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Using a quasi-natural experiment to identify the effects of birth-related leave policies on subjective well-being in Europe

by

Anna Cristina d'Addio, Simon Chapple, Andreas Hoherz and Bert Van Landeghem*

The purpose of this paper is to examine the welfare effects of birth-related leave (BRL) in terms of life satisfaction. To do so, we exploit variations in BRL policies to assess their impact on life satisfaction. The paper adds to the existing literature in various ways. First, it uses new data collected by Baldi et al. (2011) and Baldi and Chapple (2010) to describe how life satisfaction moves around the date of the reforms over time and in a number of EU countries covered in the Eurobarometer surveys. Second, the paper analyses the relation between life satisfaction and BRL in Germany and the United Kingdom with long individual panel data collected with the GSOEP and the BHPS survey. The potential endogeneity bias of the treatment effect is addressed by building a quasi-natural experiment using policy changes as the assignment rule. The results from a variety of different methods suggest that BRL policies generally have a significant positive effect on life satisfaction. Women on BRL have higher life satisfaction, controlling for observable and unobservable personal characteristics. This result is robust to alternative specifications.

JEL classification: H53, I16, J38

Keywords: Welfare, subjective well-being, difference-in-difference, birth-related leaves

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1. Overview

An important development in social policy making in many OECD countries has been the introduction and expansion of paid maternity and parental leave schemes, especially since the 1970s.

Birth-related leave (BRL) schemes have a number of aims, including improving well-being of infants and supporting child development, enhancing well-being of caregivers, keeping parents (especially women) connected to the world of paid work, and helping families with issues of work-life balance. Such schemes account for a significant proportion of family spending by governments in many OECD countries today.

The changes of BRL schemes have encompassed increases in both the duration and types of birth-related leave available to women and men and modifications to payment systems as well (Baldi et al., 2011).

While the number of good quality evaluations of these policy changes, especially in terms of their influence on short- and long-term child well-being outcomes (OECD, 2011a) is increasing, very little research has explicitly addressed the question of whether this kind of social policy, can directly influence subjective well-being (see OECD, 2010).

The present study moves into this sparsely populated territory by seeking to assess the effect of BRL policy changes on women's well-being.¹ Only Pezzini (2005) has investigated the "treatment" effect of maternity leave on life satisfaction during women's fertile age.² To do so, Pezzini exploited the variations in leave duration across countries and time using *Eurobarometer* data (starting in the early 1970s) and a variety of control groups (men, post-menopausal women). The results of these studies do not show any significant effect of leave expansion on life satisfaction of women during their fertile years.

Similarly to Pezzini (2005), the present paper exploits variations in leave policies to examine whether changes in those policies have a welfare effect – measured in terms of life satisfaction.

Our paper complements and adds to Pezzini (2005) in many ways. *First*, Pezzini uses the dataset compiled by Ruhm (2000) which, though very valuable, omits a number of policy changes and contains some errors about their timing. These problems are rectified in the dataset used in the present paper as shown in Baldi et al. (2010) and Baldi et al. (2011). *Second*, to investigate how life satisfaction varies around the dates of relevant BRL reforms in various European countries a descriptive approach relying also on *Eurobarometer* data is presented. However, the data used in our paper cover a much longer period compared with Pezzini (2005), i.e. from 1973 to 2008 rather than from 1975 to 1998. *Third*, to assess whether BRL policy changes have had a welfare effect in Germany and the United Kingdom and to control for potential endogeneity bias, our paper uses those policy changes to build a quasi-natural experiment: women on BRL before the changes are considered as "untreated" while those on BRL after the policy changes are considered as "treated". The empirical analysis rests on individual panel data extracted from the German

Socio Economic Panel (SOEP) and the British Household Panel Survey (BHPS). These two surveys have much better data, both in terms of sample size and questionnaire stability, which matters for the measurement of subjective well-being.

The structure of the paper follows. Section 2 shortly reviews the literature, while Section 3 illustrates some trends in BRL policies in OECD countries. Section 4 presents a descriptive analysis of the relation between life satisfaction and BRL policy changes in some European countries covered in the Eurobarometer surveys. Section 5 describes the empirical strategy adopted in the paper and presents the econometric specifications used. Section 6 discusses the data and variables used for the analysis. Section 7 discusses the main results, while Section 8 draws some conclusions.

2. Review of the literature on birth-related leave and well-being

As many empirical and theoretical studies highlight, there is no universal definition of subjective well-being. On the one hand, psychologists tend to identify subjective well-being with “quality of life” comprising a “combination of feeling good and functioning effectively”. On the other hand, economists and sociologists tend to use a narrower definition excluding some dimensions (such as physical and mental functioning) which are in contrast considered in the “Quality of Life” approach (see OECD, 2010; 2011a, b, c).

Two distinct components enter the definition of subjective well-being (Diener, 1984). They are: i) affective well-being (AWB); and ii) cognitive well-being (CWB). The first component (i.e. AWB) refers to emotional states and feelings, while the second may be seen as retrospective evaluation either of the overall quality of life (i.e. global life satisfaction) or of specific life domains (e.g. job satisfaction or marital satisfaction).

While acknowledging the ongoing debate on whether one component is better suited than the other for policy evaluation, this paper uses (overall) life satisfaction to measure subjective well-being because of its availability in both the SOEP and BHPS surveys and in Eurobarometer as well (see OECD, 2010; and OECD, 2011c).³

The paper tries to investigate the “welfare effects” – measured in terms of subjective well-being – of a particular type of social policy, i.e. birth-related leave (BRL). As discussed in OECD (2010, 2011b, 2011c), the study of policy measures in terms of individuals’ satisfaction is a very modern development in economics. The research in this field is rapidly expanding. The reasons for this growing interest are many. Among those the acknowledgement of the need to go beyond GDP and the development of datasets for the analysis are particularly important (see OECD, 2010; OECD, 2011c).

For the analysis of the effect of BRL on life satisfaction, only Pezzini (2005) may be cited. A number of studies have instead looked at the relation between the length of BRL and some dimensions closely related to subjective well-being – such as mental health and self-reported health outcomes.

The conclusions regarding the effect of leave on these two outcomes are somewhat mixed. For example, Chatterji and Markowitz (2005) investigate the impact of the length of maternity leave on maternal health using two measures of depression and a measure of overall health status in a sample of working mothers in the United States. They use instrumental variables models to account for the possible endogeneity of the return-to-work decision. Their findings suggest that delaying the return to work reduces depressive symptoms but not the probability of clinical depression or hospital outpatient visits after childbirth.

In a later paper, Chatterji and Markowitz (2008) consider the impact of leave on maternal depression, overall health status and substance use. They again adopt an instrumental variables approach with county-level employment conditions and state-level maternity leave policies as instruments to address reverse causality issues. Chatterji and Markowitz (2008) use data collected post Family and Medical Leave Act (in 2001) – while prior work was based on data collected in the 1980s and early 1990s – and consider several aspects of family leave, i.e. the total length of maternal leave, the total length of paid maternal leave, and the total length of the father’s leave. Their results suggest that a longer maternity leave is associated with declines in depression and improvements in overall health. Additionally, if men take paternal leave maternal depression declines. The size of these effects is however small. Doubling the length of maternal leave from nine to 18 weeks reduces: 1) maternal depressive symptoms by about 5%; 2) the likelihood of mothers’ experiencing severe depression by 1%; and 3) and the likelihood of mothers’ reporting overall poor/fair health status by 1%.

Using two waves of the *German Socio-Economic Panel* (1992 and 1997), Frey and Stutzer (2003) find a positive (but statistically insignificant) effect of maternity leave on life satisfaction. In contrast, Liu and Skans (2009) do not find any effect of the extension of the leave duration from 12 to 15 months (which took place in 1988 in Sweden) on parental well-being – measured by divorce and mothers’ mental health.⁴

Other research uses quasi-experimental methods to assess the impact of BRL on a variety of outcomes. Baker and Milligan (2005, 2007) find that doubling the length of BRL in Canada to one year resulted in a large increase in the time women take off work and in breastfeeding rates. However, when it comes to maternal health – measured alternatively by an indicator of mothers’ self-reported health, an index of depression, a binary indicator of no post-partum depression, and a count of post-partum problems – the authors do not find any impact related to the extension of the duration of BRL (see also Gjerdingen and Chaloner, 1994; Hyde et al., 1995; McGovern et al., 1997).

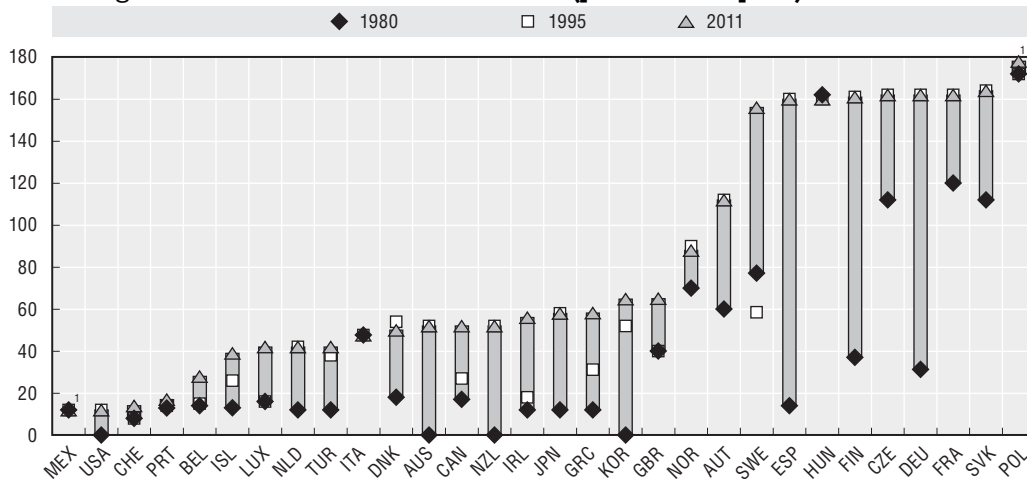
There is also a large body of literature which investigates the link between subjective well-being and other domains closely related to BRL (see Lalive and Zweimuller, 2005, for example; Staehelin et al., 2007). Some studies provide evidence of the so-called “baby honeymoon”. For example, Dyrdal et al. (2010), using a very large sample of Norwegian women, report increases in life satisfaction from early pregnancy to about six months of age of the child and thereafter reductions up to the age of three of the child (see also Gjerdingen et al., 1993, 1995). Earlier research in both Britain and Germany had suggested some interesting dynamics of life satisfaction immediately before and immediately after the birth of a child (Clark et al., 2008; Clark and Oswald, 2002).

