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On the Changing Correlation Between Fertility and Female Employment over Space and Time

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Abstract. Various authors find that in OECD countries the cross-country correlation between the total fertility rate and the female labour force participation rate turned from a negative value before the 1980s to a positive value thereafter. Based on pooled cross-sectional data, Kögel (2004) shows that (a) unmeasured country-specific factors and (b) country-heterogeneity in the magnitude of the negative time-series association accounts for the reversal in the sign of the cross-country correlation coefficient. Our paper aims to identify those variables that may explain country heterogeneity in the negative association between fertility and female labour force participation. The selection of variables is based on existing macro-demographic theories. We apply aggregate descriptive representations of the time series and cross-country evolution of fertility, female employment and a set of labour market, educational and demographic variables and indicators of social policy.

Key words: cross-country correlation, female employment, fertility, OECD comparison, time series

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Résumé. Différents auteurs ont montré que pour les pays de l'OCDE la corrélation négative qui existait avant les années 1980 entre la fécondité et la participation des femmes à la force de travail s'est renversée dans les deux dernières décennies. S'appuyant sur un ensemble de données transversales, Kögel (2004) a montré que a) des facteurs non mesurés spécifiques à chaque pays et b) la diversité des pays dans l'ampleur de la relation négative expliquaient le changement de signe du coefficient de corrélation. Dans cet article, nous essayons d'identifier les variables qui pourraient expliquer l'hétérogénéité des pays dans l'association négative entre fécondité et participation féminine au marché du travail. La sélection des variables s'appuie sur les principales théories macro-démographiques. Les séries temporelles de fécondité et d'emploi féminin par grands groupes de pays sont mises en relation avec différentes variables (démographiques, niveau d'instruction, état du marché du travail) ainsi qu'avec des indicateurs caractéristiques des politiques sociales.

Mots-clés: comparaison OCDE, emploi féminin, fécondité, inversion de corrélation, séries temporelles

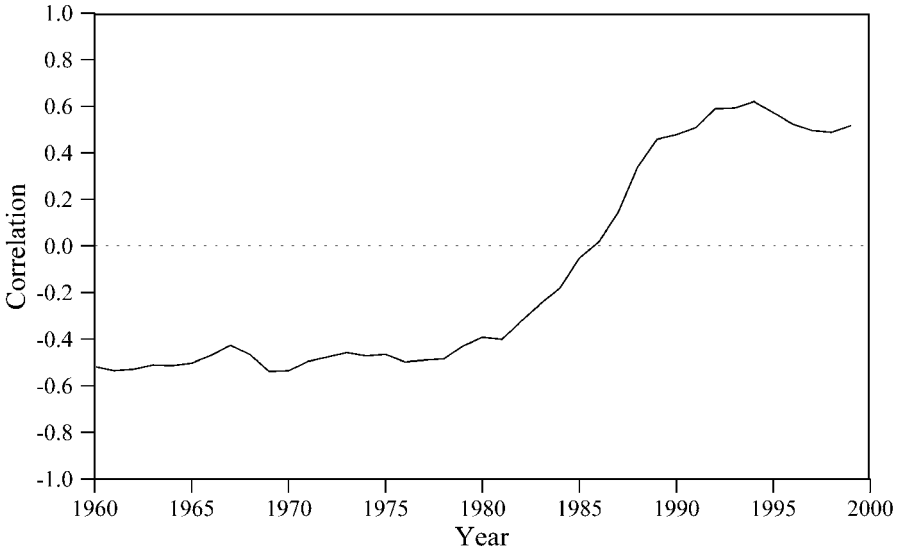

Figure 1. Cross-country correlation between the total fertility rate and female labour force participation rate, 1960–1999.

