Childbearing and Well-being:
A Comparative Analysis of the European Community

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Abstract

This paper provides a comparative analysis of the impact of childbearing on individuals' wellbeing. The analysis is based on a sample of women drawn from the European Community Household Panel Survey. Several measures of wellbeing is derived. In particular we consider, household income, poverty status and various deprivation indices. We then apply Difference-in-Difference estimators combined with Propensity Score Matching techniques (DD-PSM) as a means to provide unbiased parameter estimates of the impact of childbearing events on these measures of wellbeing. The magnitude of these effects does not only depend on the measure of wellbeing, but also on the welfare regime under consideration.[1] There are for instance strong adverse effects on wellbeing in countries belonging to the Liberal welfare state (UK and Ireland) and only small effects among Social Democratic welfare states.

Keywords: Poverty, Deprivation indices, Childbearing, Difference-in-Difference Estimators, Propensity Score Matching, ECHP.

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[3] The Swedish sample is in fact not longitudinal and is consequently excluded from our analysis.

1. INTRODUCTION

Western European countries have experienced an unprecedented fertility decline over the last two decades. Needless to say this will have important economic and social consequences in the years to come. However, the reasons for this decline are widely debated in the social sciences. Whereas economists have emphasised increasing costs of children and increased opportunity costs among women, mainly as a result of increased educational attainment and labour market participation (Del Boca, 2003, 2004), sociologists and demographers have put more emphasis on changes in attitudes and value orientations (van de Kaa, 2001). Social Policy research emphasises the inadequate response of the welfare state in providing adequate services for a rapidly changing society, both in terms of family formation and labour market behaviour (Esping Andersen, 1990). Certainly there are considerable differences both in terms of welfare provision and fertility rates among European countries. Whereas Mediterranean countries are struggling with extremely low fertility rates, the situation is somewhat different, for instance, in Scandinavian countries. At the same time the social democratic welfare states, mainly comprised of the Scandinavian countries, provide much more generous child-care support compared to the Mediterranean countries. It is frequently argued that such differences in child-care provision are important in explaining the fertility differentials between the two groups of countries, the main argument being that the welfare provision in Social Democratic welfare states actively facilitates childbearing.

Our study aims at shedding light on this issue by analysing to what extent childbearing is linked to material wellbeing. In particular we are interested in analysing the consequences of childbearing on wellbeing, how large such effects may be, and how they differ between welfare regimes. However, such analysis introduces several challenges. Simply comparing and contrasting different welfare systems in terms of monetary benefits is difficult. The level of generosity does not only depend on monetary differences, but also on the extent the system offers flexibility of working hours and maternity leave, and it is not clear how such complexities interact with individuals perception of wellbeing. Moreover, it is not even clear how one should define and measure wellbeing. The literature tends to emphasise income penalties or changes in poverty as a result of demographic

events, but it is not clear to what extent such measures are able to identify individuals' perception of wellbeing. In our analysis we use a range of measures, including poverty status, equivalised household income, and several deprivation indices. In order to identify differences in the impact of childbearing and wellbeing across different welfare regimes we use information from the European Community Household Panel (ECHP). A central problem in the econometric analysis is that childbearing events are likely to be endogenous with respect to income measures, and possibly to the measures of deprivation. Our methodological strategy is to apply a Difference-in-Difference estimator combined with Propensity Score Matching (DD-PSM).

The paper is outlined as follows. Section 2 summarizes the relevant background for our analysis – with a particular emphasis on welfare regimes theory. Section 3 gives a description of the ECHP data. In section 4 we explain how we define wellbeing and put particular emphasis on the construction of the deprivation indices. Section 5 explains our methodological strategy and results, whereas section 6 concludes.

2. BACKGROUND

The aim of our analysis is to compare the effect of childbearing on wellbeing among individuals in different European countries. As a means to make inference about the role of social policy and provision of services, we focus our analysis around the classification of welfare regimes outlined by Esping Andersen (1990). These clustering of countries are broadly defined by shared principles of social welfare entitlement and relatively homogenous outcomes. The groupings are as follows (1) *Social Democratic*, with generous and universal entitlements, (2) *Conservative*, in which social policies are linked to earnings and occupation, - and an emphasis on the family and communities as a means to provide social support, (3) *Liberal*, emphasising the role of the market to provide services, and where benefits are to a much greater extent means-tested, and (4) Southern European, where public support is limited and a greater reliance on family relations to provide social support. It is clear that there are quite significant differences in provision of childcare and services among the different welfare regimes. However, the extent to which these differences have any impact on individuals' wellbeing, and therefore their decisions

about having children is difficult to assess. One issue concerns the level of generosity provided - another is how the system of childcare provision interacts with women's labour force participation and earnings.

