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## **Abstract**

In Europe, there has been an increasing emphasis on equal rights of men and women to parental leave. Nordic countries such as Iceland are often seen as forerunners in the implementation of laws that promote gender equality by giving each parent non-transferable rights to parental leave. In October 2008, the Icelandic banking system collapsed and a severe economic recession followed. This can be seen as a natural experimental intervention and provides a unique opportunity to study potential changes in fathers' use of parental leave in response to drastic economic changes and resulting policy changes. Our data show that during the years 2003–2007, a time of economic prosperity, Icelandic fathers on average used three full months of parental leave. After this event, fathers' use of parental leave declined while the reverse could be seen for mothers who progressively took a longer leave with partial pay. Our analysis suggests that a decline in fathers' use of parental leave can be traced back to the dramatic collapse of the economic system and the subsequent substantial lowering of the maximum payment during parental leave. The most dramatic changes were seen for fathers in high income groups whose payments during parental leave were most severely cut. The data suggest that after the economic collapse and resulting policy changes, women have become increasingly responsible and men decreasingly responsible for childcare duties – an alarming trend from the standpoint of gender equality. Possible remedies and courses of action are discussed.

*Keywords:* parental leave; paternity leave; parental involvement; fathers; gender equality; gender issues; economic recession; family policy.

## Introduction

### *Parental leave policy changes*

During the 1970s and 1980s the Nordic countries took a leading role in promoting gender equality through changes in family policies. Mothers and fathers were increasingly encouraged to share the parental leave (Esping-Andersen, 2002; Gupta et al., 2008; Duvander et al., 2010; Ekberg et al. 2013; Eydal and Rostgaard, 2015). In the 1990s, fathers were given a non-transferable right to parental leave, or quota, in Norway, Sweden, and for a brief period in Denmark (Duvander et al., 2010; Rostgaard and Lausten, 2015). Such policy changes appear to have had several effects, including increased birth rates, increased time spent by fathers on household chores, and considerable increases in the involvement of fathers in the care of their children – even beyond the period of parental leave (Billari and Kohler, 2004; Eydal, 2008; Duvander et al., 2010; Arnalds et al., 2013; Nordenmark, 2015; Rønsen and Skrede, 2010; Yliännö, Pääkkönen and Hakovirta 2015).

Iceland is generally seen to belong to the Nordic welfare state model, with high levels of female employment, high levels of public services, and a general support for families (Esping-Andersen, 2002, Eydal and Rostgaard 2011; Eydal et al. 2015; Eydal and Ólafsson, 2016). Employment rates have been high in the Nordic countries and the difference in employment rates between men and women considerably lower than in other European countries (Nordic Council of Ministers, 2014). Both men and women in Iceland on average have long working hours although women in Iceland nonetheless work fewer hours on average compared to men (e.g. cohabiting/married women 25–34 years of age on average worked for 35–37 hours per week in the years 2006–2015 while cohabiting/married men of the same age on average worked for 44–49 hours per week; Statistics Iceland, 2016a).

Unadjusted wage gap estimates in Iceland range from 7–18% (Icelandic Ministry of Welfare, 2016).

Positive views towards female employment combined with generous family policies have been seen as an important cause for relatively high fertility levels in the Nordic countries (Andersson, 2000; Esping-Andersen, 2002). Furthermore, it has been shown that female earnings are generally positively related to childbearing in the Nordic countries whereas the opposite seems to hold true for other European countries (Andersson, 2000; Billari and Kohler, 2004).

From a Nordic comparative perspective, universal rights to parental leave were introduced relatively late in Iceland. In 1975, all working mothers in Iceland were entitled to three months of paid leave and by 1980 a proportion of this leave could be transferred to the father. During the late 1980s, parental leave was gradually extended to six months (Eydal 2005; Valdimarsdóttir, 2006; Eydal and Gíslason, 2008).

The Act on Maternity/Paternity Leave and Parental Leave (Act on Maternity/Paternity Leave and Parental Leave No. 95/2000) was a major progressive step toward gender equality both from a national and international perspective. According to this act, fathers in Iceland gained increased rights to parental leave in consecutive steps until they had gained full rights to parental leave in 2003, equal to those of mothers. An explicit goal of the law was to increase gender equality and to enable both parents to coordinate family life and working careers.

From this time on, each parent had a non-transferable right to three months of parental leave, as well as three months of leave that the parents could share in a way of their choosing. The original law warranted each parent on parental leave a payment consisting of 80% of his or her previous average total wages (including potential unemployment benefits), with the additional clause that the payment should always reach a particular low to moderate minimum