1. Introduction

Various authors find that in OECD countries the cross-country correlation between the total fertility rate (TFR) and the female labour force participation rate (FLP) turned from a negative value before the 1980s to a positive value thereafter (e.g. Ahn and Mira, 2002; Brewster and Rindfuss, 2000; Esping-Andersen, 1999; Pampel, 2001; Rindfuss et al., 2003). The countries that now have the lowest levels of fertility are those with relatively low levels of female labour force participation while the countries with higher fertility levels tend to have relatively high female labour force participation rates. Following the graphical presentation in the literature (e.g. Rindfuss et al., 2003), Figure 1 illustrates this change for 21 OECD countries.[1]

The change in the sign of the cross-country correlation between TFR and FLP has often been mistakenly associated with a change in the time series association between TFR and FLP (Benjamin, 2001; Brewster and Rindfuss, 2000; Esping-Andersen, 1999; Rindfuss et al., 2003). Recent studies by Engelhardt et al. (2004) and Kögel (2004) show that neither the causality nor the time series association between TFR and FLP has in fact changed over time. By applying error-correction models to six industrialised countries Engelhardt et al. (2004) find Granger causality in both directions, which is consistent with simultaneous movements of both variables brought about by common exogenous factors. Kögel (2004) not only shows that the time series association between TFR and FLP did not change, but he also offers two convincing elements which may explain the change in the cross-country correlation. These are (a) the presence of unmeas-

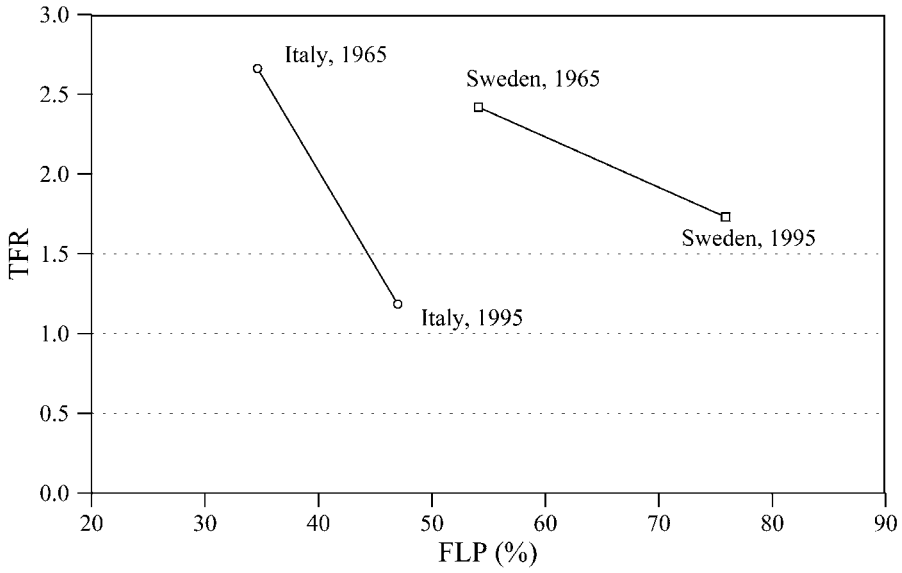

Figure 2. Total fertility rate and female labour force participation rate in Italy and Sweden, 1965 and 1995.

ured country-specific factors and (b) country heterogeneity in the magnitude of the negative time-series association between fertility and female employment. Figure 2 (taken from Kögel, 2004) illustrates these points by choosing Italy and Sweden, two countries representative for the development of TFR and FLP in the OECD sample. In both cross sections (1965 and 1995) the FLP was higher in Sweden than in Italy (supporting hypothesis (a)) and the increase in FLP is associated with a much stronger decline of the TFR in Italy than in Sweden, which is evidence for hypothesis (b).

Though these recent studies provide econometric evidence on why the cross-country correlation changed and prove that the time series association has not changed its sign, they do not give us a list of possible factors that may actually explain the change in the cross-country correlation coefficient. The studies by Adsera (2004), Ahn and Mira (2002), Benjamin (2001), Castles (2003), Pampel (2001) and De Laat and Sevilla-Sanz (2003) offer some theories and data that may explain why the sign of the cross-country correlation between TFR and FLP changed. Ahn and Mira (2002) use an extension of the Butz and Ward (1979) framework to show the importance of income effects of female wages, inflexible working hours, the possibility of purchasing childcare, and unemployment. However, only data for aggregate unemployment are actually presented, leaving the remainder of the discussion to rest on theoretical considerations. Benjamin (2001) presents an extensive discussion on factors that may cause the reversal of the cross-country correlation coefficient but then restricts her analysis to a pooled cross-section time series analysis of the TFR in which she only includes