A useful benchmark and starting point for comparing countries is to consider wellbeing in terms of shared household income. Out of the many sources of income available to the household – labour income is by far the most important. Needless to say shared household income increases with the number of employed family members, but decreases with increasing number of non-employed family members - such as children. Wellbeing, therefore, depends on two important factors: 1) Generosity of state welfare linked to childbearing, such as child benefits and child services, and 2) Regulations of the labour market – especially in terms of female labour force participation. We start by considering the issue of state welfare. The four welfare regimes differ in terms of social benefits in two important dimensions: 1) Family leave policy, and 2) Early childhood education and services (Gornick and Meyers, 2003). For instance, family leave in Social democratic states amounts to an average 37.5 weeks, whereas it is only 14.5 weeks in Conservative welfare states, and only 5 weeks in Liberal welfare states. Moreover, Social Democratic states promote a considerable higher level of gender equality in their family leave policies. The welfare regimes differ considerably in terms of the extent care is provided *publicly*. Social Democratic countries have the most extensive provision of public childcare for children in the age range of 1 to 3, whereas in contrast, both Mediterranean and liberal welfare states provides hardly any public childcare for children of this age group. Conservative countries have also quite poor provision of public childcare for very young children, but considerably better for children in the age group 4 – 5. Overall it is clear that both flexibility and generosity of social benefits are considerably better in Social Democratic and Conservative welfare states, and is likely to contribute significantly to the material wellbeing of household, and therefore promote childbearing.

As for labour market regulations the four regimes also hold significant differences. To a large extent this is reflected in the marked differences in female labour market participation. In Sweden for instance, the employment rate among mothers with children under age 6 is around 85%, whereas the average of Spain, Greece and Italy, in contrast, is only 45%. The latter three countries are also the ones with the lowest fertility rates.

Though these patterns may reflect differences in value systems and attitudes to childrearing, it is reasonably to believe these differences are also driven by a lack of flexible working hours and part time work, which is much more common in Social Democratic states, but rare in Mediterranean countries (Esping-Andersen (1999)). Southern European labour markets are in fact highly regulated both in terms of hiring and firing. These rules severely restrict opportunities for labour market entrants, a feature which has been claimed to be the main reason for high unemployment rates among women and young people (Del Boca (2004)). Unemployment among young people and women reduces of course current household income, and is likely to lead to postponements both in union formation and the onset of childbearing. The Italian labour market, for instance, is characterised by a high level of rigidity, with a strong protection for those in full-time employment, and very little protection for those in temporary. Moreover, part-time jobs are rare, but often the kind of jobs preferred by mothers. Interestingly the number of children under three years old and the daily hours offered are limited, implying that public childcare does not in fact provide much support to those in full time work – making child rearing and work a difficult combination. Often married women are forced to choose between not working or working full-time

Institutional aspects of the labour market, is of course important for women's employment prospects, and therefore important in assessing their material wellbeing. However, these examples also highlight the difficulty of comparing households operating under quite different and diverse welfare arrangements. Many studies focussing on households' wellbeing tend to do so by analysing poverty rates and changes in poverty status. An early study by Bane and Ellwood (1986) using the PSID suggest that changes in demographic status – particularly childbearing – are strongly linked to entering poverty. More recently for the UK case Jarvis and Jenkins (1996) using the British Household Panel Survey, support these findings. They show that a significant proportion of those who enters poverty do so as a result of increased family sizes, though the main source of poverty entry is from becoming unemployment. A recent descriptive analysis comparing poverty dynamics in six OECD countries highlights the importance of both family and employment change (CASE 1999). This study also shows that for all countries households particularly vulnerable to long-term poverty are female-headed household and single adult households

with children. Moreover, the study shows that poverty is more widespread in the UK compared to other European countries. Computing poverty rates for different countries *before* and *after* social benefits payments, they found that for the UK there is only a small difference, whereas in countries such as Germany, the Netherlands and Sweden the difference is considerable, a feature that is largely due to the stronger social safety net in these countries.

Holding these statistics up against fertility rates would of course confirm that Social Democratic states also have the highest fertility. However, it is also clear that Conservative states are reaching quite low fertility levels, whereas Liberal welfare regimes have maintained high fertility levels, at least compared to Conservative and Mediterranean welfare regimes. These apparent inconsistencies suggest that welfare generosity cannot be the only explanation of the apparent fertility differentials.

3. DATA

Our analysis is based on data from the European Community Household Panel (ECHP), which is a multi-dimensional and multi-purpose survey centrally designed and co-ordinated by the Statistical Office of the European Community (EUROSTAT). Starting in 1994, the ECHP provides information from six waves for Denmark, Germany, The Netherlands, Belgium, Luxembourg, France, United Kingdom, Ireland, Greece, Italy, Spain, and Portugal, and, starting from 1996, four waves are available for Austria and Finland[3]. A great advantage of the ECHP is the scope for comparability among countries in the European Union, together with the fact that it provides up-to-date information. A drawback of the panel is the lack of retrospective information. For instance, parental information cannot be recovered if the respondent has left the parental home in the first wave. Furthermore, retrospective information in terms of demographics and labour market experiences is limited[4]. However the ECHP contains fairly detailed information about the current demographic status, as well as detailed information concerning income, employment and schooling.

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[4] For a general review of the quality of the ECHP see Nicoletti and Peracchi (2002) and Peracchi (2002).

