.75	0.000	61-72 months	1.71	0.000	61-72 months	1.85	0.000
36	1.64	0.000	73-96 months	1.54	0.000	73-96 months	1.73	0.000
37	1.20	0.037	97-120 months	1.13	0.002	97-120 months	1.37	0.000
38	1.07	0.500	+120 months	0.69	0.000	+120 months	0.92	0.122
39	1.07	0.525						
40	0.61	0.000						
41	0.59	0.000	Calendar year			Calendar year		
42	0.36	0.000	1998	1.04	0.402	1998	1.00	0.956
43	0.15	0.000	1999	1.00	0.967	1999	1.02	0.743
44	0.11	0.000	2000	1	---	2000	1	---
45	0.18	0.000	2001	0.98	0.711	2001	0.98	0.755
			2002	1.00	0.961	2002	0.90	0.069
			2003	1.00	0.929	2003	0.96	0.462
Calendar year			2004	1.10	0.022	2004	1.04	0.536
1998	0.98	0.639	2005	1.10	0.022	2005	1.05	0.397
1999	0.93	0.043	2006	1.12	0.010	2006	1.05	0.405
2000	1	---	2007	1.13	0.003	2007	1.08	0.161
2001	0.94	0.086	2008	1.20	0.000	2008	1.21	0.001
2002	0.84	0.000	2009	1.24	0.000	2009	1.27	0.000
2003	0.87	0.000	2010	1.24	0.000	2010	1.40	0.000
2004	0.84	0.000	2011	1.15	0.001	2011	1.27	0.000
2005	0.84	0.000	2012	1.14	0.003	2012	1.24	0.000
2006	0.86	0.000	2013	1.08	0.074	2013	1.14	0.027
2007	0.84	0.000						
2008	0.84	0.000						
2009	0.83	0.000						
2010	0.80	0.000						
2011	0.71	0.000						
2012	0.74	0.000						
2013	0.68	0.000						