male unemployment, GDP and country groups as explanatory variables in addition to FLP. Based on a family economics approach, Adsera (2004) estimated the effects of labour market arrangements (gender specific unemployment and activity rates, number of weeks of maternity leave and replacement rates during maternity leave, and the GDP) on pooled fertility rates using a panel of 23 OECD nations. Assuming a declining effect of FLP on TFR due to shifts in tastes and preferences Pampel (2001) estimates the effect of FLP using pooled time series data of 18 countries. Castles (2003) restricts his analysis on the bivariate association between TFR and different indicators of female employment, female tertiary education, Roman Catholic faith, and the total divorce rate on two points in time (1980 and 1998). De Laat and Sevilla-Sanz (2003) developed a bargaining model of efficient household decision-making that makes explicit the gender division of housework. Their empirical analysis on attitudes towards gender roles, however, is based on comparative cross-sectional survey data from one single year.

The aim of our paper is to use a wide set of labour market variables as well as demographic, educational and social policy indicators as plausible factors to explain the change in the sign of the cross-country correlation coefficient. Thereby, we focus not only on the time series correlation of our indicators with TFR but also on the time series interaction of female employment with these indicators. Because several of our proposed indicators are only available for five-year periods or less our approach is purely descriptive. However, as demonstrated by Ahn and Mira (2002), a fruitful task to start with could be a good descriptive illustration of a hypothesis that may have caused the cross-country correlation coefficient to change its sign.

Similar to Ahn and Mira (and prompted by the findings in Kögel 2004) we start off by building country groups that are homogenous with respect to the development of their FLP. While Ahn and Mira base their analysis on three groups of countries that are assembled according to the average level of FLP over the time period 1970–1996 (cf. Appendix A), we apply a more dynamic approach, assigning countries into three groups based on average levels of FLP over 10-year time periods (1960–1969, 1970–1979, 1980–1989, 1990–1999). We therefore allow countries to belong to different country groups over these four decades. This decision was made to take into account that several countries have undergone considerable changes in FLP during the last four decades. For instance Canada started with one of the lowest FLP in 1960 (32%) and now belongs to the countries with the highest FLP with 71% of women being in the labour force in the year 2000. Taking the average value of the labour force participation rate over four decades would hide these peculiarities and would result in a much too heterogeneous grouping of countries. Most of the change in the grouping of countries occurred during the first two decades considered. Between 1960–1969 and 1970–1979 Denmark, France, United Kingdom and the USA moved from being among the medium FLP to the high FLP countries while Austria moved from the group of high to the group of medium FLP countries. During the same period Belgium

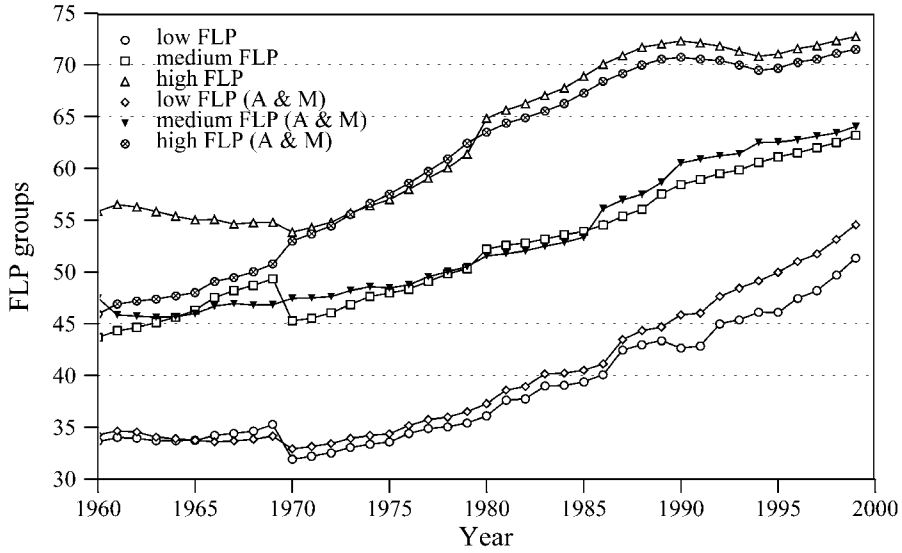

Figure 3. Average level of female labour participation rates in low, medium and high participation countries.