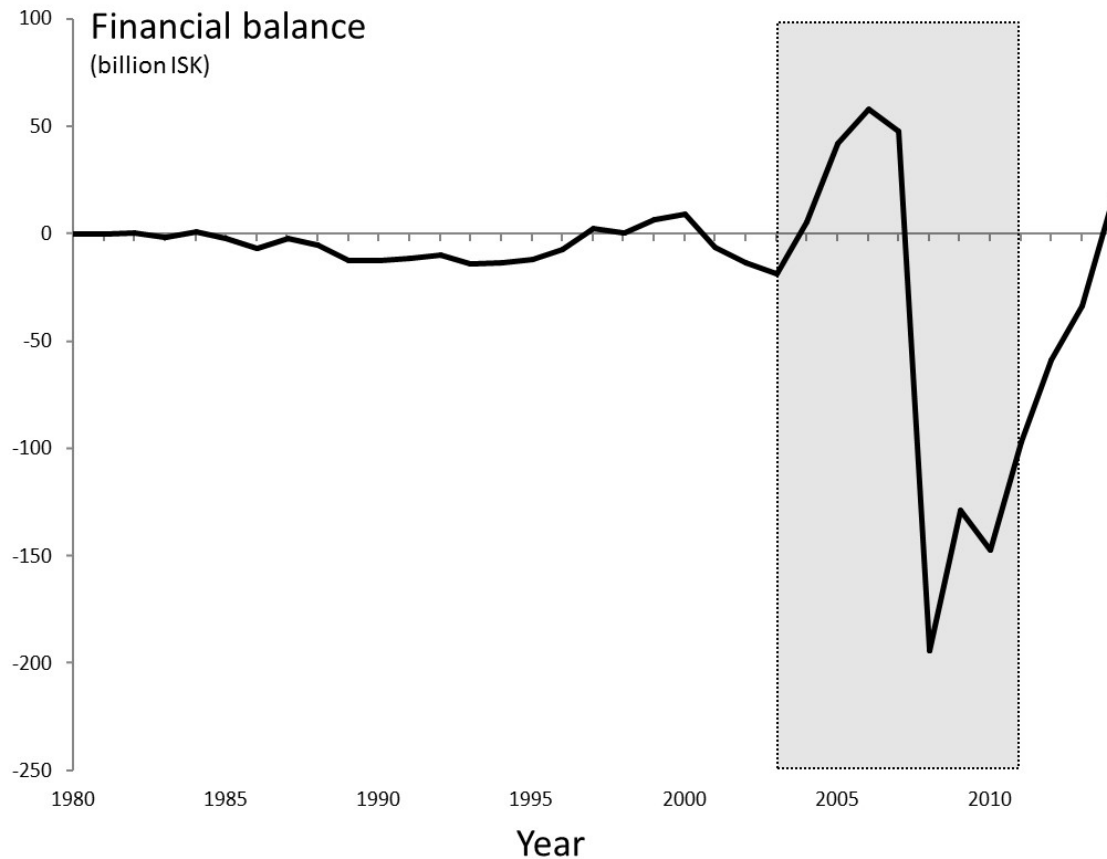
(Act on Maternity/Paternity Leave and Parental Leave No. 95/2000). Parents outside of the labor market (without unemployment benefits) as well as parents who only worked part-time (up to 25%) were also given rights to paid parental leave (a fixed, relatively low sum), as were parents who were students (a fixed, moderate sum). Parents could make arrangements to spread the payments over a longer period. Originally, parental leave was to be used some time in the first 18 months of a child's life. This was extended to 36 months for children born after 30 June 2009 (Act on Maternity/Paternity Leave No. 95/2000, Amendments No. 70/2009). A high maximum payment (480,000 ISK) was set effective January 1 2005 (Act on Maternity/Paternity Leave No. 95/2000, Amendments No. 129/2004). This maximum increased in the next three years (2006: 504,000 ISK; 2007: 518,600 ISK; 2008: 535,700 ISK). The maximum did not affect the payments of the large majority of parents who took parental leave (over 98% of mothers on parental leave, and from 97% of fathers on parental leave in 2005 to 92% of fathers on parental leave in 2008) (Directorate of Labor, 2010).

Some effects of changes in the legislation on parental leave in Iceland have been documented. Total fertility rate increased in the wake of the changes in the legislation of the late 1980s and again in the early 2000s (Garðarsdóttir, 2008). Shortly after the implementation of the Act on Maternity/Paternity Leave and Parental Leave in 2000, Icelandic fathers were using a higher proportion of the parental leave (i.e. the parental leave used in total by both parents) than their counterparts in the other Nordic countries (Eydal and Gíslason, 2008). Icelandic survey data indicated that the responsibility of childcare was more equally shared between mothers and fathers who had their first child in 2003 or 2009, after the full implementation of the Act on Maternity/Paternity Leave and Parental Leave, than it was for mothers and fathers who had their first child in 1997 before the implementation of this law (Eydal, 2008; Arnalds et al., 2013; Eydal and Gíslason, 2014). In line with international research on fathers' use of parental leave, Icelandic survey data indicated that fathers'

earnings had a positive impact on their parental leave (Sundström and Duvander, 2002; Gíslason, 2007; Eydal, 2008).

### *Economic prosperity and crisis*

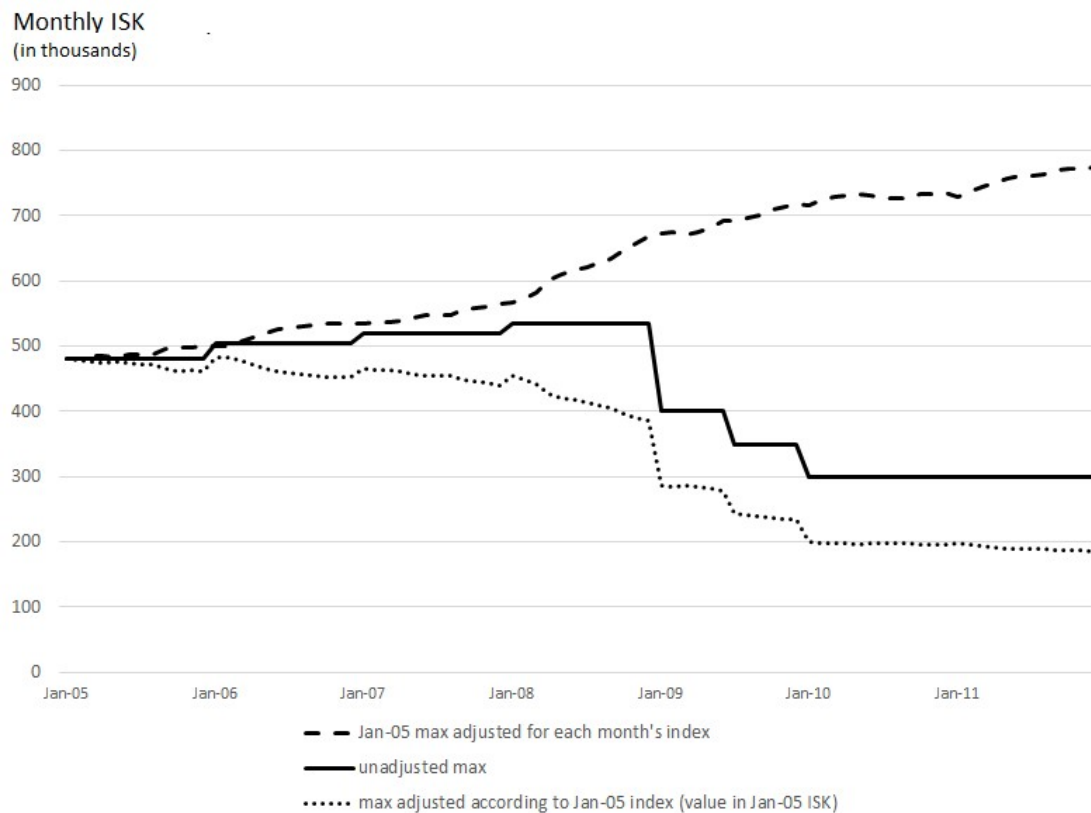
The first years after the full implementation of the parental leave reform (Act on Maternity/Paternity Leave and Parental Leave No. 95/2000) were marked by economic prosperity (Statistics Iceland, 2016b). Iceland then experienced a complete economic collapse in October 2008 when the three largest Icelandic banks defaulted and were put into receivership by the Icelandic government (Sigurjonsson, 2010). A severe economic recession followed. The central government assumed large debts. The Icelandic government reached an agreement with the International Monetary Fund (IMF) in October 2008 on a 2.1 billion U.S. dollar (USD) emergency loan (IMF Survey, 2008). The financial balance of the central government went from being unprecedently positive before the economic collapse to being unprecedently negative after the economic collapse (figure 1; Statistics Iceland 2016c). Furthermore, unemployment rates rose to higher levels than previously documented in Iceland (but were nonetheless not particularly high by international standards) and more than doubled between 2008 and 2009 (Statistics Iceland 2016d).