Some of the most recent literature on family policies and subjective well-being use policy changes to identify causal effects. A small but growing literature focuses on the causal effects of maternity leave and childcare policies on child well-being outcomes (Dustmann and Schönberg, 2008; Khanam et al., 2009; Tanaka, 2005; Wurtz, 2007; Zarrabi, 2009). Other studies estimate the causal impact of these policies on parental well-being. For example Brodeur and Connolly (2013) use triple-differences methods to investigate the effect of a change in childcare subsidies policy in Québec aimed at increasing subsidised childcare space. Their findings suggest that this policy led to a small decrease (1/20th of a standard deviation) in parents’ self-reported well-being.

3. Trends in birth-related leave in OECD countries

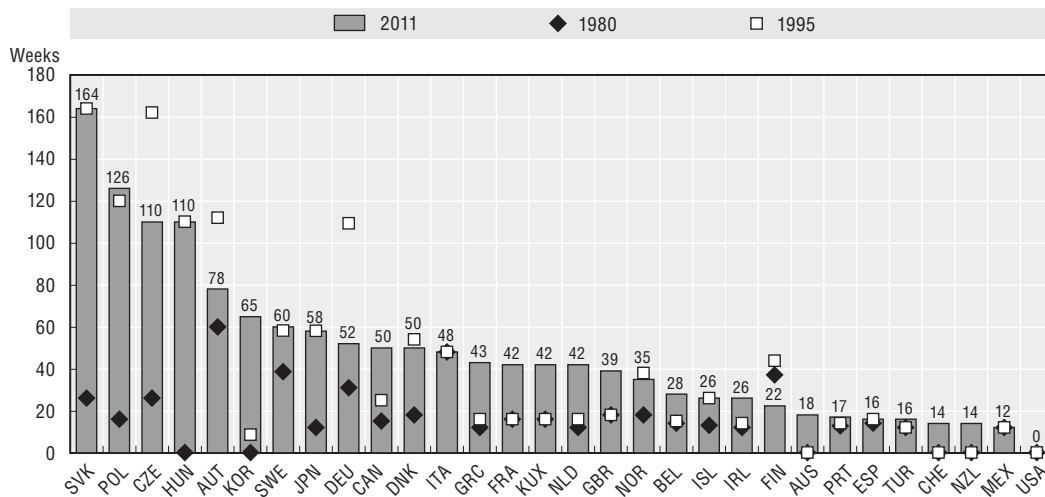
Panel A of Figure 1 illustrates the trends in the duration of (paid and unpaid) BRL over time while Panel B shows the trends in the duration of paid, job-protection birth-related and post-birth leave over time.⁵ The duration of leave (both paid and unpaid) has increased almost everywhere between 1980 and 2011 (top panel). The same trend is observed for the duration of paid BRL shown in the bottom panel (see Deven and Moss, 1999, 2005; Escobedo, 2008). However cross-country differences are large; for example large increases are displayed in the Slovak and the Czech Republics, Hungary, Poland and Korea. Conversely, a very small or zero-increase is observed in Italy, Portugal, Spain, Mexico and Turkey.

Figure 1. Trends in the BRL duration (paid and unpaid) over time



1. The bar on the chart shows the difference between the values observed in 1980 and in 2011.

Panel B. Paid BRL duration over time in selected OECD countries



Source: Based on Baldi and Chapple (2010) and on the OECD Family Database.

The starting level and the entitlements granted vary greatly across countries. Some countries (including Ireland, the United Kingdom and Denmark) have seen this sort of leave introduced for the first time over the time period considered. Italy, Spain and Turkey

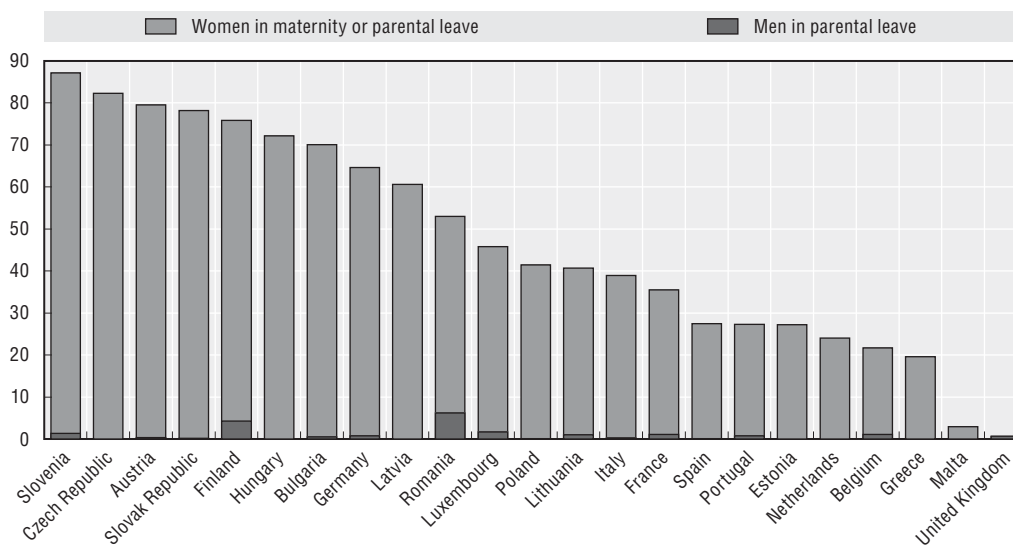
have known relatively few, and fairly small, policy changes in leave durations. In other countries, such as the Czech Republic and Germany, durations of leave rise from a few months to a time scale measured in years (see also Bird, 2001). While it is correct to state that the time trend is always upwards, in several cases there are falls in leave durations – for example in Hungary, Denmark, Finland, Poland and Sweden.

4. Is there a link between life satisfaction and birth-related leave?

To give a more international perspective to the analysis, this section analyses the effects of BRL policies on life satisfaction using Eurobarometer data for a number of EU countries experiencing major changes in those policies over the period spanning from Autumn 1973 to Spring 2008. Only women are considered in the analysis.

Figure 2 shows the parental/maternity leave take-up by employed mothers and fathers with a child below 1 year of age. It suggests that women still take the vast majority of leave on offer despite fathers' leave take-up having increased over time.⁶

Figure 2. Leave take-up by (employed) mothers and fathers, 2006



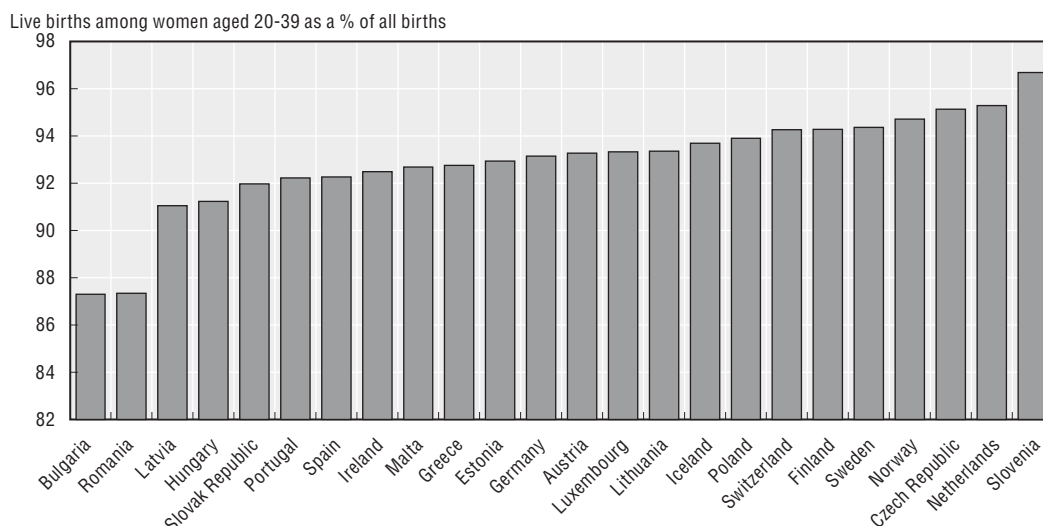
Source: OECD Family Database (Indicator PF 2.2) based on ELFS, 2006.

The analysis in this section uses data on life satisfaction reported in various Eurobarometer surveys, where life satisfaction is measured on a four-point scale – i.e. not at all satisfied, not very satisfied, fairly satisfied and very satisfied. Because these surveys do not record whether women are or are not on BRL, the assignment to the “treatment” and “control” groups, respectively, is done with respect to the age of the survey respondents.⁷ This is the approach adopted for example in Pezzini (2005) who assigns women aged 15-49 to the treatment group (the “fertile” age) and those aged 50 and over to the control group.

In this paper, and differently from Pezzini, only women aged between 20 and 39 (rather than those aged 15-49) are assigned to the treatment group. Using Pezzini’s definition would have resulted in the two groups overlapping over the long observation period considered. Moreover, many women included in the treatment group would have achieved their desired number of children which might have worked against finding any policy effect.

Another reason justifying the choice of the age limit adopted here is that very few women in Europe have babies after age 39: on average in the twenty four countries represented on the chart, only 7% of the total live births occur either before 20 or after 39 years of age (Figure 3). Data on the age of mothers at birth in Europe also supports the definitions of treatment and control groups used in this article.