and Canada moved from being among low to medium FLP countries. Between 1970–1979 and 1980–1989, Canada further increased its FLP joining the high FLP countries while the increase in FLP slowed down in Japan, Switzerland and France that joined the group of medium FLP countries. During the last period from 1980–1989 to 1990–1999 only one country changed its position, the Netherlands, which has experienced a pronounced increase in its FLP (cf. Henkens et al. 2002, who show that most of this increase can be explained by an increase in part-time employment for women during this time period). Obviously, our grouping produces more homogeneous groups of countries by level of FLP during the 1960s and early 1970s (the time period not considered in the study by Ahn and Mira). In Figure 3 we plot the average level of FLP for the grouping suggested by Ahn and Mira (indicated by the letters A&M) as well as for our alternative grouping (cf. Appendix A for details on the country groupings).

Calculating the average TFR for each country group (Figure 4) (applying our country grouping) confirms the second hypothesis of Kögel (2004): the decline in TFR was much more pronounced in countries with lower FLP levels. In section 3 we assemble corresponding plots for a set of labour market, educational and demographic variables and indicators of social policy to identify factors that may explain country heterogeneity.

In the following section we briefly discuss theoretical approaches aimed at explaining the mutual relationship between fertility and female employment. The selection of variables is then based on those theories. Section 3 compiles the descriptive findings. We close with a short discussion and an outlook for future research.

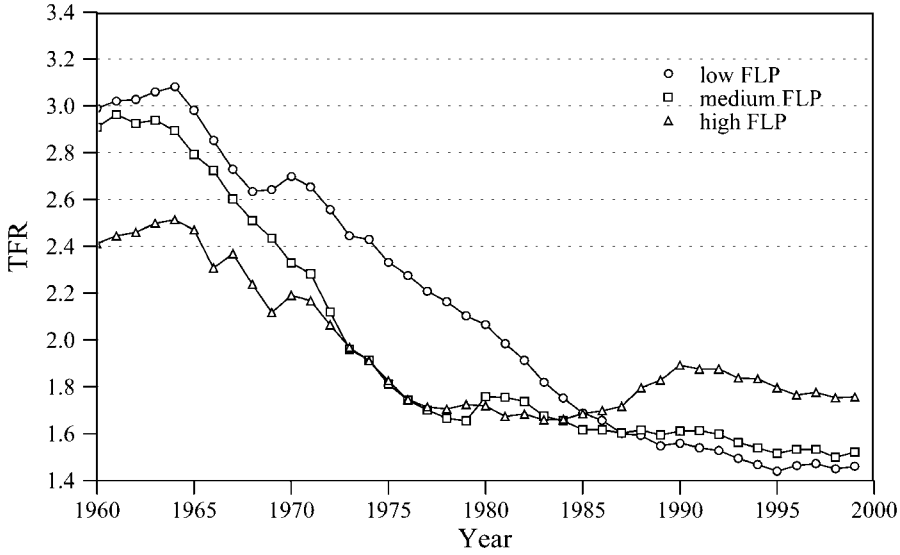

Figure 4. Average total fertility rates in low, medium and high participation countries.

2. Theoretical considerations

In economics, two contrasting schools have emerged to explain the relationship between the changes in fertility and female labour force participation over time: the New Home Economics model and the Easterlin model. Both approaches attempt to put forward explanations for a negative relationship between female employment and fertility. They differ in their identification of the driving force, as indicated by the respective labels used to describe them: the "value of time" model and the "relative income" model (Sanderson, 1976). New Home Economics (e.g. the model by Willis, 1973, and its application by Butz and Ward, 1979) focuses primarily on changes in the value of women's time whereas Easterlin (1980, 1987) focuses on changes in relative income due to the demographic cycle (baby boom and baby bust). The alternative "role incompatibility" hypothesis, prominent in the sociological and demographic literature, is that societal level responses have eased the incompatibility between childrearing and female employment. A fourth hypothesis that gains in importance to explain the low levels of fertility that go together with the lowest FLP levels e.g. in Italy and Spain is based on ideational factors that encompass social norms towards family structures. In the following we discuss those theories with specific focus on the variables we will select for empirical analysis. We leave out the Easterlin model since we do not have data to test for the relative income hypothesis (for a theoretical discussion, cf. Engelhardt and Prskawetz, 2002).