4. MEASURES OF WELLBEING

4.1 Monetary measures

We use two measures of monetary wellbeing. These are household income and poverty status, the latter being derived from the former. When assessing economic wellbeing it is paramount to adjust for the income needs of households with different characteristics. This will depend on the number of children in the household and the extent to which economy of scale within the household is exploited. Such adjustment is conventionally dealt with by applying an equivalence scale. However, studies have shown that the composition of poor households depends quite markedly on the choice of equivalence scale, though the actual poverty ranking of countries tends to be unaffected (e.g. de Vos and Zaidi, 2003). We include therefore two different equivalence scales. The first is the modified OECD scale, which gives a weight of 1 for the first adult, 0.5 for any other adults, and 0.3 for each child. The second is the Fuchs scale (Fuchs, 1986), where the first adult is given a weight of 1, other adults a weight of 0.8, the first child 0.4, and any other children 0.3. Compared to the OECD scale, the Fuchs scale gives a higher weight to other adults and a slightly higher weight to the first child - a feature that should be reflected in our estimates (see section 5). It is important to be aware that the use of equivalence scales in this manner assumes that household members share the income equally. However, this is not necessarily the case. For instance, there is ample evidence to suggest that the hypothesis of "income pooling" among married couples is rejected (Browning et al 1994; Lundberg et al 1997), instead giving support to bargaining models (e.g. McElroy and Horney 1981).

Unfortunately, constructing needs-adjusted income based on household bargaining models is not yet well developed, and not attempted here. Two additional details concerning household income are important. First, since we are here comparing different countries, we have to ensure that household incomes also are comparable. To do so we convert household income into the same currency. Moreover we adjust for the countries' Purchasing Parity Power (PPP) wave by wave. Finally, total net household income, as

reported in the ECHP refers to the previous calendar year, restricting the analysis to five waves only.

Poverty status is derived by comparing the total net household income as described above, with a poverty threshold – here set to 60 percent of the median level for the same variable. Thus, if the household income is less than the threshold the individual is consequently defined as poor. Again we use two different poverty measures defined over the two different equivalence scales described above.

Table 1: Means of poverty status derived from 60% of total net equivalised household income by welfare regimes and household type (weighted data)

	TOT	1 person hh	2 or more adults (no children)	Single parent with children	2 adults with 1 child	2 adults with 2 children	2 adults with 3 children
Social Democr.	0.120	0.235	0.081	0.209	0.076	0.076	0.144
Conservative	0.136	0.163	0.094	0.271	0.098	0.107	0.200
Liberal	0.207	0.208	0.098	0.555	0.168	0.191	0.371
Mediterranean	0.186	0.104	0.139	0.226	0.122	0.165	0.322

Note: Social Democratic: Denmark, Finland, and Netherlands; Conservative: Belgium, France, Austria, and Germany; Liberal: Great Britain and Ireland; Mediterranean: Greece, Italy, Spain, and Portugal

Table 2: Means of poverty status derived from 60% of total net equivalised household income by welfare regimes, age and two household types (weighted data)

	2 or more adults (no children)				2 adults with 1 child			
	<20	20-29	30-39	40-49	<20	20-29	30-39	40-49
Social Democr.	0.124	0.110	0.037	0.062	0.114	0.106	0.052	0.075
Conservative	0.168	0.107	0.067	0.088	0.157	0.116	0.075	0.100
Liberal	0.156	0.100	0.063	0.115	0.280	0.202	0.116	0.189
Mediterranean	0.224	0.149	0.111	0.136	0.171	0.172	0.099	0.104

Note: Social Democratic: Denmark, Finland, and Netherlands; Conservative: Belgium, France, Austria, and Germany; Liberal: Great Britain and Ireland; Mediterranean: Greece, Italy, Spain, and Portugal

Descriptive statistics from the European Household Panel shows how poverty rates differ across welfare regimes. First column in Table 1 shows strong variation in poverty rates. Social Democratic states have the lowest (12%), whereas the Liberal welfare states have the highest (20.7%) closely followed by the Mediterranean states (18.6). The next columns show poverty rates by household composition. It is of particular interest to see that among Social Democratic welfare states poverty remains low for all household types with children. In fact, poverty rates for households with less than three dependent children (excluding single parents) remain lower than households with two adults with *no* children. Comparing this with the other welfare states, we see that household with children tend to

have higher poverty rates than those without children. This is especially the case for Liberal welfare states. These trends are also evident in Table 2, which shows poverty rates by age groups for two different household types. Again Social Democratic welfare states have considerably lower poverty rates, with the Liberal welfare states having the highest poverty rates. These differences indicate strong differences in family related welfare provision. In general they confirm the widely held belief that Social Democratic welfare regimes, and to a large extent Conservative welfare regimes, provide much more generous family support.