Figure 3. Percentage of live birth among women aged 20-39 as a % of all births, 2011, in selected EU countries



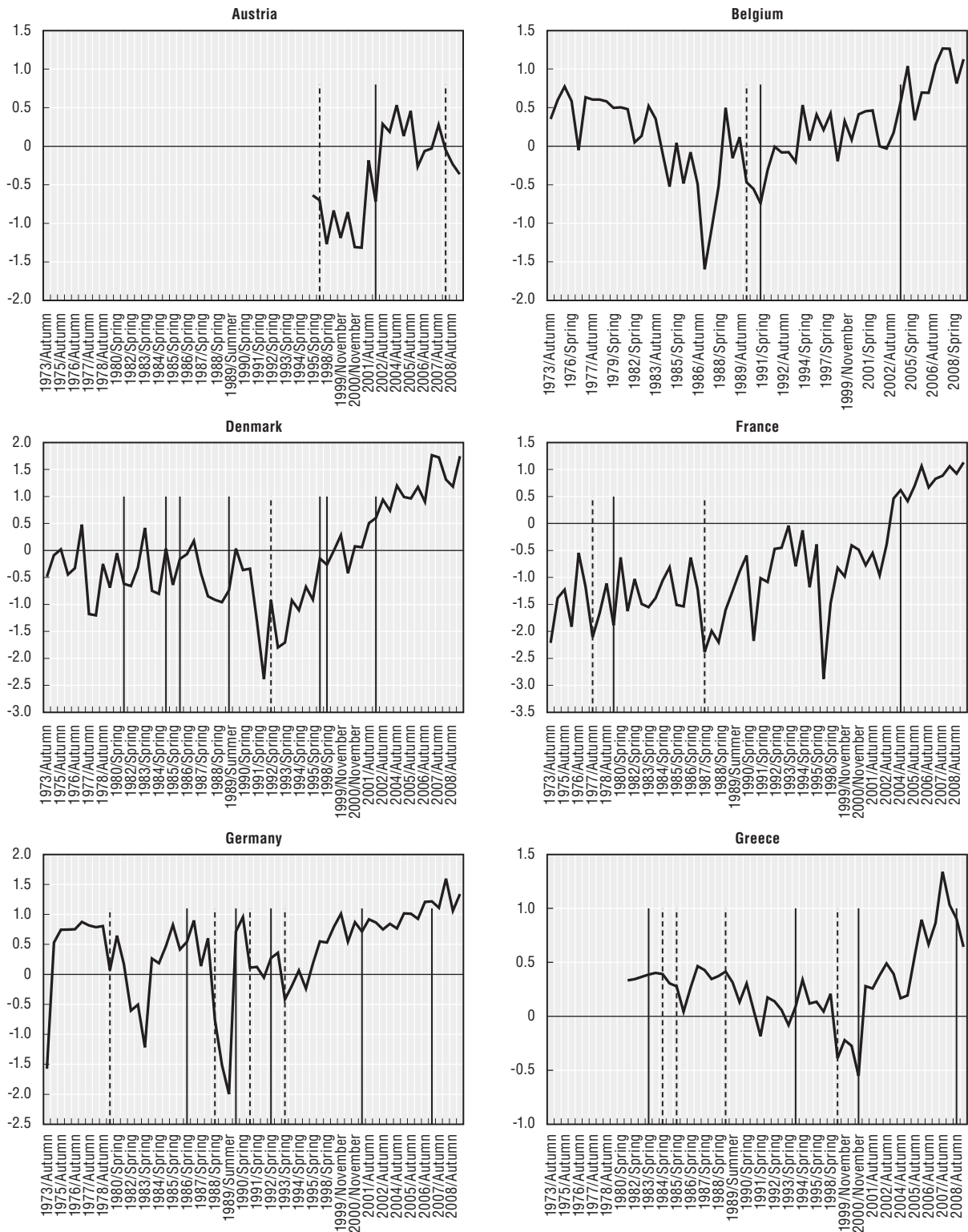
Source: Eurostat for countries with data available.

One could argue that the definition used in Pezzini (2005) is better than the one used here because in a number of countries parents are currently eligible for BRL until their child is quite old (e.g. age 8 and over in some countries), which would tend to push up the effective age of the treatment group (i.e. the women eligible for BRL). However, most parents use the vast majority of leave in the early years when their child is an infant or toddler. Data from 2006 *Labour Force Surveys* indicate, for example, that on average 46% of employed women are on maternity or parental leave when the child is aged less than one year (Figure 2). This percentage drops to 5% when the child is aged less than three.

A simple visual inspection of the difference in life satisfaction between women aged 20-39 years (i.e. the “treated”) and women aged 50 years and over (i.e. the “untreated”) around the policy changes does not reveal any specific trends either increasing or decreasing the relative life satisfaction of women who were potentially eligible for BRL policies. This result might be simply a statistical artefact reflecting relatively small sample sizes (a few hundred women in most cases) and high sampling errors.

To gather a better understanding of the variable of interest a mild formalisation has been adopted to smooth the data.⁸ To do so, we compared the difference in life satisfaction between the two groups two periods before and two periods after the reform. The vertical lines in Figure 4 identify the date at which the reform takes place: a dotted line states that the reform did not lead to an increase in life satisfaction and a solid line indicates when it does so. The analysis suggests that life satisfaction has increased over decades in many of the countries considered.

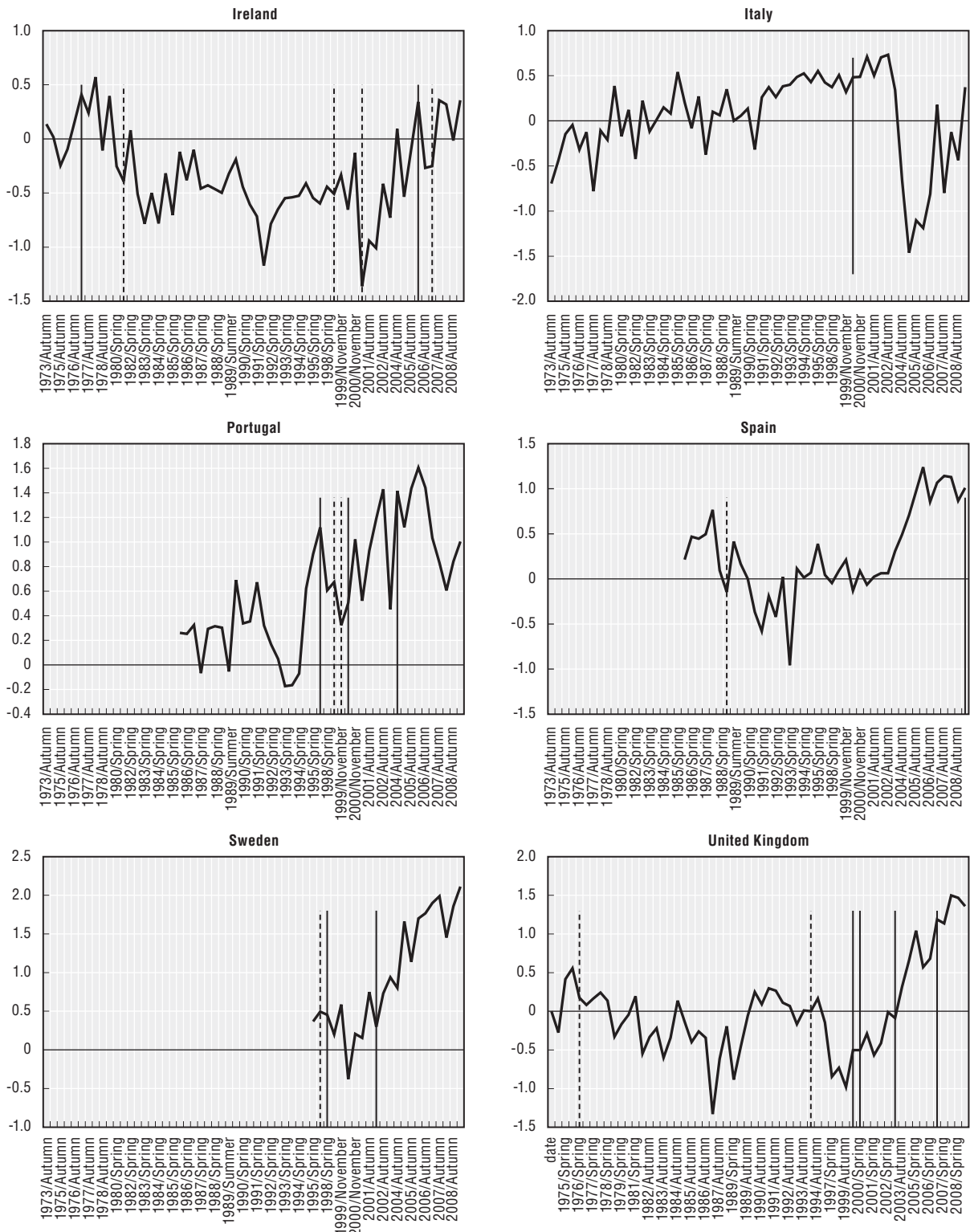
Figure 4. Reforms of parental leave and differences of life satisfaction between treatment (women aged 20-39 years) and control groups (women aged 50+ years)



Note: The vertical lines indicate the point in time when the reform occurred. A dashed line indicates that the reform did not increase life satisfaction while a solid line does indicate an increase in life satisfaction. The analysis considers differences in life satisfaction two periods before and after the reform date.

Source: Reforms data from Baldi and Chapple (2010); data on life satisfaction from different Eurobarometer surveys (see Appendix A).

Figure 4. Reforms of parental leave and differences of life satisfaction between treatment (women aged 20-39 years) and control groups (women aged 50+ years) (cont.)



Note: The vertical lines indicate the point in time when the reform occurred. A dashed line indicates that the reform did not increase life satisfaction while a solid line does indicate an increase in life satisfaction. The analysis considers differences in life satisfaction two periods before and after the reform date.

Source: Reforms data from Baldi and Chapple (2010); data on life satisfaction from different Eurobarometer surveys (see Appendix A).

However, this does not mean that trends in life satisfaction are related in a causal way to the reforms. There are good reasons to believe that most of the variations in the chart are due to other factors (such as the increased participation of women in the labour market and their different role within the household) and are unrelated to the policy effect. Only a more rigorous econometric analysis may help to shed some light on this issue.

5. Estimation strategy

The paper uses a number of econometric strategies to assess whether changes in BRL policies affect well-being. Because (relatively) long time series of individual data are necessary to adequately account for the endogeneity bias, the analysis is limited to two OECD countries, i.e. Germany and the United Kingdom.

Concerning the estimation strategy, the literature on subjective well-being generally uses ordinary least squares (OLS) for reasons of simplicity and ready interpretation (Ferrer-i-Carbonell and Frijters, 2004).

The OLS specification can be written as:

$$Y_i = \beta_0 + \beta'X_i + \alpha D_i + u_i \quad [1]$$

where β_0 is the constant, X contains the explanatory variables, D is the treatment dummy (equal to 1 for the treated and to 0 for the untreated) and u is the error term. The choice of X (i.e. the explanatory variables) rests largely on the standard specifications used for the estimation of life satisfaction. Standard controls include employment status, number of children, nationality, years of education, age, net household income, and marital status (see OECD, 2010).

However, because of the potential endogeneity of the relation between being on BRL and life satisfaction – i.e. between D_i and Y_i in equation [2] – a model with fixed effects is also estimated. In particular, fixed personality characteristics of individuals may simultaneously give rise to both life satisfaction and decisions to be on BRL: mothers on BRL may have different time-invariant personality traits, information or preferences than mothers who are not on BRL. These traits in turn may be correlated with subjective well-being. Individual fixed effects help remove these, controlling for the unobserved factors which do not change over time (Wooldridge, 2007).