**Figure 1. The financial balance of the Icelandic central government in billions of Icelandic kronas (ISK) from 1980 to 2014.** A severe financial crisis started in October 2008 with the fall of Iceland's major banks. Our dataset on parental leave spans the years 2003 to 2011 (shaded areas). Source: Statistics Iceland, 2016c.

In the wake of the financial crisis, childcare benefits were frozen and their real value thus decreased, and most importantly for the current analysis, parental leave benefits were cut (Thorsdottir, 2013a and b). The maximum parental leave payment was lowered in three consecutive steps that took effect on 1 January 2009 (maximum payment 400,000 ISK), 1 July 2009 (maximum payment 350,000 ISK), and 1 January 2010 (maximum payment 300,000 ISK with an additional clause that parental leave payments should be 80% of previous wages up to 200,000 ISK and 75% of previous wages exceeding 200,000 ISK) (Act on Maternity/Paternity Leave No. 95/2000, Amendments No. 173/2008, No. 70/2009 and 120/2009) (see figure 2). The three steps, respectively, affected the maximum payments for an

estimated 7%, 14%, and 19% of mothers who took parental leave, and an estimated 26%, 36%, and 46% of fathers who took parental leave (Directorate of Labor, 2010, 32–33). Taking full parental leave severely decreased the disposable income of fathers in higher income groups.



**Figure 2. The development of the maximum payment during parental leave 2005–2011.** The unbroken line shows the monthly maximum payment in unadjusted Icelandic kronas (ISK). The dotted line shows this same maximum adjusted according to the consumer price index of January 2005 (i.e. its value in Jan-05 ISK). The dashed line shows the initial maximum payment as it was in Jan-05 adjusted for the consumer price index for each month (i.e. what the maximum should be at each time point in order to keep its initial value despite inflation). Source: Statistics Iceland, 2016e.

In most European countries, the recession brought about a halt in an upward trend in fertility and fertility levels stagnated or declined in 2010 and onwards, especially in countries such as Spain and Latvia that were harshly hit by the economic crisis (Sobotka, Skirbekk and Philipov, 2011). In spite of the deep recession in Iceland and the notable decline in the



maximum payment during parental leave, total fertility rate remained high through 2010 but declined thereafter despite a notable recovery of the economy after 2010 (Statistics Iceland, 2016f). However, according to an Icelandic survey of parents who had their first child in 2009, 14% of the parents who responded to the survey did believe that the economic crisis had had an impact on their childcare choices, and estimates from the Icelandic Maternity/Paternity Leave Fund (Fæðingarorlofssjóður) indicated a drop in fathers' use of parental leave (Directorate of Labor, 2010, 32–33; Eydal and Gíslason, 2014).

### *Current study*

The current study concerns the development of fathers' parental leave in Iceland in the years 2003–2011, a period of extreme economic fluctuations (figure 1). We primarily focus on the effects of the collapse of the Icelandic economy in 2008 and the subsequent lowering of the maximum payment during parental leave on the parental leave of fathers belonging to different income groups. This “natural experimental intervention” provides us with a unique opportunity to assess its potential impact on gender patterns in the use of parental leave.

We hypothesized that the economic recession would negatively impact fathers' use of parental leave due to the increased financial stress experienced by Icelandic families; furthermore, we expected the lowering of the maximum sum paid to parents during parental leave to most severely affect fathers in higher income groups because they would have to take a significant pay cut in order to go on parental leave. To answer these questions, we used data derived from databases on the entire Icelandic population.

## Data selection

Population data were gathered and combined from two sources: Statistics Iceland (Hagstofa Íslands, the centre for official statistics in Iceland) and the Icelandic Maternity/Paternity Leave Fund (Fæðingarorlofssjóður). Data on earnings and various demographic variables were extracted from registers administered by Statistics Iceland. Those were linked with information on payment during parental leave and with the duration of parental leave.

Duration of leave was measured in “full days” as well as “total days”. Any reference to “full days” in the following text indicates the number of maximally paid days of parental leave used by a parent, whereas “total days” indicates the total number of days of leave used, regardless of whether maximal or partial funds were received per day from the Icelandic Maternity/Paternity Leave Fund. For example, a father might decide to use his rights to use 90 days of maximally paid days of leave as well as the 90 days of maximally paid leave that could otherwise have been shared by him and his partner. In addition, the same father might decide to double the length of his parental leave, therefore only receiving half of the maximal payment per day. The father might e.g. be on parental leave for 300 days, return to work for 30 days, and go on parental leave again for another 60 days. The father would be said to use 180 full days of leave, but 360 total days of leave.

Data on full days of parental leave were available for the entire period. Data on total days of parental leave were available from 1 January 2007 and onward. Data on parental leave were concerning children born between 2003 and 2011 were fetched from the Icelandic Maternity/Paternity Leave Fund database in March 2015 and therefore includes information on parental leave used up until that time.