4.2 Poverty deprivation indexes

We have so far discussed definitions and patterns of wellbeing in terms of monetary measures. The drawbacks of using poverty status are well known. Dividing the population into a simple dichotomy of "poor" and "non-poor" is clearly an oversimplification. Wellbeing is not a single attribute that characterises an individual or household in terms of its presence or absence (Betti and Verma, 2002). Using household income directly overcomes this problem to some extent in that it expresses wellbeing in terms of a certain degree rather than a simple dichotomy. Nonetheless, household income does not take into account that wellbeing is multidimensional. That is wellbeing is unlikely to depend on monetary wellbeing alone. Recently considerable research has been undertaken to develop multidimensional measures. We follow this literature closely and define several deprivation indices, which generally depend on a range of characteristics of the household[5].

In brief the approach can be explained as follows. A range of "items" believed to be important for individuals' perception of wellbeing is chosen. These items might be ordinal variables, either given as yes-no dichotomies or ordered scales. Moreover, these items might be subjective in nature, expressing individuals' perception of their economic situation, or any other relevant dimension of their current situation. These indicators are then "summarised", using an appropriate weighting scheme, to construct a composite index, ranging from 0 (no deprivation) to 1 (max deprivation). The technical approach is

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[5] See Mencarini (1999) for an application of this approach.

based on "fuzzy systems" and follows closely Betti and Verma (2002), which builds on the suggestion by Cerioli and Zani (1990) and elaborated by Cheli and Lemmi (1995). The majority of the items under consideration here are simple 'yes/no' dichotomies. A value of 1 is assigned if the item is present and 0 if the item is absent. Some items may involve more than two ordered categories. Similarly to dichotomous items equally spaced values in the range 1-0 can be assigned to an ordered polytomy:

$$v_{(m)} = (M-m)/(M-1)$$

where individual j is ranked m on M ordered categories, with $m=1$ the most deprived to $m=M$ the least deprived.

From the ECHP we identified 25 items that may be used to define the deprivation index (see Table 3). One serious issue here is that many of the items might be correlated. For instance, if a household does not possess a colour television – it is also unlikely that they possess a video recorder. Similarly, a dwelling plagued by damp walls is also likely to have rot in the windowsills. Failing to control for these correlations may make some household disproportionately deprived. As a result we perform a factor analysis to identify groups of items that are highly correlated *within*, but uncorrelated *between*. Largely consistent with Whelan et al (2003) we identify five groups: (1) "Affordability" dimension, based on subjective information on the ability of the household to make the ends meet, to keep the house warm, to go on week holiday away from home and so on; (2) "Housing deterioration", based on the physical characteristics of the dwelling, such as leaky roof, dampness and rot; (3) "Environmental problems", based on noise from neighbours, pollution, vandalism and crime; (4) "Secondary deprivation", based on non-essential durables, such possession of a car, video recorder and so on; (5) "Essentials", based on essential housing facilities such as having a bath and shower, and durables, such as television and telephone.

Of course, lack of a particular item does not necessarily reflect deprivation. Rather they might simply reflect individuals' preferences. For instance, some individuals may have a high income but choose not to have a television. To account for this we only record a deprivation item to be absent in so far the household was unable to afford it. This is relevant for items in groups 4 and 5. The indices of the various variables are defined over their weighted sum:

$$f(x_i) = \frac{\sum\limits_{j=1}^{J} g(x_{ij}).w_j}{\sum\limits_{j=1}^{J} w_j} \qquad (i = 1, ..., I)$$

where w_j is the weight. Two important issues determine the calculation of the weight. The first is the item's power to distinguish individuals in the population. For instance, items of deprivation that affect only small proportions of the population are considered more critical, and consequently given a larger weight. Secondly, it is adjusted according to the extent to which the item is correlated with other items. Specifically, the weight depends on the inverse of the average measure of its correlation with all other variables (See Betti and Verma, 2002) for technical details. In total we calculate six deprivation indices. The first is based on all items in Table 3, whereas the remaining five are specific to each subgroup. The indices are calculated separately for all countries and for all waves.

Computing deprivation indices based on the ECHP is not, however, without problems. On several occasions there has been routing problems in questionnaires, severely restricting variables to be included. Moreover, only a handful of the variables in Table 3 are available for Luxembourg and Germany. Accordingly these countries were excluded from the analysis. Many items were also missing for the UK sample in the first two waves, which were also excluded from the analysis.

Table 3: Information used to construct deprivation index

Deprivation indexes		Information included
Affordability	1.	Household's ability to make ends meet
	2.	Household can afford to keep house warm
	3.	Household can afford week holiday away from home
	4.	Household can afford replacing worn out furniture
	5.	Household can afford to buy new, rather than 2nd hand clothes
	6.	Household can afford to eat out, if want to
	7.	Household can afford to invite friends over
	8.	Household can afford to pay bills and utilities
	9.	General feeling about economic situation
House characteristics	10.	Shortage of space in the house
	11.	Accommodation is too dark or insufficient lighting
	12.	Lack of adequate heating
	13.	Leaking roof of the house
	14.	Dwelling has damp walls, floors or foundations
	15.	Dwelling has rot in windows
Environmental	16.	Noise from outside neighbours
	17.	Pollution or grime
	18.	Crime or vandalism
Luxury durables	19.	Possession of a car
	20.	Possession of a video recorder
	21.	Possession of a micro wave
	22.	Possession of a dishwasher
Essential durables	23.	Bath and shower in the dwelling
	24.	TV colours
	25.	Telephone