The specification estimated, which includes individual fixed effects, is in this case:

$$Y_{it} = \beta_0 + \beta'X_{it} + \alpha D_i + u_{it}, \quad \text{with } u_{it} = \mu_i + v_{it} \quad [2]$$

where μ_i are individual-specific, time-invariant effects $i = 1, \dots, N$ denotes the individuals and $t = 1, \dots, T$ the time periods. In equation [2], y_{it} is life satisfaction of individual i at time t , α is the parameter of interest which is associated to either $D_i = 1$ for the treated or $D_i = 0$ for the control group – i.e. the treatment is here “being on BRL”; and X_{it} are the explanatory variables.

While the use of fixed effects and multivariate controls address some of the issues associated with omitted variables and causality, it is still possible that the coefficient associated to the “treatment” will be biased upward due to high-life satisfaction mothers who are more likely to take BRL.

When assignment to the treatment or control group is random, D_i can be considered as exogenous, and the standard OLS estimator is consistent because only when $E(u_{it} | D_i, X_{it}) = 0$, α is the average treatment effect (ATE). This occurs in data with randomised experiments or controlled social experiments, but not in the non-random or non-

experimental data that are common in practice. When the assignment to the treatment group is non-random, the OLS estimator does not yield consistent estimates of α and β because u_{it} and D_i are correlated, which yields:

$$E(u_{it} | D_i, X_{it}) \neq 0 \text{ and } E(Y_{it} | D_i, X_{it}) \neq \beta'X_{it} + \alpha D_i \quad [3]$$

One way of addressing this issue is through instrumental variable (IV) even though good and valid instruments are difficult to find. Indeed, to be valid the instruments Z , should be: i) exogenous – i.e. uncorrelated with the errors such that $\text{corr}(Z'u) = 0$; ii) correlated with the endogenous X , i.e. $\text{corr}(Z'X) \neq 0$; and iii) correlated with y only through X .

$$Y_{it} = \beta_0 + \beta'X_{it} + \pi, Z_i + u_{it} \quad [4]$$

The instruments used here are the time at which policy changes occurred which are deemed to affect the probability for women to be on BRL.⁹

A fundamental problem of non-randomised policy evaluation derives from the impossibility for the observational unit of being either treated or untreated at the same time. Longitudinal data combined with (exogenous) policy changes represent a solution to this puzzle because they provide repeated measures of the same individuals before and after the policy change which may thus be seen as treated and untreated.

To assess the robustness of the estimates of the welfare effect obtained with the IV-FE estimator, a difference-in-differences estimator (DiD) is therefore used. In this model, the outcome Y_i (i.e. life satisfaction) is modelled by the following equation:

$$Y_i = \beta_0 + \alpha D_i + \gamma_i + \delta(D_i \cdot t_i) + u_i \quad [5]$$

where α is the treatment-group specific effect (to account for average permanent differences between treatment and control); γ is the time trend common to control and treatment groups; δ is true effect of treatment. The purpose of the programme evaluation is to find a “good” estimate of δ , given the data available.

The method considers the differences between life satisfaction before and after a treatment for participants and for non-participants. It computes thus a “double difference” (see Wooldridge, 2007). The basic idea behind the DiD estimator is that taking the difference-in-difference cancels out the difference in period effects, leaving only the impact, as desired. The assumption here is that women entering the BRL after each policy changes are “treated”, those who were on BRL before the policy change are “untreated”. This implies that the date of the policy change is considered as the assignment rule. Results based on this estimator are likely to differ from those illustrated in Figure 4 for a number of reasons. For example, in Figure 4 we do not control for some observed heterogeneity, the control groups are different as the data are as well.

It is important to highlight that even though the magnitudes of the estimates are not expected to be the same across the different specifications, they might happen to be so because the fixed-effect estimator on panel data may be seen as generalisation of a difference-in-difference design.

6. Data and variables

The analysis focuses on Germany and the United Kingdom because they both combine the availability of long panel data with a number of policy changes in BRL policies which can be used for the identification strategy in the quasi-experimental approach.¹⁰

6.1. The case of Germany

The empirical analysis for Germany uses data from the *German Socio-Economic Panel* (GSOEP) 2009 release (1984-2008). The GSOEP is a representative, longitudinal survey of more than 20 000 respondents in about 12 000 private households in Germany. The survey has been conducted every year since 1984 with the same persons and families. The sample has been amended several times to remain a long-term, longitudinal representative set of individual and household data in Germany.

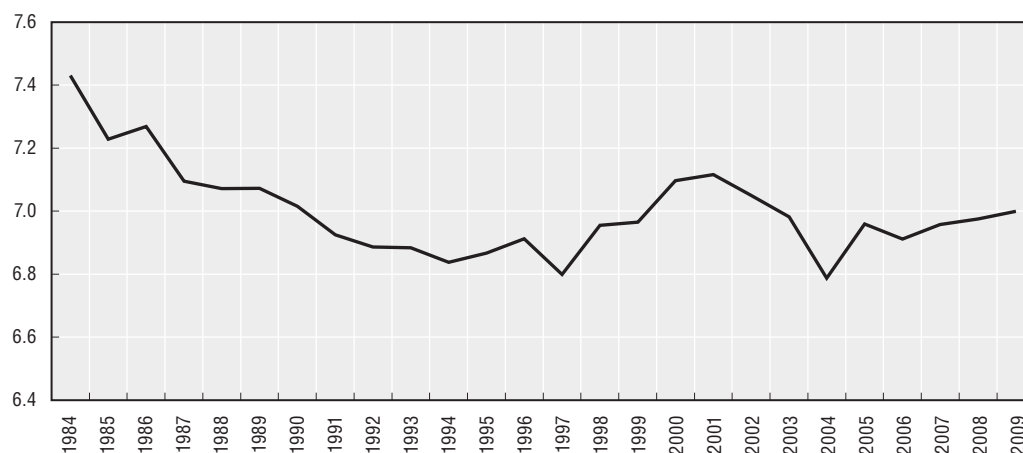
Only women are considered in the analysis because the number of men ever on BRL in the GSOEP is extremely low. Low male representation in part reflects a general OECD trend as illustrated in Figure 2 above.

In terms of the variable, this article is seeking to explain, in each interviewing year of the GSOEP all adult household members are asked to rank their overall life satisfaction, using an 11-point scale. The level of life satisfaction is based on responses to the question:

Finally, we would like to ask about your overall level of life satisfaction. Please answer again according to the following scale, “0” means completely and totally dissatisfied, “10” means completely and totally satisfied. How satisfied are you at the present time, all things considered, with your life?

This measure is used to approximate respondents’ subjective well-being over the sample period. The average female life satisfaction over the period was 6.99 with a standard deviation of 1.85. Its trend is illustrated in Figure 5.

Figure 5. Average life satisfaction of women

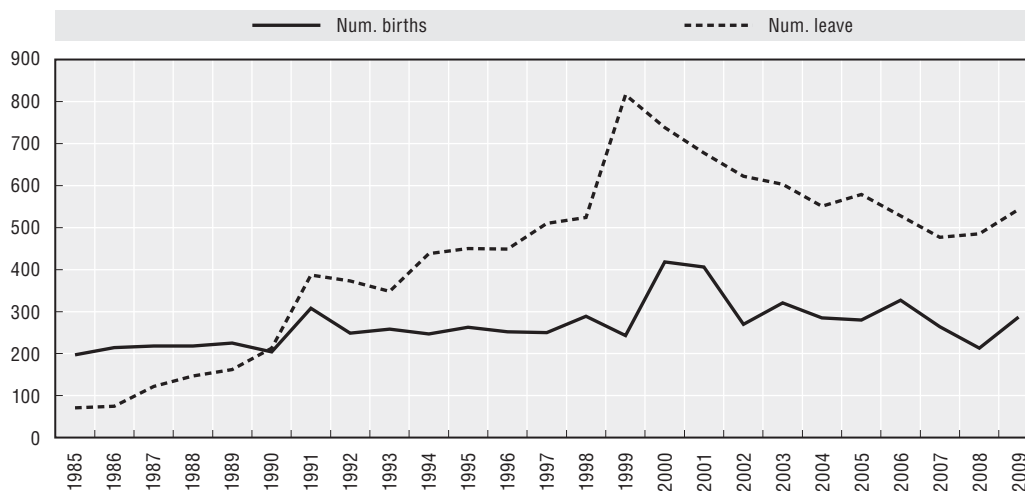


Source: German SOEP, 1984-2009.

As no single unique question for BRL is included over the entire sample period, the analysis uses a combination of questions about the particular months of the previous year in which the respondents received maternity pay (1984-90) and the particular months of the previous year in which the respondents have been on parental or maternity leave (1991-2008). The question, in both instances, relates to the January-December calendar year prior to the year the subject was interviewed, regardless of the interview month. The data are depicted in Figure 6.

Data from the *OECD Social Expenditures Database* indicate that Germany spent EUR 5 269 million on social policies in 2007; 11.8% of these expenditures were devoted to

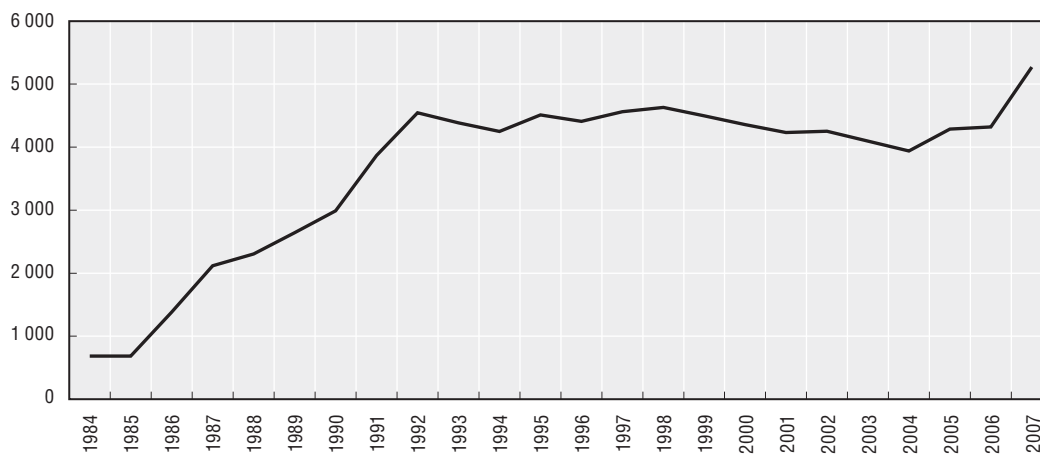
Figure 6. **Number of births to women in the German SOEP and number of women on BRL by year**



Note: Data on the number of births and leave are based on the GSOEP.
 Source: German SOEP 1984-2009.

spending on birth related leave policies which represented a 7 percentage point increase from 1984. Public expenditures on BRL policies in Germany, taken from the OECD Social Expenditure Database, are shown in Figure 7.