We included data concerning children born in Iceland where information on both the mother and the father was available in the National Registry (Þjóðskrá Íslands), where the

combined income of the mother and the father for the year before birth was above zero, and where the mother was assumed to be in a relationship with the father (registered as either cohabiting or married at the end of the birth year). Data on adopted children were excluded. Data were also excluded if a child's father only got a so-called student stipend from the Icelandic Maternity/Paternity Leave Fund, a fixed sum given to students regardless of their previous wages. The study therefore mainly focuses on families who were active in the labour market upon the birth of the child. The rationale for excluding single parents is our interest in the joint decision of couples in how they share responsibilities such as the taking of parental leave. This resulted in population data from a total of 28,997 children born between 2003 and 2011.

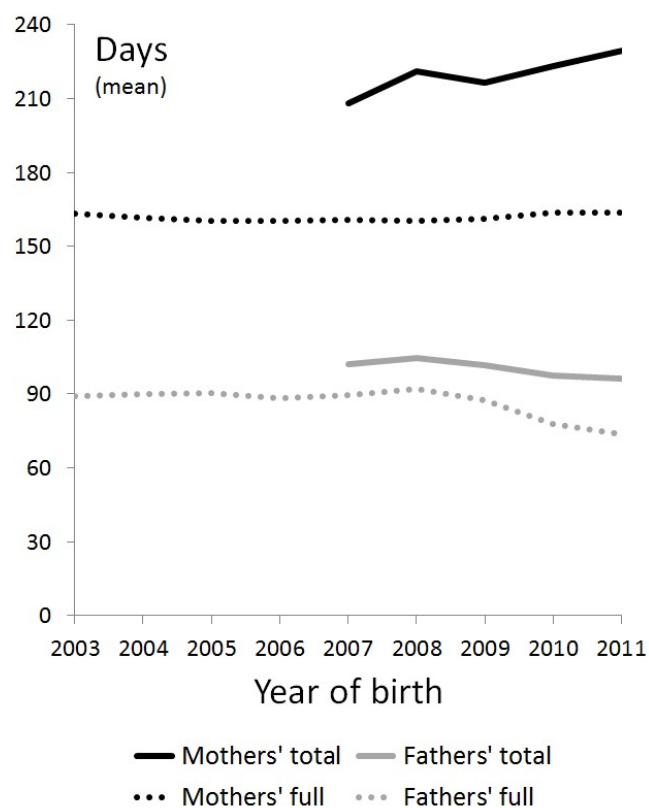
## **Analysis and results**

In this chapter, we will first look at the general development of the use of parental leave during our observation period (2003–2011). We will then further analyze the parental leave of fathers in different income groups. The ultimate goal of this analysis is to see to which extent the economic collapse and the subsequent lowering of the maximum payment for parental leave had a detrimental effect on fathers' parental leave.

### *Development of parental leave over time*

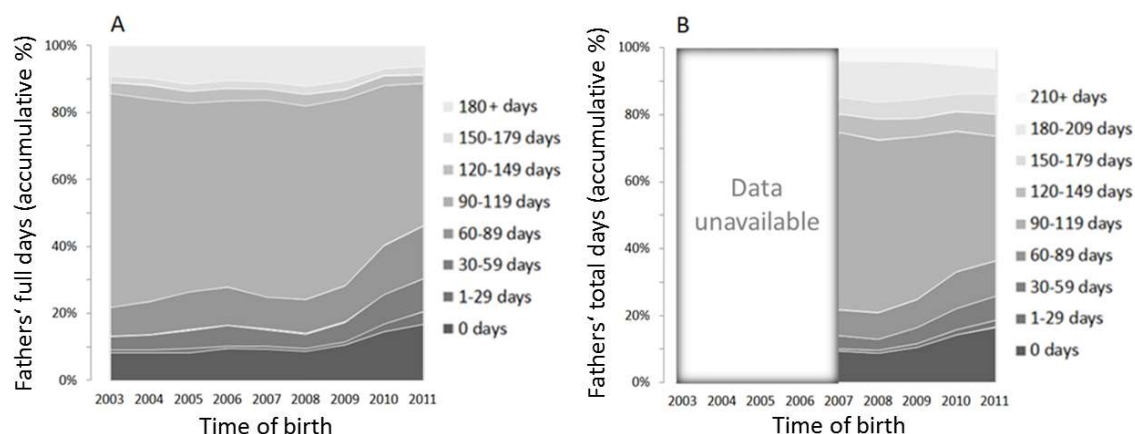
We first looked at the average number of full days of parental leave used by mothers and fathers of children born sometime within a 9-year period from 2003 to 2011, as well as the total days of parental leave used by parents of children born within a 5-year period from 2007 to 2011 (figure 3). The mean number of full days used by mothers was stable throughout the

entire period (maximum year average: 164 full days, minimum year average: 160 full days) while the mean number of full days used by fathers declined (maximum year average: 92 full days, minimum year average: 73 full days). The mean number of total days used by mothers increased within the observation period (maximum year average: 229 total days, minimum year average: 208 total days), while the mean number of total days used by fathers somewhat decreased over the observation period (maximum year average: 105 full days, minimum year average: 96 full days).



**Figure 3. Development of the use of parental leave by mothers and fathers of children born in Iceland 2003–2011.** Solid lines: The mean number of total days of parental leave used by mothers (black lines) and fathers (grey lines) of children born in Iceland in the years 2007–2011. Dotted lines: The mean number of full days of parental leave used by mothers (black lines) and fathers (grey lines) of children born in Iceland in the years 2003–2011. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