Table 4: Deprivation indexes by welfare regimes (weighted data)

	Total deprivation index	Affordability	House characteristics	Environmental	Luxury durables	Essential durables
Scandinavian	0.084	0.133	0.080	0.184	0.064	0.010
Continental	0.098	0.168	0.109	0.178	0.071	0.011
Liberal	0.107	0.174	0.078	0.116	0.148	0.037
Mediterranean	0.153	0.249	0.159	0.216	0.201	0.036

Table 4 gives the mean deprivation levels for each of the welfare regimes. Looking at the total deprivation (first column) we see that the Social Democratic countries have the lowest deprivation level, whereas the Mediterranean countries have the highest. Interestingly this pattern is similar to the poverty rates reported in Tables 1 and 2. Looking across the other five indices we see that the pattern of deprivation by welfare regimes persist to a large extent. However, for the groups concerning household characteristics and environmental

items, Conservative countries score better than Liberal countries. As expected we see that there is very little deprivation in terms of essential durables. Table 5 presents the total deprivation level for different welfare regimes and different household composition. Not unexpected single parents have the highest levels of deprivation. Looking across the different household types, concentrating on households with two adults, we see that deprivation does not vary much by the number of children. This is somewhat different to the case of poverty status, which seems more sensitive to the amount of children present in the household.

Finally in table 6 we see that the level of deprivation is not particularly sensitive to the age of the individuals, in so far they have no children. Among those who have children we see that deprivation becomes lower with higher ages, though overall the effect is not particularly pronounced.

Table 5: Deprivation index (total) by welfare regimes and household type (weighted data)

	1 person hh	2 or more adults (no children)	Single parent with children	2 adults with 1 child	2 adults with 2 children	2 adults with 3 children
Social Democratic	0.130	0.075	0.141	0.075	0.068	0.076
Conservative	0.130	0.093	0.153	0.095	0.082	0.101
Liberal	0.124	0.087	0.224	0.099	0.082	0.121
Mediterranean	0.156	0.154	0.183	0.137	0.132	0.160

Table 6: Deprivation index by welfare regimes and age classes (weighted data)

	2 or more adults (no children)				2 adults with 1 child			
	<20	20-29	30-39	40-49	<20	20-29	30-39	40-49
Scandinavian	0.072	0.088	0.068	0.060	0.072	0.089	0.070	0.069
Continental	0.102	0.097	0.092	0.086	0.089	0.108	0.096	0.080
Liberal	0.106	0.105	0.108	0.112	0.142	0.133	0.102	0.116
Mediterranean	0.198	0.156	0.144	0.153	0.144	0.161	0.132	0.124

5. Causes and effects: the impact of childbearing on wellbeing

The tables presented previously show interesting patterns of poverty and deprivation for different groups in society and for the welfare regimes under study. However, the reported statistics do not say much about whether - or to what extent - childbearing events may *lead* to higher levels of deprivation. In order to make such an assessment we need to construct a statistical model. By doing so we have to consider the likely possibility that childbearing events are endogenous with respect to poverty and deprivation. In other words, the effect of childbearing on household wellbeing can be confounded by the spurious effects of other variables. For instance, in table 4 we notice that one-person households are generally less deprived with respect to single parent households, but we do not know whether the higher deprivation of the latter household is a cause or a consequence of the presence of children. Given that endogenous regressors will produce biased estimates, they do not provide helpful information in terms of uncovering causal effects. From a social policy point of view this is important: sensible policies aimed at reducing poverty and improving wellbeing, can only be successfully implemented as long as one knows the underlying mechanism of poverty. If for instance, demographic events do not *lead* to poverty, then policies aimed at alleviating poverty, might be more successfully implemented if they are targeted elsewhere.

In this section we implement a method with the aim of establishing whether childbearing events do have a causal impact on poverty and deprivation, and if so, establishing the magnitude and the differences between welfare regimes. We apply this technique on different measures of wellbeing. In particular we are interested in (1) whether the use of different wellbeing measures provide different conclusions about the causal effects, and (2) whether different measures of wellbeing provide different conclusions about the effect of childbearing *across* different welfare regimes.

5.1 Methodological approach

A desirable approach for assessing individuals' wellbeing with respect to childbearing would be to consider explicitly the underlying processes that determine the households' income streams and thereby their wellbeing. Particularly important in this

strategy would be the employment and fertility processes, both of which would depend on a range of factors, including social benefits linked to childbearing. Such a strategy may for instance be implemented using event history modelling[6] and panel regression, which would uncover the dynamic relationship between work, fertility and wellbeing. However, this strategy is difficult to implement with our ECHP data – mainly due to the lack of parental and retrospective information, and the fact that we only have five waves. Another crucial problem is the endogeneity of childbearing with regard to wellbeing as discussed previously. The most common remedy for this problem is to use an Instrumental Variable (IV) estimator, in which the endogenous variable is instrumented by variables not correlated with the error term in the regression equation. Unfortunately this is complicated due to the difficulty of finding valid instruments in the ECHP.