Figure 7. **Public spending on BRL benefits in Germany, millions of euro**



Source: OECD SOCX Database.

For the identification strategy of the causal effect of the reforms of BRL on life satisfaction of women in the quasi-natural experiment, changes in birth-related leave policies (see Box 1) were used as an assignment rule to treatment and control groups, respectively. The treatment group includes women with children who were on BRL after the policy change, while the control group is defined by women with children who were not affected by the policy change. Eight policy changes relating to birth related leave are examined as detailed in Box 1.

Box 1. Federal BRL policy in Germany*

(West) German maternal and parental leave policy has a long history, dating to the 1870s. In 1878, a code was introduced to forbid pregnant women working for three weeks before birth (Wikander et al., 1995). There were further amendments to the code in 1903 and 1911, which increased the leave period to six weeks and supplied women with paid time off work for two weeks before delivery (Merz, 2004). In 1924, job protection was introduced for women taking maternity leave (Jordan, 1999).

The modern expansion of BRL in (West) Germany dates to the late 1960s. From 1 January 1968, employed women expecting a child were granted fourteen weeks of mandatory maternity leave (*Mutterschutzgesetz*). Six weeks had to be taken before and eight weeks after birth. During those 14 weeks, a sickness insurance benefit was paid by the social security system at a flat rate equal to about the average salary for women workers. Employers were required to supplement this benefit to cover the woman's full salary (Merz, 2004). East Germany regulated maternal leave in 1972 introducing the "Babyjahr", i.e. a one-year maternity leave with a benefit equal to the level of sickness benefits. This right was granted only to mothers.

From 1 January 1979 (Merz, 2004) or 1 May (Dustmann and Schoenberg, 2008) employed women on maternity leave could opt to take an additional four months of leave immediately following maternity leave. From six weeks before to eight weeks after childbirth, mothers were paid their average income, estimated over the three months before giving birth. For the additional four months, payment was a flat rate of roughly one-third of average pre-birth earnings (Dustmann and Schoenberg, 2008). Women could not be dismissed and had the right to return to their employer, albeit not necessarily to their previous job (Merz, 2004). The prime motivation of the 1979 reform was maternal health. The later reforms would be more focused on enhancing child development (Dustmann and Schonberg, 2008).

From 1 January 1986, a new parental leave scheme was introduced. Following the 14-week maternity leave, parents were entitled to a further eight months of job-protected parental leave as a shared right, with a total of post-birth job-protected leave of 10 months. The benefit paid became disconnected from an employment condition. Any new parent working less than a maximum of 15 hours per week was entitled to receive a benefit from the federal government, regardless of his or her previous labour market status. The parental benefit equaled DM 600 for the first six months of the additional eight months (about 20% of average pre-birth wages). The benefit during the seventh and eighth months was means tested, based on family income before childbirth. A married couple received the benefit as long as annual net family income was less than DM 29 400. For a single parent, this income limit was DM 23 700 per year. Each additional child increased the upper limit by DM 4 200 (Dustmann and Schonberg, 2008; Merz, 2004; Kamerman and Kahn, 1991).

There was an increase from eight months to ten months job-protected parental leave from 1 January 1988, a further rise to 13 months from 1 July 1989, and a final rise to 16 months from 1 July 1990 (Dustmann and Schonberg, 2008; Merz, 2004). Payment was extended at the same time.

The next reform was introduced from 1 January 1992. Eligible parents were entitled to take job-protected leave up to three years after the birth of their child. Payments still lasted in total for 18 months following birth, with eight weeks maternal leave and 16 months parental leave (Merz, 2004; Gauthier and Bortnick, 2001). Thereafter parents could use unpaid but job-protected parental leave up to the child's third birthday.

Box 1. Federal BRL policy in Germany* (cont.)

The 1992 reform was further extended from 1 January 1993, with the payment period for parental leave rising from 16 to 22 months, making a total of two years paid maternal and parental leave (Dustmann and Schonberg, 2008; Merz, 2004). As Dustmann and Schonberg (2008) point out, the federal government had committed to providing subsidised child care for every child over the age of three from 1996. The intent was to encourage mothers to stay at home until the child was three, and then aiding a return to work via subsidised child care thereafter.

Reforms from 1 January 2001 introduced flexibility in the parental leave system. Parents were able to choose a shorter and better paid leave (DM 900 per month for 10 months) or a longer but less well paid leave (DM 600 per month for 22 months). Benefits remained income tested. Paid leave could be used until child's second birthday. The third year of leave could be used until a child reached eight years of age (Merz, 2004).

On 1 January 2007, a new earnings-related parental leave benefit with floors and ceilings was introduced (*Elterngeld*, or "parental money"). It replaced the old, means-tested flat rate benefit (*Erziehungsgeld*). The duration of the job-protected maternal plus parental leave remained at a maximum of three years following childbirth. The parental leave payment was 67% of parent's average earnings during the year before childbirth, with a ceiling of EUR 1 800 per month and a floor of EUR 300. The new parental leave payment was for ten months, plus two extra months for the father if he used at least two months of parental leave, making 14 months of payment in total when including the eight weeks post-birth maternity leave. The maternity leave payment was included in this period, reducing the actual *Elterngeld* payment period to 12 months. It is possible to extend leave up to 24 plus four months (if each parent takes at least four months leave), with a proportionate reduction in the monthly payment rate. The actual *Elterngeld* payment period was then 28 months less the two months maternity payment, i.e. 26 months. (Moss and Korintus, 2008, p. 208). The effects of the 2007 policy change differed for rich and poor parents. Before the policy change, the poor received *Erziehungsgeld* of EUR 7 200 in total over 24 months. Post-reform they get EUR 3 600 (12 months) to EUR 4 320 (14 months). Pre-2007, richer parents also received EUR 7 200, or nothing if they were in excess of the income threshold. Post-2007, they could obtain up to EUR 25 200.

* A number of birth related leave policies are also implemented in various *Länder*. These are detailed in Appendix B. For example, while the parental leave legislation is federal, four *Länder* (Bavaria, Baden-Württemberg, Thuringia, Saxony) also pay a means-tested benefit up to the third year of parental leave.

As mentioned already, the analysis in the present paper only focuses on women. The inability to investigate the effect of BRL on fathers' life satisfaction is a major limitation of the analysis which we need to acknowledge here.

It is however difficult to examine how the take-up of leave has evolved in Germany following the implementation of these different BRL policies because of unavailability of the relevant data in many cases. However, data from the Federal Statistics Office for the year 2010 highlight that around 810 000 mothers and fathers obtained paid parental leave support. The majority of applications were filled by single parents and among these 25% were fathers.¹¹ But more than three-quarters of those fathers asked for parental benefit support for less than two months. In contrast, couples asked for support on average for a period of two months.

The labour market status of the mother was a decisive factor in determining who was asking for support: when the mothers were employed in the twelve months before the birth the probability that the fathers, too, take a parental leave increases (see D-Statist, 2012). 32% of the partners of women employed before the birth of the child filed an application for parental leave support in 2010 against 12% in the case of women who previously were not employed. On average the sum paid to mothers and fathers was EUR 964 – EUR 878 were paid to mothers and EUR 1 201 to fathers on average – but a third of the applicants only received the minimum amount of EUR 300. If fathers apply for paid parental leave benefits, they generally do this for the first three months of the new-born child (41%). Every fifth father opted for support after the first year of the child.

A number of controls have been used in the analysis. The descriptive statistics for the sample of women with children used in the analysis suggest that 62% of women are employed, 60% are married, 6% divorced and 1% separated, 29% are aged below 29 years, while 28% are aged between 30 and 39, 14% are aged between 40 and 44 and 27% are aged over 44 years. On average, they have been in education for 11 years; 21% live in North-Rhine Westphalia, 14% of women live in Baden-Württemberg, 3% in Berlin and 1% in Bremen. To capture “anticipation” and “actuality” effects related to childbirth, the specification includes a number of leads and lags prior to and after birth. The choice of leads and lags around birth reflects both biological factors and findings of the research on the “honeymoon period”. They are introduced as controls in the regression to capture variations in subjective well-being which are not strictly related to the BRL policy.

6.2. The case of the United Kingdom

The empirical analysis for the United Kingdom uses The *British Household Panel Survey* (BHPS) – made available through the ESRC Data Archive and originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex. The BHPS started in 1991 with households from 250 areas in Great Britain. In later years, samples from Wales, Scotland and Northern Ireland were added.

At the date of the analysis, the BHPS consists of 18 rounds of data, containing rich information about people’s activities and socioeconomic status. Unfortunately, however, not all of these rounds contain all the information on the dependent variable – subjective well-being – that should ideally be used throughout the analysis. A general life satisfaction question is only included from the year 1996 onwards, and has been skipped in 2001, which means there are subjective well-being data for the period 1996-2000 and 2002-08. Additionally, the life satisfaction measure is not exactly comparable to the German measure. The “satisfaction with life” data for waves 6-10 and 12-18 are based on the following survey question:

Please tick the number which you feel best describes how dissatisfied or satisfied you are with your life overall? 1 (not satisfied at all) to 7 (completely satisfied).

This seven point question thus differs from the 11 point life satisfaction question of the GSOEP. Across these 12 waves and all surveyed individuals, respondents give an average life satisfaction score of 5.22 on a scale of 7, with a standard deviation of 1.29. In 1.5% of the responses, an individual indicates being completely dissatisfied (a score of 1), while in 14.5% of cases respondents are completely satisfied (a score of 7).

In total, there are 2 120 individuals on BRL. Only 28 of them, however, are male. The analysis will therefore be restricted to female individuals.

The detail of BRL policy changes in the United Kingdom is presented in Box 2. In summary, there were a maximum of five policy changes to be considered during the analysis. These policy changes are seen here as exogenous, i.e. not related to people's circumstances or personality, but are likely to be correlated with the demand for parental leave. They are thus candidates for instrumental variables in regressions exploring the effect of parental leave on subjective well-being. The dates of the five policy changes are as follows: 1) 16/10/1994; 2) 15/12/1999; 3) 30/04/2000; 4) 06/04/2003; and 5) 01/04/2007.

Box 2. BRL policy changes in the United Kingdom

In 1973, the United Kingdom had a paid but not job-protected maternity allowance of 18 weeks (Sargeant and Lewis, 2008). From 1 June 1976, the 1975 Employment Protection Act introduced the right to return to work up to 29 weeks following birth. Maximum leave before birth was 11 weeks (thus 40 weeks job-protected leave in total). Payment was provided for 18 weeks, consisting of the first six weeks paid at 90% of earnings and the remaining 12 weeks with a flat rate. Eligibility criteria include at least two years full-time work with the same employer for 11 weeks before childbirth, or five years part-time (Zabel, 2009). Although the 1975 Employment Protection Act received parliamentary assent on 12 November 1975, it was implemented until 1 June 1976 for a right to return to work on 6 April 1977 (Fonda, 1980).