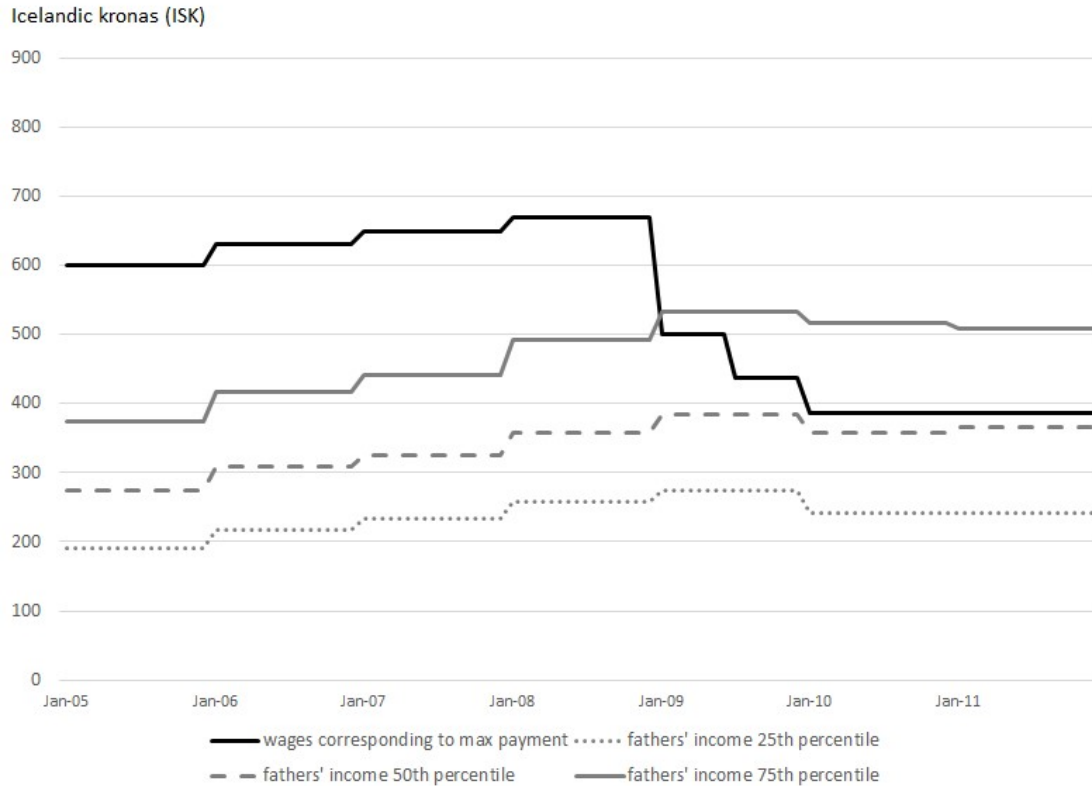
A further breakdown of the full days and total days of leave used by fathers can be seen in figure 4. The percentage of fathers who took at least 90 full days of leave declined from 78% in 2003 to 54% in 2011 (panel a). Similarly, the percentage of fathers who took at least 90 total days of leave declined from 78% in 2007 to 64% in 2011 (panel b).



**Figure 4. Details of the development of parental leave used by fathers of children born in Iceland in the years 2003–2011.** Panel a shows the breakdown for the number of full days and panel b shows the breakdown for total days of leave. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

#### *Paternal leave: income groups*

In order to look further into the decline in fathers' use of parental leave, we looked at the full days of leave used by fathers of children born in each month from January 2003 to December 2011, and did this separately for fathers in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> income quartiles. The quartile points were defined based on the income (in the year before the birth of each child) of all fathers in our included population, and these points were defined separately for the fathers of children born in each year between 2003 and 2011. The quartile points relative to the maximum payment during parental leave in our observation period are displayed in figure 5.



**Figure 5. The development of the maximum payment during parental leave 2005–2011 and the development of fathers’ income.** The black unbroken line shows monthly income at each time that correspond to the maximum payment during parental leave. The gray lines show the development of income of fathers included in the current dataset. The 25<sup>th</sup> (gray dotted line), 50<sup>th</sup> (gray dashed line), and 75<sup>th</sup> (gray unbroken line) percentiles mark the cutting points of the four income quartiles. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

Our main question concerns whether the sudden and unforeseen economic collapse and the subsequent lowering of the maximum payment for parental leave would have a major impact on fathers’ use of parental leave, and to which extent this effect would depend on fathers’ income group. In other words, we wanted to look for evidence in the different income groups for an abrupt change in fathers’ use of parental leave with time, a so-called transition point or breakpoint in the relationship between time and the full days of leave used by fathers (Muggeo, 2003, 2008). The relationship can thus be said to be segmented.

Our question can be further broken down as follows: 1. Given the data, at what timepoint is it most likely that such a breakpoint or abrupt change happened? 2. What is the

margin of error for this best guess, i.e. what is the confidence interval for this timepoint estimate? 3. Is the breakpoint “real”, i.e. is there a significant non-zero difference in slope parameters (slope before and after the timepoint) of the supposed segmented relationship between time and full days of leave used by fathers? 4. Given that there is an actual breakpoint, what is the relationship between time and full days of leave used by fathers before and after the breakpoint? We used the *segmented* package for R to answer these questions. The package allows for estimation and summarization of models with segmented relationships (Muggeo, 2008).

First, four linear models were fit to the data of the separate income groups. The number of full days of parental leave used by fathers was treated as a dependent variable in these models. Time of the birth of a child (in months, from January 2003 to December 2011) was our primary independent variable of interest. We also included the following background variables in the models: Child’s place of birth (born in or outside the greater capital area; dummy coded), parents’ immigration status (neither parent is an immigrant, the father but not the mother is an immigrant, the mother but not the father is an immigrant, both parents are immigrants; dummy coded), parity (mother’s first child, mother’s second child, mother’s third child or greater; dummy coded), mother’s education (no more than compulsory education, secondary education or vocational training, higher education; dummy coded), father’s education (no more than compulsory education, secondary education or vocational training, higher education; dummy coded), mother’s marital status at the end of child’s year of birth (cohabiting, married; dummy coded), mother’s student status (mother did or did not receive a student stipend from the Icelandic Maternity/Paternity Leave Fund; dummy coded), the mother’s age, and the father’s age.