Given these difficulties, we propose an approach, which combines the *Difference-in-Difference* (DD) estimator with *Propensity Score Matching* (PSM). This approach borrows heavily from the treatment effect model, which is generally concerned with estimating the impact of treatments, such as labour market training, on the expected income. Here the idea is to consider the effect of a change in demographic status from time *t* to time *t+1*, on any change in wellbeing in the same time period. Thus we are interested in the evaluation of the causal effect of experiencing childbirth on wellbeing. This relies closely on the construction of the *counterfactual*, which in this case will be the wellbeing outcome of the same women if they *did not* experience the childbirth. The counterfactual is consequently unobservable, but can be approximated by the help of Propensity Score Matching (PSM) techniques.

The use of PSM involves comparing the predicted probability of individuals having a child to the most similar individuals who did not have a child (Rosenbaum and Rubin, 1983). As a result individuals are divided into two types: those who experienced a childbirth (D_i=1) and those that do not (D_i=0). Individuals having children (the treated) are matched to those without (the comparison) by the means of the propensity score, which is based upon *observable* characteristics. The propensity score for individual *i* is defined as:

$$P(X_i)=Pr(D_i=1|X_i) \qquad\qquad (1)$$

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[6] e.g. Aassve et al 2003 for such an implementation using data from the BHPS

where X_i is a vector of explanatory variables recorded prior to the childbearing event. In our case the propensity score is defined by age, number of children, work and health status, educational level, marital and cohabiting status of the adults. Moreover, we also include initial level of poverty and deprivation prior the childbearing event. Thus, the estimated effects should be seen as the marginal effects of a childbearing event, of any order, on wellbeing.

Rosenbaum and Rubin (1983) show that if exposure to treatment is random within each cell as defined by X_i, it will also be random within cells defined by the propensity score variable $P(X_i)^7$. The assumption underlying this approach is commonly referred as conditional independence or strong ignorability. Mathematically the assumption states the following:

$$(Y_0, Y_1) \perp D \mid X, \qquad\qquad (2a)$$

$$0 < P(D=1 \mid X) < 1 \qquad\qquad (2b)$$

which means that conditional on X (the observable variables) – the outcome Y is independent on assignment to treatment. The propensity score can be easily estimated by either a probit specification or a logit. Having done so testing for the conditional independence assumption is needed. Provided the latter holds one may proceed to compute the average effect of treatment on the treated, which is given by

$$E\{Y_{1i}-Y_{0i} \mid D_i=1\} = E[E\{Y_{1i} \mid D_i=1, p(X_i)\} - E\{Y_{0i} \mid D_i=0, p(X_i)\} \mid D_i=1\}] \qquad (3)$$

where Y_{1i} and Y_{0i} denotes the possible outcomes in the two counterfactual situations of treatment and non-treatment and the outer expectation is over the distribution of $p(X_i)\} \mid D_i=1$ (see Becker & Ichino, 2002, for further details and references).

The fact that the variable $p(X_i)$ is continuous implies that the probability of observing two units with exactly the same propensity score is zero. Thus pairs cannot be matched by whether they have the same propensity score or not. However a range of procedures have been introduced to overcome this problem. Here matching of pairs of individuals is based on *how close* the estimated propensity scores are across the two samples. Various estimators have been proposed for this purpose, including Radius Matching, Kernel Matching, Stratification Matching, and Nearest Neighbour Matching. Here we use the

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latter approach in which the closest match to the ith treated individual is defined as the non-treated individuals that minimises $\|p_i - p_j\|$ (see Becker and Ichino, 2002, for details concerning the other estimators).

One of the main drawbacks of this method concerns the (2*a*) as it conjectures that selection occurs only on the base of observables. Provided this assumption can be overly strong, Heckman *et al.* (1997) propose to combine a Difference-in-Difference estimator to matching procedure. By using the Difference-in-Difference estimator we compare the mean change of *Y* from time *t* to *t+1* of participants with the mean change of *Y* for the same time period for non-participant. Formally this estimator is expressed as: $(\overline{Y}_{1,t} - \overline{Y}_{0,t+1})_1 - (\overline{Y}_{0,t} - \overline{Y}_{0,t+1})_0$. An important advantage of the DD estimator is that it allows us to control for selection into the treatment group caused by unobserved heterogeneity. That is, provided unobserved heterogeneity is time-fixed, its effect will be netted out by taking first difference (Heckman *et al.*, 1997; Froelich 2002).

In our application we use various versions of the DD - PSM estimator. First we analyse the impact of childbearing on differences in equivalised household income. Next we consider individuals who are at risk of entering poverty, and again analyse the impact of childbearing. Finally, we consider the impact of the same childbearing events on changes in deprivation as defined previously. All of the analysis is implemented separately for the four welfare types outline in section 2.