From 16 October 1994, all employed pregnant women, regardless of hours or length of service, were entitled to 14 weeks of job protected maternity leave with all normal contractual entitlements except pay. Women who have two years continuous service were entitled to an additional period of maternity leave, lasting from the end of statutory maternity leave until the 28th week after the baby was born. Women could start maternity leave at any time from 11 weeks before the date of expected childbirth (still 40 job protected weeks). Women who had been with their employers for 26 continuous weeks, ending the 15th week before the expected date of birth were entitled to receive Statutory Maternity Pay for 18 weeks, with six of these weeks at 90% of earnings and 12 weeks at an improved flat rate (Callendar et al., 1997).

From 15 December 1999, parents with children under five years of age were each entitled to up to 13 weeks of unpaid leave. Where individual employers had not chosen to negotiate their own arrangements with employees, leave allowed within one calendar year was limited to four weeks.

From 30 April 2000, all employed pregnant women, regardless of hours or length of service, were entitled to 18 weeks of job protected maternity leave with all normal contractual entitlements except pay, up from 14 weeks (Gregg et al., 2007). This period further rose to 26 weeks from 6 April 2003: all employed pregnant women, regardless of hours or length of service, were entitled to 26 weeks of job protected maternity leave with all normal contractual entitlements except pay. Also from 6 April 2003, maternity leave increased to one year. It was divided into ordinary and additional maternity leave. The first period and second period were both 26 weeks. The payment was at 90% of earnings for the first six weeks, but the flat rate paid period was now 20 weeks long (up from 12 weeks). The 26 weeks additional maternity leave was unpaid. Paternity leave was introduced around the birth of a child for two weeks at flat rate payment. Mothers and fathers still both have access to 13 weeks of statutory unpaid parental leave while the child was less than five years old.

From 1 April 2007, the flat rate payment period increased from 20 weeks to 33 weeks.

Data from the *SOCX Database* suggests that public expenditures on social policies in 2007 were considerable also in the United Kingdom: EUR 5 025 million. The share of expenditures devoted to BRL policies amounted to 11% of the total social policy spending in the same year.

According to Moss (2012), the mean length of maternity leave taken by women increased by approximately two months between 2006 and 2008. A large majority of fathers (91%) took some leave around childbirth. 49% of them took statutory paternity leaves – 50% of them for a duration of two weeks and 34% for a shorter duration. 25% took statutory paternity leave plus other paid leave. Moss (2012) also highlights that the probability of taking paternity leave was higher for men working in the public sector. Data on the take-up of parental leave in the United Kingdom are limited. Those available indicate that in 2008, only 5% of mothers used “fully” paid parental leave in their first-job after birth compared with 17% of employed fathers.

7. Results

7.1. Germany

Table 1 reports the result of the various regression models estimated: column 1 is the simple OLS, column 2 is a FE and column 3 is the FE IV.

Some of the OLS estimates are in contradiction with FE and IV-FE estimates, in particular, OLS cannot control for cohort effects independently of age. This may be related to the inadequacy of the OLS estimator to control for unobservable characteristics of individuals which are pooled over time. The OLS estimator also mixes up cohort and age effects whereas FE holds cohort constant. The estimates of household income and of the treatment are also bigger in the OLS than the corresponding FE and IV-FE estimates which could be related to an endogeneity problem.

In contrast, the estimates are very stable across the IV and FE specifications and suggest a number of interesting patterns. First, being on BRL positively and significantly affects life satisfaction. This effect is robust to all specifications estimated and may be related to the ability for mothers on BRL to preserve the positive effects of being employed while they stay at home and raise their children. The highly significant coefficient is 0.125, which is very close to the impact on life satisfaction of being in paid employment. Perhaps it is the job protected nature of the birth related leave which is driving the similarities between being at work and being at home but with a job guarantee. Note that because the regression controls for household income, the coefficient on BRL refers only to the non-monetary effects of leave. However, this non-monetary effect will over-estimate the positive influence of leave on life satisfaction when BRL status is associated with less than full replacement of market wages and leads then to a reduction in household income.¹²

Both the fact of being employed and having a higher income increase life satisfaction. The results also suggest that life satisfaction declines up to the age 30-34 and then starts increasing with age. Older women with children seem more satisfied compared with younger ones. There are many reasons for this, but it may be that the ability to cope with family and professional life has worsened in Germany. Younger women may also be less satisfied because of the lower number of children they have in recent decades compared with older women in the past. In fact, the coefficient associated with the number of children suggests that life satisfaction increases with additional children. Married women also display higher satisfaction than non-married, divorced, separated women and

Table 1. Estimation results

	OLS	FE	FE-IV
		Lifesat	
Treatment effect	0.2652** (0.0468)	0.1272** (0.0369)	0.1250** (0.0369)
Other employment status (ref.)			
Employed	0.1401** (0.0248)	0.1492** (0.0206)	0.1505** (0.0206)
Married (ref.)			
Separated	-0.4825** (0.0783)	-0.3395** (0.0754)	-0.3428** (0.0754)
Single	-0.1404** (0.0519)	-0.1896** (0.0693)	-0.1897** (0.0689)
Divorced	-0.2114** (0.0595)	-0.0119 (0.0665)	-0.0147 (0.0666)
Widows	-0.0922 (0.0872)	-0.1983* (0.0931)	-0.2007* (0.0935)
Partner abroad	-0.8798** (0.2668)	-0.3356 (0.2946)	-0.3340 (0.2948)
Below 20 (ref.)			
20-24	-0.2212** (0.0476)	0.0183 (0.0497)	0.0173 (0.0497)
25-29	-0.4197** (0.0529)	0.0151 (0.0589)	0.0143 (0.0590)
30-34	-0.6402** (0.0582)	-0.0149 (0.0684)	-0.0134 (0.0685)
35-39	-0.6135** (0.0691)	0.1134 (0.0829)	0.1141 (0.0830)
40-44	-0.4634** (0.1015)	0.2997** (0.1110)	0.3009** (0.1112)
> 44	-0.7145** (0.1405)	0.3901** (0.1481)	0.3919** (0.1483)
Net (ln) household income	0.6962** (0.0282)	0.4093** (0.0266)	0.4104** (0.0265)
Number of children	-0.0557** (0.0167)	1.7126** (0.3905)	1.7122** (0.3906)
9 to 2 month before birth	0.6123** (0.1418)	0.4183** (0.1073)	0.4168** (0.1076)
2 to 0 month before birth	0.3596** (0.0935)	0.4025** (0.0835)	0.4035** (0.0838)
2 to 6 month after birth	0.2072* (0.1048)	0.1984* (0.0941)	0.2021* (0.0939)
6 to 10 month after birth	0.0671 (0.1127)	0.0705 (0.0966)	0.0708 (0.0970)
10 to 12 month after birth	0.2470 (0.1676)	0.0637 (0.1463)	0.0760 (0.1450)
12 to 15 month after birth	0.1082 (0.1714)	0.0297 (0.1479)	0.0271 (0.1480)
15 to 18 month after birth	0.2796 (0.1878)	0.0867 (0.1531)	0.0912 (0.1528)
18 to 24 month after birth	0.0314 (0.1652)	-0.0162 (0.1434)	-0.0183 (0.1430)
18 to 36 month after birth	0.1290 (0.1222)	0.0155 (0.1078)	0.0131 (0.1077)
Years of education	0.0284** (0.0059)	-0.0116 (0.0109)	-0.0117 (0.0109)

Table 1. **Estimation results** (cont.)

	OLS	FE	FE-IV
	Lifesat		
Constant	2.0957** (0.2274)	1.2840 (0.8207)	1.6009* (0.7827)
Time	Dummies	Dummies	Trends
Länder effects	Yes	Yes	Yes
Observations	81 828	81 828	81 828
Number of never changing person ID		10 277	10 277

Robust standard errors in parentheses.

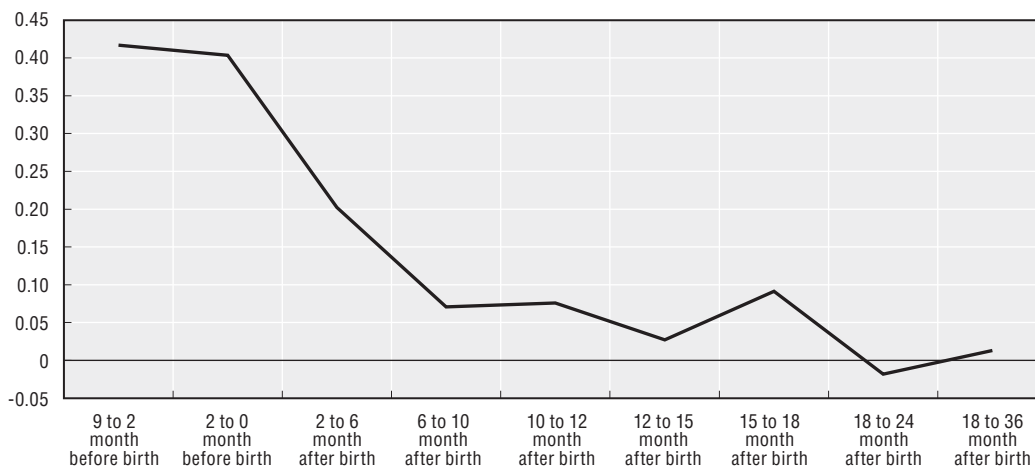
* Significant at 5%; ** significant at 1%.

widowers. Education does not significantly affect life satisfaction, but its effect is probably captured by (the natural log of) net household income. The *Länder* dummies indicate significantly life satisfaction compared with Bayern (the reference category), in particular living in Bremen gives the largest satisfaction premium (13%) compared with Bayern.

The coefficient estimates associated with the control variables related to marital status and income are in line with those found in the literature on life satisfaction. Similarly, the estimates associated with the age coefficient show the expected relation with life satisfaction found elsewhere in the literature.

The analysis of the leads and lags around childbirth confirm some of the evidence reported in the literature for the baby honeymoon (Figure 8): the largest positive effect on life satisfaction comes before and just after birth – with a size larger than more than twice the positive effect of being employed. However, this is a very temporary effect, which disappears as the infant grows older. After another two months, the effect is more than halved, and by about one year of age, any positive effect on life satisfaction related to child-age has gone. Moreover, the effect is only significant up to six months after birth. One might interpret this finding as some mild evidence in favour of a policy of BRL for a period of up to six months, if the policy goal is women’s life satisfaction.