2.1. VALUE OF TIME

In New Home Economics, fertility decisions are a function of individual preferences and the costs of children, given an income constraint (Becker, 1991; Cigno, 1991; Willis, 1973). Since parents receive utility from increased child "quality" and "quantity", the cost of children is endogenous in the models. Cost of children includes opportunity costs (the earning loss from reduced labour supply), childcare costs (including the availability of childcare) and time costs of raising and educating a child (including the domestic division of labour). These costs are offset to some extent by income adjustments supplied by other household members as well as by public and employer-provided welfare benefits and taxes. The New Home Economics model stresses the role of female wages, representing the opportunity cost of childbearing, as a determinant of fertility (e.g. Willis, 1973). Female wages are seen to have both (positive) income and (negative) substitution/price effects on fertility, with opposite effects on female labour force participation. The income effect refers to the fact that when income increases, the demand for children increases as well, thus resulting in an increase in fertility; the substitution effect implies that when income increases, the opportunity cost for having more children increases, thus leading to a dampening effect on fertility. If all childrearing is done by women, an increase in men's wages will have a pure income effect. The overall effect on fertility of a proportional increase in men's and women's wages is theoretically ambiguous. Empirically, the female wage rate (or other measures of women's opportunity costs) is more often in negative relation to fertility (Becker, 1991; for an empirical overview cf. Hotz et al., 1997 and Macunovich, 1996). Higher female wages delay the timing of all conceptions and reduce total fertility (Heckman and Walker, 1990). Reduced wage differentials between men and women lead women to substitute childrearing activities with the labour market (Galor and Weil, 1996).

The potential earnings of women, and hence the price of raising children, have increased as the educational level of women has risen. Given the division of labour within the family, this increase in the earning capacity of women has had an increasingly greater negative impact upon aggregate fertility (Ermisch, 1979). Therefore, we expect a positive association between the tertiary gross enrolment ratio, the average years of schooling, and the highest educational level on employment and a negative effect of these factors on fertility. Furthermore, New Home Economics leads us to expect that women with a high degree of human capital (education and training) will delay the birth of their first child (Hotz et al., 1997). In addition "enhanced educational opportunity captures aspects of both changing cultural values and a changing employment structure, allowing women to escape from the thrall of outmoded beliefs, whilst simultaneously providing them with the skills required to participate in a modern economy" (Castles, 2003, p. 10).

Unemployment is not explicitly considered in the models of New Home Economics. However, understood as a zero wage, unemployment induces a strong income effect for households in which the husband is employed, while it should

yield both income and substitution effects if a participating wife becomes unemployed (Ahn and Mira, 2002). However, empirical evidence shows mixed results: Andersson (2001) reports a stronger income effect for individual female unemployment in Sweden during the 1980s and 1990s, while Kravdal (2002) finds a slightly stronger substitution effect for individual unemployment for first births in Norway in the period 1992–1998, and a slightly stronger income effect for higher-order birth rates.

Butz and Ward (1979) used the New Home Economics model to define a causal macro-level relationship between fertility and female employment. In this model, it is postulated that fluctuations in fertility can be attributed to a dominant substitution effect of a rising female wage, and subsequently varying levels of female labour force participation. Note, however, that participation rates are considered to be exogenous to fertility rates, whereby the participation rate depends on the joint distribution of male and female wages (which are treated as exogenous) and other characteristics.