5.2. Results

The results from the Difference-in-Difference estimator are reported in Table 7. We start by considering differences in equivalised household income across welfare regimes as a result of the childbearing event. The two first rows in Table 7 gives an indication of the income penalty from one period to another caused by the childbearing event. That is, the figures indicate the reduction in equivalised household income as a result of having another child. Consequently this gives us an absolute measure of the "penalty" of childbearing. The difference in magnitude is obviously caused by the different equivalence scales. In particular, the two scales have quite different weights for additional adults present in the household. Whereas the OECD scale uses a weight of 0.5 the Fuchs scale

uses a weight of 0.8. However, both scales are fairly similar in terms of the weight imposed by children present in the household. Thus, the impact of an additional child from one period to the next will have a stronger impact when using the OECD scale - simply because the difference in weights between additional adults and children is smaller. However, the relative impact of childbearing events across welfare regimes is independent of which equivalence scale used. In general we find that that the strongest "income penalty" appears among the conservative welfare states, followed by the social democratic, Liberal and the Mediterranean. As we can see the difference between Conservative and Social Democratic on one hand and the Mediterranean regimes on the other - is rather large. Bearing in mind that the Social Democratic states have the most generous family policies and benefits, it may seem odd that the income penalty is much larger than what it is in Mediterranean countries. However, the differences in household income, as estimated here, do not control for the fact that income levels in Northern Europe are considerably higher than in the South of Europe. Consequently, simply using household income is not able to identify the effect of the differences in the generosity of the welfare provision.

Next we turn to the impact of poverty status – again using the two versions of the equivalence scales. However, before looking at the effects for the different welfare regimes we need to explain an apparent oddity in that household income based on the OECD scale, brings about a larger income penalty compared to the Fuchs scale. However, when considering poverty status we see that the increase in poverty – caused by the childbearing event – it is higher when it is based on the Fuchs scale. This might seem odd given that the household income penalty is lower when using the Fuchs scale. This is explained by the fact that the poverty threshold is itself is based on the equivalised household income of the sample (by country and wave). Consequently, and in contrast to the case of household income, poverty status is not sensitive to the weighting scheme of the adults in the households. However, it will still be sensitive to the weighting of children. The Fuchs scale puts a slightly higher weight to the first child in the household, which is reflected by the slightly higher poverty rates.

The poverty status parameters (columns 3 and 4) can be interpreted as the average change in entering poverty that is attributable to having a child. Thus, for the Social Democratic states, our estimates indicate an increase in entering poverty by 1.1 percent (or

2.1 % using the Fuchs scale), caused by having a (another) child. Looking across the welfare regimes we see that the effect on entering poverty is the lowest for Social Democratic welfare states. We find the strongest effect for Liberal Welfare regimes, whereas the effect for Mediterranean and Conservative welfare states is somewhere in between and similar. Holding these patterns against changes in Household income, we see some interesting patterns. The Social Democratic welfare states have the second largest income penalty of childbearing, but the lowest impact in terms of changes in entering poverty. On the opposite end we find the Liberal welfare states, with the second lowest income penalty but clearly the highest impact on entering poverty.

Overall, these results are consistent with welfare regime theory. The different patterns of results with regards to household income and poverty status are the result of different factors. One factor concerns the different shapes of the income distributions of the welfare regimes considered. It is well known that the income distributions in Social Democratic welfare states are generally characterised by a low level of inequality (i.e. low Gini coefficients), whereas income distributions in Liberal welfare regimes are much more unequal (higher Gini coefficients). This is also evident from Table 1 showing poverty in terms of the Head Count Ratio (HCR). Table 1 shows that Social Democratic welfare states have a much lower HCR, which in reality is a measure of "egalitarianism" in a country. Consequently, a negative income shock in Social Democratic countries, here caused by childbirth, is less likely to translate into entering poverty. Conversely in Liberal and Mediterranean states a smaller drop in household income is required for entering poverty. A second factor concerns differences in activity rates among women. Most Scandinavian women tend to work prior to the childbearing event and on average they stop working for 37 weeks, but only loosing a part of their income. This causes an obvious impact on household income though it is less likely to increase the probability of entering poverty, given the generosity of family benefits. In contrast, women in Southern Europe have considerably lower participation rates. As a result, they do not loose out in terms of salary loss, but the risk of poverty gets significantly higher due to increased family size and low family allowances.