**Table 1. Coefficients of the linear terms of segmented regression models for different income groups of fathers.** Q1: 1<sup>st</sup> income quartile, Q2: 2<sup>nd</sup> income quartile, Q3: 3<sup>rd</sup> income quartile, and Q4: 4<sup>th</sup> income quartile. Adjusted R-squared: Q1: 0.042, Q2: 0.030, Q3: 0.045, Q4: 0.155. Significance ( $p < 0.05$ ) is marked with an asterisk. For time of birth, slopes (beta values) before and after the estimated breakpoint are shown. An asterisk besides a slope indicate that it is significantly different from zero. The difference in slopes before and after the breakpoint was significant in all cases. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

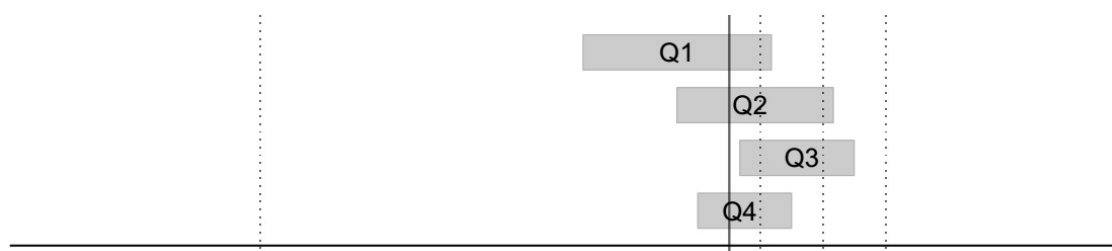
	<b>Q1 Beta</b>	<b>Q2 Beta</b>	<b>Q3 Beta</b>	<b>Q4 Beta</b>
<b>Time of birth: Before breakpoint</b>	0.07	0.10*	0.05*	-0.07*
<b>Time of birth: After breakpoint</b>	-0.41*	-0.41*	-0.64*	-1.04*
<b>Born outside greater capital area</b>				
<b>Born in greater capital area</b>	-8.27*	-3.97*	-6.64*	-21.07*
<b>Neither parent is an immigrant</b>				
<b>Father (but not mother) is an immigrant</b>	-7.00*	1.29	-7.56*	-7.11
<b>Mother (but not father) is an immigrant</b>	1.33	3.04	8.64*	3.30
<b>Both parents are immigrants</b>	10.85*	6.87*	6.98*	4.37
<b>1st child</b>				
<b>2nd child</b>	-2.68*	-2.77*	-3.59*	-7.17*
<b>3rd child or greater</b>	-5.24*	-3.77*	-4.93*	-8.75*
<b>Mother: No more than compulsory education</b>				
<b>Mother: Secondary education / vocational training</b>	0.51	1.84	-0.16	-5.43*
<b>Mother: Higher education</b>	1.56	-2.31	-5.10*	-11.69*
<b>Father: No more than compulsory education</b>				
<b>Father: Secondary education / vocational training</b>	6.27*	3.59*	2.73*	-2.73
<b>Father: Higher education</b>	-2.16	0.94	2.39	-10.88*
<b>Cohabiting</b>				
<b>Married</b>	-2.28	0.56	0.41	-0.17
<b>Mother: Not a student</b>				
<b>Mother: Student</b>	12.09*	16.05*	14.94*	14.47*
<b>Mother: Age</b>	-0.03	-0.17	-0.38*	-0.56*
<b>Father: Age</b>	-0.33*	0.05	0.04	-0.47*

The linear models were then further processed in order to look for evidence of a segmented relationship between time of birth and full days of leave. Given a linear regression model, the



*segmented* package estimates a new model having a segmented relationship with the time of birth. Summaries of the coefficients of these segmented models can be seen in table 1.

The estimated breakpoints are as follows (see also figures 6 and 7): 1<sup>st</sup> quartile: May 2008 (95% confidence interval: August 2007 to February 2009), 2<sup>nd</sup> quartile: December 2008 (95% confidence interval: May 2008 to August 2009), 3<sup>rd</sup> quartile: May 2009 (95% confidence interval: November 2008 to October 2009), and 4<sup>th</sup> quartile: November 2008 (95% confidence interval: July 2008 to April 2009).

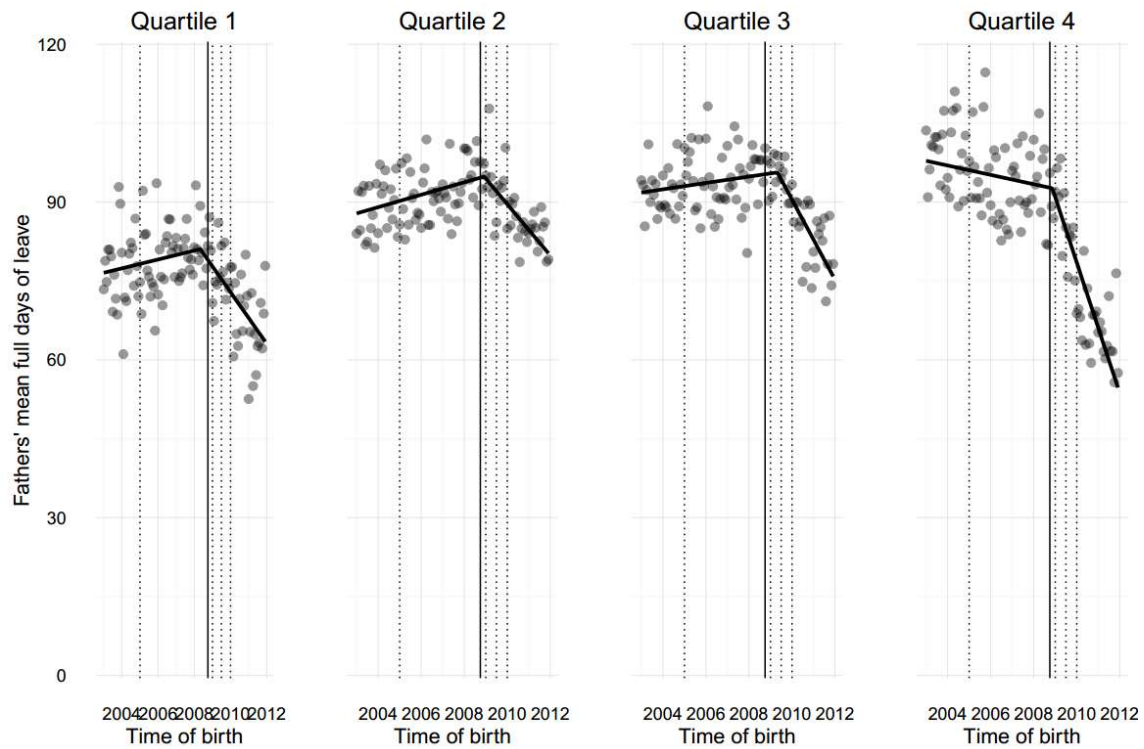


**Figure 6. Estimated breakpoints in the relationship between time of birth of a child and the length of paternal leave.** The time of the economic collapse (October 2008) is marked with a vertical solid line, and the time of four legal changes (see main text), each one leading to a lowering of the maximum payment for parental leave, is marked by four vertical dotted lines. Estimated breakpoints of 1<sup>st</sup> income quartile (Q1), 2<sup>nd</sup> income quartile (Q2), 3<sup>rd</sup> income quartile (Q3) and 4<sup>th</sup> income quartile (Q4) in relation to events of interest (marked by vertical lines). 95% confidence intervals for the time of these breakpoints are represented by the width of gray squares. The entire observation period (time of birth from January 2003 to December 2011) is represented as a horizontal line. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