2.2. ROLE INCOMPATIBILITY

Because both the neoclassical model and the Easterlin hypothesis based on wage structures poorly explain either common time trends or cross-national variation in fertility and female employment, the emerging alternative hypothesis in the demography literature is that societal level responses have eased the incompatibility between childrearing and female employment (Brewster and Rindfuss, 2000; Engelhardt et al., 2004; Pampel, 2001; Rindfuss et al., 2003; Rindfuss and Brewster, 1996). This hypothesis in turn nests within the broader hypothesis that state policies affect fertility rates by changing the costs of children mentioned at the start of this section (cf. e.g. Gauthier, 1996). This alternative approach to the costs of children focuses less narrowly on women's wages as the measure of the "price" of children. Instead it takes into account the ability of women to combine childbirth and labour as well as the overall costs, with regard to both the household standard of living and the woman's career, that arise from interruptions or reductions of labour supply in conjunction with childbirth and childrearing. This approach is qualitatively different from the neoclassical approach in that it focuses attention not on the wage structure of a given society, but rather on the complex of social and economic institutions. These institutions in turn determine how easily a woman can combine work and family, i.e. how costly it is for the family when a woman reduces her labour earnings, which again determines how large the wage or career opportunity cost is based on the experienced labour market reduction (cf. DiPrete et al., 2003).

The changes in the industrial and occupational structure have expanded employment opportunities for women, especially for part-time employment (O'Reilly and Fagan, 1998). Increasing rates of part-time employment, however, reduce the opportunity costs of children and, thus, increase fertility.

A measure of the availability of childcare is the gross enrolment ratio of children in pre-primary education. By reducing opportunity costs, a high ratio should have a positive effect on the aggregated fertility rate as well as a positive effect on female employment. Family allowances reduce the income constraint and are therefore expected to have a positive effect on fertility.

As De Laat and Sevilla-Sanz (2003) note, cross-country comparisons of social structural factors have gone some way in explaining the positive correlation between fertility and female employment. In particular, these studies provide convincing arguments why women have been able to make "work-and-children" choices. They also provide convincing arguments as to why women in low fertility countries are faced with "either-work-or-children" choices. However, the role incompatibility hypothesis fails to explain the most central piece of the fertility-employment-puzzle: why are low female labour participation rates accompanied by low fertility rates, i.e. what causes women in some countries to make "neither-work-nor-children" decisions?

2.3. IDEATIONAL AND DEMOGRAPHIC FACTORS

Ideational factors, on the other hand, are those that may influence women's and men's perceptions of working mothers and of alternatives to mother-provided childcare. Thus, prevailing attitudes toward working mothers and norms concerning the nature and duration of supervision required for children may be responsible for the country-specific fertility/employment nexus. Several authors like De Laat and Sevilla-Sanz (2003), Bettio and Villa (1998) and Di Tommaso (1999) have suggested that differences in norms regarding family structure and its role in economic life between low and high fertility countries might provide a missing link in explaining the low-fertility-low-participation puzzle. The two schools of economics also mention these attitudinal factors without explicitly modelling them. Especially authors in the line of New Home Economics highlight the continued persistence of traditional ideas about women's roles in lowest-low fertility countries, the unequal sharing of domestic labour as well as the central role of the family in providing social insurance. In the case of Italy, Di Tomasso (1999) and Del Boca (2002) note that norms regarding the division of time within the household might be reinforcing the socio-economic factors which prevent Italian women from combining work and children.

Though not explicitly included theoretically by either economic theory or by the role incompatibility hypothesis, demographic developments may also have an effect on the fertility/employment puzzle. The effects of demographic variables (e.g. total first marriage rate and total divorce rate) on fertility and female employment can easily be derived by some ad hoc considerations guided by a general (family) economic framework.

Easterlin (1980, p. 87) empirically observes, ". . . that low childbearing makes for high divorce, and vice versa . . .". A hypothesis for this phenomenon would be

that the perception of increasing divorce rates could be a "self-fulfilling prophecy". Women with doubts about a lifetime relation with their partners may invest less in their relationships with the result of an increased divorce risk due to their minor investments in marriage. The aggregate result of this feedback effect might be a negative relationship between divorce rates and fertility rates and a positive relationship between divorce rates and female labour force participation rates.