Figure 8. **The effects of child age and being on BRL and child age on life satisfaction in Germany**



Source: Based on column 3 of Table 1.

Table 2 reports the results of the difference-in-differences estimation, conditional on a range of covariates as in the previous models. These are the conditional double difference, i.e. the difference in life satisfaction before and after the policy changes between the treated and the untreated. All the estimates are positive suggesting a potential welfare effect of BRL policy. However, only four policy changes seem to have a significant effect on life satisfaction. The 1986 policy introducing eight months of paid parental leave, the 1992 and 1993 policy changes extending the duration of unpaid and paid parental leave and the 2001 introduction of flexibility in taking parental leave all had a statistically significant effect on life satisfaction. The effect tends also to become more positive over time.¹³

Table 2. Estimation results, Germany, BRL and life satisfaction (DiD)

Policy change	Difference-in-difference
1986 introduction of 8 months of paid parental leave	0.353
1988 rise in paid parental leave from 8 to 10 months	0.080
1989 rise in paid parental leave from 10 to 13 months	0.046
1990 rise in paid parental leave from 13 to 16 months	0.055
1992 rise in unpaid parental leave to three years	0.185
1993 rise in paid parental leave from 16 to 22 months	0.195
2001 introduction of flexibility in taking parental leave	0.199
2007 introduction of earnings related paid parental leave	0.132

Note: Figures in bold are statistically significant at 5%.

7.2. Results from the British Household Panel Survey

Table 3 presents the results from the regression models using FE and FE-IV to estimate the effect of being on BRL on life satisfaction of women interviewed in the BHPS. The specifications include a set of standard controls, as similar as possible to those used in the analysis of German data and individual fixed effects as well. The results highlight patterns similar to those found in the literature on subjective well-being.

In terms of the first column, being on BRL has a statistically significant impact on life satisfaction. Its magnitude is one-quarter of a life satisfaction point, or an effect size of 0.2 of a standard deviation. The effect obtained with FE in the United Kingdom is very close to the comparable German statistic (Table 1). The fact of being employed and going to work raises life satisfaction by 0.16 of a life satisfaction point (effect size of about 0.1).

The BHPS does not contain questions on net income. Income is calculated separately, as described in Bardasi et al. (1999). The release of the income measures always lags a couple of years behind the data releases, which means that net income data are currently only available for the rounds 1-16. In terms of the results, the log of household income has a statistically significant though economically small impact on life satisfaction: a 10% increase in income only increases life satisfaction by 0.005 points on a 7-point scale.

Even though fixed effect are being controlled for, there is still a concern that there are unobserved time-varying factors which are influencing both the decision of going on parental leave and life satisfaction. Therefore, column 2 of Table 2 shows a regression model in which the BRL dummy is instrumented with the dummies for policy change 2, policy change 3, and policy change 4. Note that the first and last policy changes cannot be used since life satisfaction is only measured from 1996 onwards, and income data is not available

**Table 3. Subjective well-being and BRL
in the British Household Panel Survey (FE and IV)**

Variables	FE	FE IV
	Life satisfaction	
	(1)	(2)
Treatment effect	0.2426*** (0.052)	1.0042 (4.872)
Employed	0.0794*** (0.016)	0.1339 (0.349)
Youngest child < 1 year	0.0514* (0.026)	-0.0726 (0.764)
Youngest child 1-2 years	-0.0054 (0.026)	0.0071 (0.071)
Log Household income	0.0511*** (0.011)	0.0405 (0.065)
Education – high	0.0283 (0.057)	0.0241 (0.061)
Education – medium	-0.0058 (0.057)	-0.0026 (0.062)
Married	0.0373 (0.033)	0.0247 (0.076)
Widowed	-0.2911*** (0.054)	-0.3025*** (0.078)
Divorced	-0.0244 (0.043)	-0.0320 (0.059)
Disabled	-0.1962*** (0.024)	-0.2026*** (0.029)
Time dummies	Yes	Yes
Time trend	No	No
Age dummies	Yes	Yes
Observations	59 577	59 577

yet for the years 2007 and 2008. This specification includes fixed effects as well. The policy change dummies are, however, collinear with time dummies. It is thus necessary to assume that well-being evolves smoothly over time and the time dummies are replaced with a time trend as previously. This specification does not show us a significant relationship with education, and widowed individuals are significantly unhappier than the others. Being disabled is also negatively related to subjective well-being.

Having a child of less than one year of age has a positive and statistically significant though small impact on one's life satisfaction. The coefficient on its lag is negative, though, which suggests adaptation. However, the lag is not statistically significant.¹⁴

Results from the IV regressions are rather disappointing. The parental leave dummy has an ill-defined, very large though statistically insignificant, coefficient in column 2 which may be related to the weakness of the instruments used – as indicated by the Stock-Yogo tests.

Given the poor performance of the IV-FE specifications, a treatment-effect regression model was also estimated where the (endogenous) variable is being on BRL. Policy changes 2, 3, and 4 were used as exclusion restrictions to identify the effect of interest in the life satisfaction regression. The coefficient estimate of being on BRL is positive (0.69) and statistically significant, suggesting again an increasing effect of BRL on life satisfaction.

8. Conclusions

The theoretical and empirical academic literature considering subjective measures of well-being and their socio-economic determinants has increased substantially in recent decades. Concurrently to this burgeoning academic literature, a significant amount of data on subjective well-being has been collected.

The academic literature is beginning to have an influence in the public and policy arenas. Academics have begun writing articles and books addressing policy issues and implications (for example, Layard, 2005; Diener et al., 2008; Greve [ed.], 2010). The Stiglitz-Sen-Fitoussi report, commissioned by the French government, has added further impetus to this movement. Both international and national reports were increasingly drawing on subjective measures as part of an indicator dashboard to describe the evolution of social outcomes, both between countries and across time (e.g. OECD, 2010; OECD, 2011b, c).¹⁵

This growth has contributed substantially to the knowledge of how to measure subjective well-being, the relationship between subjective measures and traditional economic indicators like GDP, and the background factors such as family life, health and income which may influence an individual's subjective well-being.

Despite this impetus a central issue remains. It is about how to use these tools to evaluate the welfare effects of social policies. A larger body of empirical work which directly addresses policy choices and their impact on subjective well-being needs to be built. This is even more important to shed light on the main mechanisms behind welfare effects in the absence of randomised experiments.

The aim of this paper was to fill some of these gaps by addressing the following question: Does being on BRL enhance life satisfaction? In doing so, the paper uses policy changes as the assignment rule into treatment and control groups, respectively, to build a quasi-experiment.

Differently from Pezzini (2005) the results from a variety of methods suggest that BRL policies tend to have a significant positive impact on life satisfaction of women eligible for this kind of policy both in Germany and in the United Kingdom. Differences between the findings of the present paper and the studies of Pezzini may be related to a variety of factors.

In particular, quality and precision of the data collected in the GSOEP and BHPS are bigger compared with Eurobarometer. The data collected in the GSOEP and BHPS are representative of populations in Germany and the United Kingdom. Sample sizes are much smaller in Eurobarometer. BHPS and GSOEP collect individual panel data and thus information on the same individuals over time which implies a greater stability over time than the Eurobarometer, both with respect to the question asked and the people surveyed which affect once again the robustness and validity of the data.

The result we find in our paper is robust to using a variety of approaches. Overall, the results for the United Kingdom offer cautious support for the German results. The effect of BRL on life satisfaction is relatively large, very close and even higher in the case of the United Kingdom to the effect on life satisfaction deriving from being in employment. It may well be the combination of time off *and* the right to return to work that result in higher life satisfaction. The effect seems to be causal, running from leave to satisfaction.

This result is useful to inform the debate of welfare effects of social policy. However, it is also important to highlight that that long leave periods tend to reduce women's attachment to the paid labour market. The key issue then becomes the optimal design of

BRL, a design which would allow the combination of high level of individuals' life satisfaction with a high probability of returning to work. For example, the analysis of German data suggests that life satisfaction for women on BRL is highest just before and up to six months after childbirth. Other studies and more precise data on BRL are necessary to see if this effect is robust over time and across countries.

The analysis presented here has also some limitations which should be acknowledged. *First*, the benefits of leave in terms of subjective well-being are likely to be shared across the family unit. The inability to assess the impact of maternity leave on fathers' well-being is a major issue. For example, data from the German Federal Statistics Office show that the proportion of fathers taking leave has increased substantially between 2006 and 2009. Future waves of the GSOEP might help to shed some light on the benefit of the 2007 reforms also on fathers.

Second, there are distributional aspects which the paper cannot address because of the lack of a natural experiment. Those who experience the positive effect on life satisfaction are likely to be different from those who do not. The methods used in the paper represent one possible attempt to deal with this issue. However enhanced data on the relevant outcomes might shed further light on these issues.

Notes

1. The definition of birth-related leave used in the paper covers both maternity and parental leave. See www.oecd.org/els/soc/PF2.1_Parental_leave_systems%20-%20updated%20%2018_July_2012.pdf.
2. In this paper, we often refer to "treated" and "untreated" (or "control"). These terms generally identify two different groups of individuals that have and have not, respectively, participated in a given experiment. Broadly speaking the group which is treated has undergone the treatment, while the control has not. Pure experimental methods allow identification of the effect of a given treatment by eliminating all "confounding" factors and, in particular, the endogeneity bias. The literature has extended these concepts to quasi-experimental methods (or natural experiments) which also comprise policy changes designed in such a way that individuals cannot select themselves into or out of the measure. In that case, the treated group is formed by those individuals that are affected by the policy change while the control group is formed by those individuals that are not affected by the policy change.
3. See also Burchardt (2006).
4. The measure of mental health was hospital admissions for mental health reasons.
5. Similarly there are very large variations in expenditures on BRL. See OECD (2011b) for details.
6. See for example Nielsen (2009).
7. It is worth noting that sampling/non-sampling errors may affect the construction of the treatment and control groups. For example, non-sampling errors are likely to be large in Eurobarometer because of the changes in the questionnaire and resulting impact on framing effects on responses to SWB questions.
8. We are indebted to one of the referees for this suggestion.
9. Correction of the selection bias with Heckman's treatment model is also possible and this approach will be used to estimate welfare effects of BRL in the United Kingdom.
10. Originally the analysis also included Belgium. However, for the small sample size, because of the different measure of subjective well-being recorded in the survey and of the unique policy change that occurred, we have decided to exclude it. Results are available for interested readers.
11. In 2011, the participation of fathers in paid parental leave benefits increased substantially to 27.3% but more than three-quarters of them requested benefits for no longer than two months. The reform of parental leave introduced in 2007 was explicitly aimed at increasing the take-up of leave by fathers. According to very recent data published by the Federal Statistics Office, the proportion

of fathers taking leave has increased steadily: from around 3% in 2006 to around 26% for children born in the third quarter of 2010 (see Blum and Erler, 2012).