Next we turn to our estimates concerning the deprivation indices. In general we would expect childbearing to have different impacts on the indices. For instance, it is likely

that an additional child have a detrimental impact on individuals' evaluation of affordability, whereas it less likely that it will have a strong impact on environmental items, the latter expected to remain fairly stable over time – independent of couples have children or not. Similarly, the deprivation index comprising essential items is expected to remain fairly stable. These expectations are confirmed by our estimates. Apart from the Conservative welfare regimes, "affordability" worsens significantly when a child is added to the household. In contrast, there is no significant impact on deprivation in terms of essential items. Looking across welfare regimes we notice that the impacts on deprivation is not always consistent with the patterns found for the monetary measures reported above. For instance, worsening in affordability is stronger in Social Democratic states compared to Conservative states and also Mediterranean states, though the effect is still strongest for the Liberal welfare regimes. Considering the total deprivation index, which includes all deprivation items, we see that there is no difference between Social Democratic and Conservative regimes, whereas the impact on Liberal welfare states is now insignificant. The estimates provide some odd results. For instance, the effect on childbearing has a significant effect on environmental deprivation among Conservative welfare regimes. As indicated above, it is not clear why childbearing should have such an effect, given that this index is likely to remain stable over time. One possible explanation is that prospective parents move to a more deprived area (i.e. cheaper housing) as a result of having another child. Another possibility is that they change their attitudes to towards environmental problems in their neighbourhood once a child is born. There are also significant effects in housing deprivation among Social Democratic and Mediterranean welfare regimes. However, these effects are easier to explain. For instance, one item in this index consists of individuals' assessment of whether the dwelling is of a suitable size. Naturally, new family members will necessarily make a dwelling feel more crowded. However, it is not clear why this does not have an effect on Conservative and Liberal welfare states.

Table 7, Effects of childbearing on Equivalent household income, and poverty status, and deprivation indices, Females.

	Social Democratic Welf. Regime	Conservative Welfare Regime	Liberal Welfare Regime	Mediterranean Welfare Regime
Net Household income				
OECD Equivalence scale	-1976.592 (-4.375)	-2223.232 (-7.335)	-1708.986 (-4.982)	-1281.604 (-7.996)
Fuchs equivalence scale	-1622.736 (-4.122)	-1875.132 (-7.297)	-1373.534 (-4.673)	-1037.073 (-7.647)
Poverty status				
OECD equivalence scale	0.011 (1.196)	0.037 (3.151)	0.066 (3.516)	0.040 (3.714)
Fuchs equivalence scale	0.021 (2.217)	0.062 (4.807)	0.091 (4.595)	0.056 (4.908)
Deprivation index				
Affordability	0.018 (3.927)	0.008 (1.511)	0.023 (2.998)	0.011 (2.303)
Household Characteristics	0.013 (2.333)	0.008 (1.049)	-0.009 (-1.019)	0.015 (2.861)
Environmental	0.007 (0.706)	0.025 (2.471)	0.001 (0.095)	0.010 (1.318)
Luxuries & Durables	-0.006 (-1.088)	0.001 (0.121)	0.009 (0.814)	0.009 (1.392)
Essentials	-0.002 (-1.049)	-0.002 (-0.861)	0.006 (1.081)	0.006 (1.593)
Total deprivation index	0.006 (2.376)	0.006 (2.007)	0.004 (0.768)	0.011 (3.779)

6. CONCLUDING REMARKS

Our estimates confirm many of the widely held beliefs based on welfare regime theory. For instance, our results for monetary deprivation show that childbearing has only a minor impact on poverty in Social Democratic welfare regimes, whereas it is much stronger in the remaining countries, especially among the Liberal welfare regimes. We also find that the use of changes in household income, shows quite different patterns compared to poverty status. We also see that the ranking across countries is fairly robust with regards to which equivalence scale applied. Overall, our estimates indicate that there is indeed a significant relationship between childbearing and material wellbeing. This has, obviously, important policy implications. For instance if the aim is to reduce poverty then policies might be successfully be targeted towards family related allowances. The introduction of deprivation indices to measure wellbeing gives a more mixed picture. Though, we find that affordability significantly diminishes as a result of a childbearing event, the effect across welfare regimes are not entirely consistent with welfare regime theory.

Another important issue concerns the magnitude of these effects. In general the effects are rather small. In the worst-case scenario we find childbearing events to increase the entry rate into poverty by 9.1% (Liberal welfare states). This figure is consistent with findings by Jenkins and Jarvis (1999) using the BHPS, but as they report in their findings, the impact of becoming unemployed has a considerably larger impact. This brings us over to some of the shortcomings of this analysis. It is important to be aware that we are here estimating the marginal effect on wellbeing as a result of a childbearing event. That is, controlling for background variables – including the level of initial household income and deprivation (see page …), we estimate the isolated effect of having a (another) child. This involves of course some limitations. For instance, it does not capture the dynamics and the interactions with the individuals' labour market behaviour. This is of course important, given that at least in terms of monetary wellbeing, fulltime employment is one of the crucial factors. The main point is that consequences incurred by childbearing are long lasting and stretches over more than one period. Related to this is the fact that welfare benefits and services vary in duration and flexibility. These issues suggest further research effort. An important extension would be to apply the analysis to the union formation and

employment events. In this way one would be able to identify the importance of childbearing events on wellbeing compared to these other important life events. Another important extension would be to separate out birth events for women in a stable union from single mothers. Moreover, it would be useful to undertake the analysis separately for parity, since many of the European countries operate with different welfare provision depending on the birth order. Moreover, it is likely that the effect on wellbeing will differ by parity.

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