Associated with declining fertility rates, especially in Southern Europe, is the emergence of a situation in which long-term partnership commitments – symbolised through legal marriages – are declining (e.g. Billari and Kohler, 2002). Withdrawing from a long-term investment in marriage may also coincide with a withdrawal from fertility. Generally it is assumed that there is a positive relationship between marriage rates and fertility rates and a negative relationship between marriage rates and participation rates.

3. Empirical evidence

To describe the changing correlation between fertility and female employment, we use a set of labour market variables, educational variables, demographic variables and indicators of social policies, as discussed below. The data used in the empirical analysis are compiled from a number of publicly available sources to construct a full series of single-year figures from 1960 to 2000. For an overview of data, definitions, and sources cf. Appendix B. The countries included are Austria, Australia, Belgium, Canada, Denmark, Finland, France, West Germany, Greece, Italy, Ireland, Japan, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States. The selection of countries is based on the availability of data for our indicators.

Our methodological approach is to examine patterns in the indicators trends over time, in differences in levels with respect to women's labour force participation, and in trend*FLP interactions. In particular, we analyse whether these patterns are consistent with the development of TFR in the respective countries.

We start our empirical investigation by considering the change in the male economic position across time and space. Indicators of the male economic position include the male labour participation rates (MLP) and the average male unemployment rates (MUR). While FLP has increased across time and space, the male labour participation shows a clear downward trend over the last three decades (Figure 5) which was mainly caused by decreasing labour force participation rates at older ages for males (cf. Gruber and Wise, 1999).[2] In addition, the male unemployment rate has increased considerably during the last four decades (Figure 6).[3] These figures clearly evidence the fact that the male economic status became more unstable over time for all countries in our sample. Confronted with the positive income effect of male wages (as given by the New Home Economics model) the decline in the overall levels of TFR during the last four decades can be explained by those developments. Proceeding with the same theoretical argumentation would

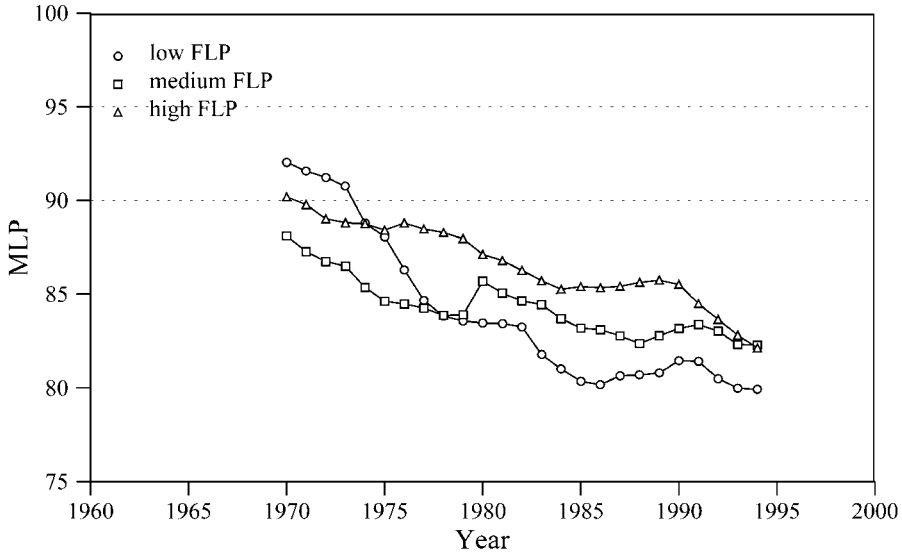

Figure 5. Average male labour participation rates in low, medium and high participation countries.