12. Unfortunately, we cannot control for the generosity of leave benefits because of the unavailability of longitudinal data.
13. It is interesting to note that the average effect obtained with the DiD estimator is 0.152 which is not far from the one obtained with the IV estimator.
14. Ideally, as in the case of Germany, it would be desirable to break down these dummies in even finer sub-annual categories, to control for fluctuations of well-being during the months before and after giving birth – the so-called “baby honeymoon effects” examined with German data. The use of the additional information contained in the fertility calendar in the BHPS might allow undertaking such an exercise.
15. In 2011, for example, the OECD launched a new indicator (the Your Better Life Index) which allows comparison across countries in terms of average well-being along 11 dimensions. See www.oecd.org/statistics/betterlifeinitiativeyourbetterlifeindex.htm.

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APPENDIX A

Eurobarometer survey detail

Eurobarometer	Year	Fieldwork months	Question number
ECS73	1973	September, October	Q22
3	1975	May	Q61
4	1975	October	Q68
5	1976	May, June	Q149
6	1976	November	Q112
7	1977	April, May	Q112
8	1977	October, November	Q112
9	1978	May, June	Q112
10	1978	October, November	Q112
11	1979	April	Q124
13	1980	April	Q112
15	1981	April	Q120
17	1982	March, April	Q142
18	1982	October	Q232
19	1983	March, April	Q121
20	1983	October	Q238
21	1984	March, April	Q212
22	1984	October, November	Q226
23	1985	March, April	Q132
24	1985	October, November	Q155
25	1986	March, April	Q122
26	1986	October, November	Q145
27	1987	April	Q231
28	1987	October, November	Q135
29	1988	March, April	Q125
31	1989	March, April	Q124
31A	1989	July	Q123
32	1989	October, November	Q3
33	1990	March, April	Q2
34.0	1990	October, November	Q7
34.1	1990	October, November	Q2
34.2	1990	October, November	Q2
35.0	1991	March, April	Q2
36.0	1991	October, November	Q2
37.0	1992	March, April	Q2
37.1	1992	April, May	Q2
37.2	1992	April, May	Q2
37.0+1	1992	March, April, May	Q2
38.0	1992	September, October	Q2
38.1	1992	November	Q2

Eurobarometer	Year	Fieldwork months	Question number
39.0	1993	March, April	Q2
40.0	1993	October, November	Q2
41.0	1994	April, May	Q2
42.0	1994	November, December	Q2
43.1	1995	April, May	Q2
44.2bis	1996	February	Q2
47.1	1997	March, April	Q36
49	1998	April, May	Q5
52.0	1999	October, November	Q7
53	2000	April, May	Q4
54.1	2000	November, December	Q4
55.1	2001	April, May	Q7
56.1	2001	September, October	Q46
56.2	2001	October, November	Q4
57.1	2002	March, April, May	Q4
58.1	2002	October, November	Q4
60.1	2003	October, November	Q4
62.0	2004	October, November	Q4
63.4	2005	May, June	QA3
64.2	2005	October, November	QA3
65.2	2006	March, April, May	QA3
66.1	2006	September, October	QA3
67.2	2007	April, May	QA3
68.1	2007	September, October, November	QA3
69.2	2008	March, April, May	QA3
70.1	2008	November, December	QA3
71.1	2009	January, February	QA2
71.2	2009	May, June	QA1
71.3	2009	June, July	QA1
72.4	2009	October, November	QA1

Source: www.gesis.org/en/services/data/survey-data/eurobarometer-data-service/eb-trends-trend-files/list-of-trends/life-satisf.

APPENDIX B

Birth-related provision in the German Länder

A number of *Länder* – seven out of the 16, which covers approximately half the German population – have additional payments (*Landeserziehungsgeld*) which effectively extend the paid leave provided at a federal level. The *Länder* providing these benefits include Baden-Württemberg, Bavaria, Berlin, Mecklenburg-Vorpommern, Rhineland-Palatinate, Saxony and Thuringia. In most cases, these appear to be employment-conditioned young child benefits. See Map 1 for details of *Länder* locations, their absolute and relative populations (share of the current German population) and a summary of the policy shifts.

Baden-Württemberg

At the same time as the federal reform of 1 January 1986 was introduced, Baden-Württemberg introduced a DM 400 (EUR 205) per month payment lasting for one year, beginning after the child reached 10 months of age, when federal payments for maternity and parental leave ran out (RL-LErzG, 1986).

Conditions include a *Länder* residency condition, being an EU national, not being in full-time employment and being under a relatively low monthly net family income ceiling (less than DM 2 000 until 1/1/1994; DM 2 200 until 1/1/1996; DM 2 450 until 1/1/2001, and from 2001 EUR 1 380 and EUR 1 125 for single parents). The income limit rises by DM 300 (EUR 230 since 2001) for every additional child (RL-LErzG, 1986; 1988; 1995; 2001).

From 3 July 1995, the one year of payment commenced from the child's second birthday up until the third birthday (RL-LErzG, 1995). Thus people living in Baden-Württemberg were covered up to three years for the unpaid but job-protected leave introduced by the federal government in 1992. From the 1 January 2001 federal reform, the additional year of paid *Länder* leave could be used up until the child was eight years old. Additionally, a higher payment was introduced for the third child: The first two children receive EUR 205 a month, the third and additional child EUR 307 per month. On 1 January 2007, the payment for the third child was cut to EUR 240 (VwV-LErzG Mehrlinge, 2007).

Bayern (Bavaria)

On 1 July 1989, Bayern introduced a monthly parental leave payment of DM 500 (EUR 256) for six additional months after the legal end of the federal parental payment (13 months at that point) (BayLErzGG, 1989). On 1 July 1993, this was further extended to one year's payment for children born from 8 December 1994 onwards (BayLErzGG, 1995). Thus parents could be covered for the entire period of the three years job-protected leave, created federally in 1992 (BayLErzGG, 1995). From 1 January 2001, parents received EUR 307

Map 1. Länder population, population shares and employment-conditioned young child benefits



instead of EUR 256 for the third and any higher order children. Children born from 1 July 2002 receive EUR 200 per month for six months for a first child, EUR 250 for 12 months for a second child and EUR 350 for 12 months for the third or higher order children (BayLERzGG, 2001). From 1 January 2007, these payment rates were cut by EUR 50 to EUR 150, EUR 200 and EUR 300, respectively, (BayLERzGG, 2007).

Conditions include a *Länder* residency condition, being an EU national, and not being in full-time employment. Families were required to be under a relatively low annual income ceiling, similar to that calculated by annualising the monthly threshold in Baden-Württemberg (Annual net family income for a couple not exceeding EUR 15 050 and for a single parent EUR 12 100. Each additional child increased the annual limit by EUR 2 150).

Berlin

Berlin introduced a payment for children born from 1 January 1983. The Berlin system paid a universal base-payment of DM 3 000 (EUR 1 533) during the first year of a child's life. The payment increased to DM 4 800 (EUR 2 454) per child if the parent was not working

full-time (non-full-time bonus) (GesSozFam VB1, 1983). The payment was abolished from 1 January 1993.

Conditions included a *Länder* residency condition, and being an EU national. There was an annual gross income ceiling above which families were not eligible for payment of EUR 33 745, extended by EUR 3 375 for each additional child.

Mecklenburg-Vorpommern

From 1 July 1995, families in Mecklenburg-Vorpommern received EUR 307 per month for a year after the legal end of the federal *Erziehungsgeld* for children born after 31 December 1993 (LErzGG M-V, 1995). From 1 April 1997, the duration of the payment was reduced to six months (LErzGÄndG M-V, 1997). Eligibility was reduced to children with mothers in education and training courses from 25 June 1999 (LErzGG M-V, 1999), and finally abolished on 1 May 2005, with final payments for some families up until 14 October 2005 (HRG, 2004/05).

Conditions included a *Länder* residency condition, not being full-time employed and being an EU national. There was an annual gross income ceiling above which families were not eligible for payment of EUR 15 032 for married couples and EUR 12 118 for everybody else. The threshold was extended by EUR 2 147 for each additional child.

Rheinland-Palatinate

From 1 July 1984, EUR 102 per month was paid for six months for a third or higher order child. The rate increased to EUR 153 for the second six months. There was an income ceiling. From 1 January 1986, parents of three or more children received EUR 153 per month for 18 months after federal pay finished. The income limits were similar to the limits of the federal scheme. From 1 January 1993, the duration of the payment introduced in 1986 was reduced to 12 months because the federal *Erziehungsgeld* was extended to 24 months. Thus the maximum period of 36 months remained unchanged. The payment was abolished for children born after 15 April 1995.

Saxony

From 1 September 1992, a payment was introduced, of EUR 205 per month for six months duration following the end of parental leave if the child was born between 1 January 1992 and 31 December 1993, and for 12 months if born after 1 January 1994. There is no payment if the child is in a public kindergarten (SächsLErzGG, 1992). From 1 January 2001, payment duration fell to nine months (SächsLErzGG, 2001). The regular pay of EUR 205 increased to EUR 307 for third or higher order children if the child was the third or more or if the entitled person was a student and when the child was born after 31/12/1994 (SächsLErzGG, 1996).

From 25 November 2007, payments were EUR 200 for the first child and EUR 250 for the second, both for nine months, and EUR 300 for the third and higher order child for one year. The annual net income-ceiling for married persons changed to EUR 17 100 and for others EUR 14 100. Each additional child increased the limit by EUR 3 140 (SächsLErzGG, 2008).

Conditions included a *Länder* residency condition, not being full-time employed and being an EU national.

Thuringia

From 1 January 1994, a young child payment was introduced. The amount and condition of the pay are linked to the federal *Erziehungsgeld* legislation. For every change in federal legislation, there was one for Thuringia. Parents receive the payments for six months following the end of the federal payment at the same monthly payment rate. The income thresholds were also as with the federal system (Thür LErzG, 1993).

There was a further change from 3 February 2006. The payment period was extended. Parents received EUR 150 for 12 months for the first child, EUR 200 for the second, EUR 250 for the third and EUR 300 for the fourth and additional child. If the child attended a kindergarten, parents could claim up to EUR 150 of this payment (Thür LErzG, 2006). From 14 May 2010, payment ceased if a child was in a kindergarten for more than five hours per week (Thür KitaG, 2010).