Are these estimated breakpoints real? This question was addressed by applying Davies’ test as implemented in the *segmented* package (Davies, 1987; Muggeo, 2003, 2008). Given a linear model, Davies’ test can test for a non-constant regression parameter; in other words, is there a significant difference in the slope of the relationship between date of birth and full days of leave before and after the supposed breakpoint? The null hypothesis is that there is no difference in slope and therefore no actual breakpoint. In all cases, there was a significant difference in the slope before and after the timepoint of interest, suggesting that there is a real breakpoint in the relationship between time of birth and full days of leave (table 1).

In the time period before the estimated breakpoint, the slope of the relationship between time of birth and full days of leave was not significantly different from zero in the 1<sup>st</sup> quartile income group (slope = 0.071, 95% confidence interval: [-0.006; 0.149]); the average full days of leave used by fathers in this income group stayed relatively constant during this time period. The slope for the time period before the respective breakpoints was significantly positive for the 2<sup>nd</sup> (slope = 0.098, 95% confidence interval: [0.044; 0.153]) and 3<sup>rd</sup> (slope = 0.050, 95% confidence interval: [0.001; 0.100]) quartiles, indicating that the full days of leave used by fathers in these income groups were increasing during this time period. The opposite was true for the 4<sup>th</sup> quartile, where the slope before the estimated breakpoint was significantly negative (slope = -0.074, 95% confidence interval: [-0.140; -0.009]) indicating that the full days of leave used by fathers in this income group was decreasing during this time period.

In the time period after their respective estimated breakpoints, the slope of the relationship between time of birth and full days of leave was negative in all income groups (1<sup>st</sup> quartile slope = -0.407, 95% confidence interval: [-0.538; -0.276]; 2<sup>nd</sup> quartile slope = -0.407, 95% confidence interval: [-0.556; -0.257]; 3<sup>rd</sup> quartile slope = -0.635, 95% confidence interval: [-0.814; -0.456]; 4<sup>th</sup> quartile slope = -1.035, 95% confidence interval: [-1.206; -0.864]). During this time period, the days of leave used by fathers decreased in all income groups. This drop was especially marked in the 4<sup>th</sup> income quartile group; while the average days of leave used by this group was already dropping before the breakpoint, the rate of this drop increased after the breakpoint to a remarkable one day of leave for each month during this time period.



**Figure 7. The segmented relationship between time of birth of a child and the length of paternal leave.** The time of the economic collapse (October 2008) is marked with a vertical solid line, and the time of four legal changes (see main text), each one leading to a lowering of the maximum payment for parental leave, is marked by four vertical dotted lines. Each point corresponds to the average full days of leave used by fathers in a particular income group (from left to right: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> income quartiles) whose child was born in a particular month. The predicted lines (black) are estimated for each month (January 2003 to December 2011) with background variables in the segmented regression model kept at their respective average values. Data sources: Statistics Iceland and the Icelandic Maternity/Paternity Leave Fund (for data inclusion criteria, see “Data selection” chapter).

A summary of these results can be seen in figure 7. For clarity, individual data points are not shown; each point on scatterplots instead corresponds to the average full days of leave used by fathers of a particular income group whose child was born in a particular month. The predicted lines, on the other hand, are based on all individual data points; the segmented models described above are used to predict the length of parental leave (full days of leave used by fathers) from the time a child was born with all background variables set at their respective average values.

## Discussion

In recent years, the European Union has paid increasing attention to equality between men and women on the labour market. A Directive dating from 2010 (Directive 2010/18/EU) stresses the importance of ensuring minimum requirement on parental leave for both men and women and related employment protection. The directive stresses an individual entitlement to parental leave of at least four months where at least one month cannot be transferred to the other parent to encourage more equal use of leave (Directive 2010/18/EU).

The Nordic countries have often been described as forerunners in the implementation of such laws that promote gender equality on the labour market and at home. Public day-care provisions have been generous and currently parents in the Nordic countries are entitled to a paid parental leave of between nine months and over a year and currently three of the Nordic countries ensure both parents non-transferable rights to parental leave (Valdimarsdóttir, 2006; Eydal and Rostgaard 2015). In 2000, Iceland took a leading role in Europe in promoting gender equality through changes in parental leave policy and from 2003 each parent was entitled to a non-transferable parental leave of three months and joint entitlement of three months (Act on Maternity/Paternity Leave and Parental Leave No. 95/2000).

Initially the law appeared to promote greater sharing of parental leave between parents, but with the economic recession of 2008 and a notable lowering of the maximum payment during parental leave, we observe a reverse of this trend. Despite equal legal rights of mothers and fathers, the gender imbalance in the use of parental leave increased in the wake of Iceland's national economic crisis. In 2003, with the full implementation of the Act on Maternity/Paternity Leave and Parental Leave (No. 95/2000), eight out of ten fathers used at least their non-transferable rights to three months of leave. At the end of our observation

period, in 2011, this number had decreased to five out of ten fathers. Furthermore, mothers increasingly took a longer leave with partial pay.

Our data indicate that the decrease in fathers' parental leave (full days of leave) is related to the collapse of the economy and the following lowering of the maximum payment during parental leave. Our data clearly indicate that there was a real turning point in the use of parental leave by fathers of all income groups during our observation period. Purely data-driven methods were used to estimate the time of change. Estimates of the time of change were consistent with it being triggered by the economic collapse in October 2008 (fathers in the 1<sup>st</sup>, 2<sup>nd</sup>, and 4<sup>th</sup> income quartiles) and the immediately following policy changes.

Before these turning points, the use of parental leave by low-income fathers was stable, middle-income fathers were increasing their use of parental leave, and high-income fathers showed a slowly decreasing trend in their use of parental leave. After the turning points, the use of parental leave started to decrease in all income groups.

The economic crisis itself might have been a major driving force behind the change in the use of parental leave for lower-income fathers (1<sup>st</sup> and 2<sup>nd</sup> income quartiles), whose length of parental leave started to decrease around the time of the national economic collapse (figures 6 and 7) despite never hitting the theoretical maximum payment during parental leave (figure 5). The effects for the high-middle income fathers (3<sup>rd</sup> income quartile), however, were delayed until the maximum payment was lowered after the crisis onset (figures 6 and 7). Before these cuts, no fathers in this income quartile hit the theoretical ceiling of payments during parental leave. Potential payments during parental leave for some fathers in this group were however affected by the first cut after the onset of the crisis, and the potential payments of even more fathers in this group were affected by the second cut (figure 5). The drop seen in this group might therefore be mainly driven by the change in the law. High-income fathers (4<sup>th</sup> income quartile) were the most greatly affected, dropping from being the group of fathers

who on average took the most parental leave to being the group of fathers who on average took the least parental leave (figure 7). Of note, however, is that even before the onset of the economic crisis, this group of fathers showed a slow but significant downward trend in their use of parental leave over time. We speculate that this could be driven by the early policy change of the setting of a high maximum payment effective in the beginning of 2005 which affected the potential parental leave payment of a minority of men in this income group, while leaving other income groups unaffected.

The fathers in the lowest income group warrant a closer look. Fathers in this group took the shortest leave upon the full implementation of the Act on Parental leave in 2003, presumably because low-income fathers and their families could not afford to take the pay cut that their parental leave would entail. While the economic collapse in Iceland affected a majority of the population in some way, this group was arguably the most vulnerable and the economic collapse appears to have affected their use of parental leave right away. In addition to having to take a pay cut in order to go on parental leave, many of these fathers presumably had little job security and therefore arguably felt the need to be perceived as dedicated hard workers. Such fears were probably warranted given that men's unemployment rates rapidly increased in the wake of the economic collapse (Statistics Iceland, 2016d) and that fathers who use more than the fathers' quota might be expected to receive negative feedback from their employers (Brandth and Kvande, 2003),

The parental leave of high-middle income fathers in Iceland, on the other hand, was not affected until after a law change forced them to take a major pay cut in order to go on parental leave. The same could be true for the highest income fathers, although for this group our data do not allow us to clearly separate the effects of the economic collapse itself and the immediately following lowering of the maximum payment. As can be seen in figure 6, the drop in this highest income group is quite staggering, and does not seem to decelerate at all

even when the economic situation starts to get better at the end of our observation period (figure 1). We interpret this as an effect of the ever-decreasing maximum payment, both formally because of the aforementioned legal changes but also *de facto*; even a stable maximum (in ISK) is actually worth less and less because of inflation (figure 2). High income fathers have to take an ever-increasing pay cut in order to go on parental leave.

Of interest is the possible dynamic interaction between the parental leave of mothers and fathers. The average total days of leave increased for both mothers and fathers between 2007 and 2008 (figure 3). However, after the economic collapse, fathers started to decrease their use of parental leave, and mothers started spreading their parental leave over longer periods (figure 3). It therefore seems like women were increasingly picking up the slack in childcare duties. From the standpoint of gender equality, this is a worrisome trend. While many men rejoin the work force soon after a child's birth or do not leave it at all, a large proportion of women appear to be leaving the work force for extended periods of time. This is likely to make employers see women as less reliable and thus making them less hireable. This in turn could generate a positive feedback loop where women increasingly stay out of the work force.

Our analysis indicates that money might be a major driving force behind the changes in the pattern of parental leave. Money presumably might thus play a large role if this trend is to be reversed. Raising the maximum pay for parental leave is one obvious option. However, another possibility would be to facilitate the transition from all-day parental care to out-of-the-home day care. In Iceland, playschool taught by professional teachers is in general only an option for children older than approximately two years of age. By and large, only other more expensive day care options are available for younger children. By prolonging their parental leave, mothers are increasingly taking responsibility for bridging the gap between parental

leave and affordable day care. Another possible solution would therefore be to make early childcare more readily available at a lower cost.

Interestingly, visual inspection of the development of the average full days of leave used by fathers (figure 7) suggests that none of the four income groups show any obvious signs of recovery in their use of parental leave even as Iceland starts to recover from the economic recession (figure 1). Quite intriguingly, this might mean that although economic factors *triggered* the trend of decreased use of parental leave by fathers in Iceland, economic factors might not be the only ones that *maintain* it. A shorter paternal leave and a longer maternal leave might have been normalized, so that economic factors as well as *cultural* factors are responsible for maintaining the increased “gender gap” in the use of parental leave in Iceland.

The introduction of non-transferable rights to paternal leave has been seen as an important policy measure in the effort to attain gender equality in the public and the private sphere. Setting out minimum requirements for parental leave is an attempt to reconcile professional and family responsibilities and ensure equal opportunities and treatment regardless of gender (Directive 2010/18/EU). In the Icelandic case, the Act of Maternity/Paternity and Parental Leave in 2000 led to a radical change in the involvement of fathers in the care of young children. In a publication dating from 2008 (just before the economic collapse), Eydal (2008) pointed out that if “the implementations will continue to emphasize the entitlements of fathers then there are reasons to expect that Iceland will be among the first countries to realize the rights of children to care from both parents.” Our study suggests that this has not happened, but could have come true if not for the total collapse of the Icelandic economy and the following radical lowering of the maximum payment during parental leave. According to a European Union Directive, some rights to parental leave should be non-transferable to encourage a more equal take-up of leave by both parents (Directive



2010/18/EU). Our data suggest that this does not guarantee a gender-equal use of parental leave; monetary factors such as the overall state of the economy as well as policy-induced maximal payments during parental leave also need to be considered before full gender equality in the use of parental leave can be reached.

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