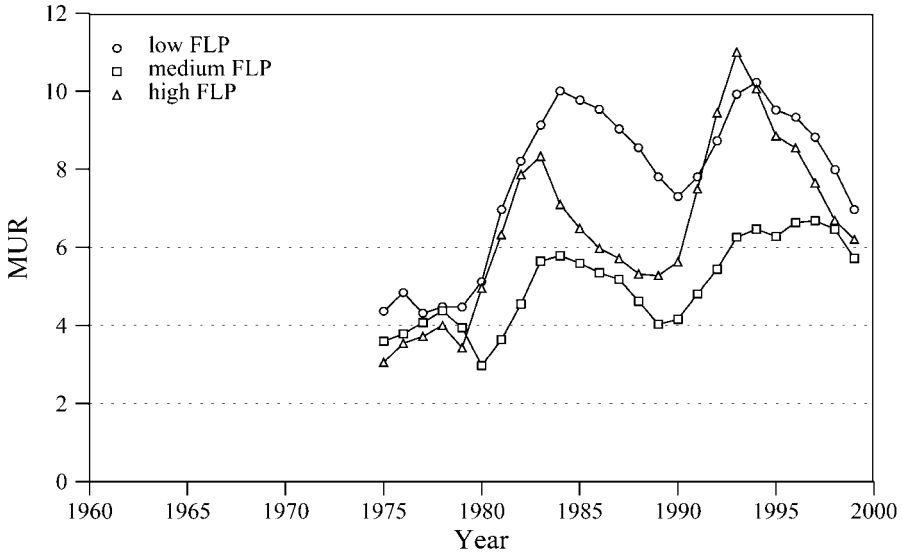

Figure 6. Average male unemployment rates in low, medium and high participation countries

then imply that the lowest levels of TFR should be observed in countries with the worst male economic conditions. However, the opposite was true during the 1970s and 1980s, with low FLP countries having the lowest levels of male labour force participation rate and highest levels of TFR. Only in the 1990s, this income effect seems to have been uncovered since now countries with the worst male and female economic positions have indeed the lowest levels of TFR.

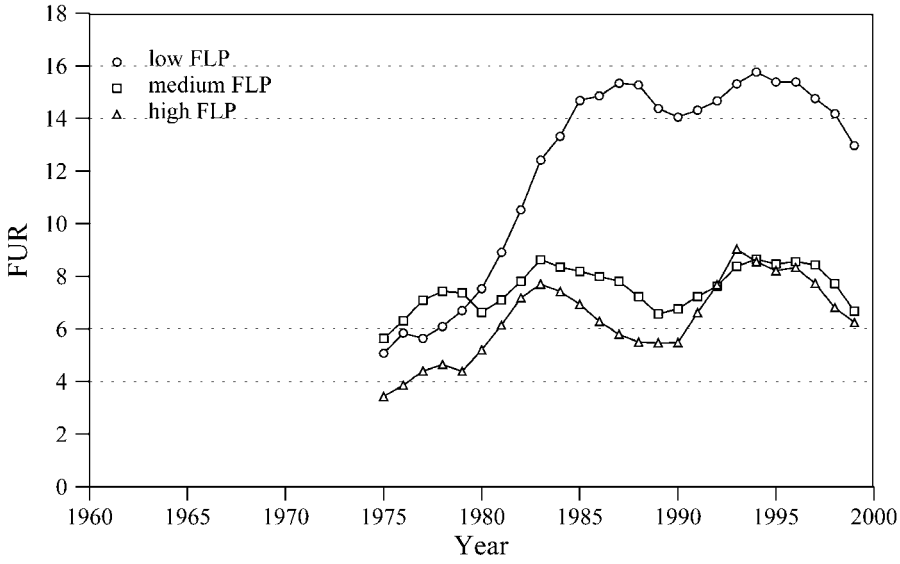

Figure 7. Average female unemployment rates in low, medium and high participation countries.

Therefore, the different development of TFR by FLP level cannot be explained by those changes. One may only argue that in low FLP countries the economic status of males might be of greater importance for fertility decisions and the negative income effect of a decline in the men's economic position might have had a stronger impact. In other words, the income effect on fertility might have been relatively unimportant in the past but has become increasingly important through the 1970s, 1980s and 1990s. Or: societal responses lessening the incompatibility between women's employment and fertility (as observed in high FLP countries) have allowed the income effect on fertility to "uncover".

Not only was the male economic status lowest in countries with the lowest FLP, but the female unemployment rate in those countries was highest (Figure 7). I.e. in countries with already low levels of female labour force participation, the share of those seeking employment among the total female labour force was highest. In addition to the different levels of female unemployment across FLP groups, the development differed across FLP groups during the last four decades. Figure 7 clearly shows that female unemployment rates were similar during the late 1970s but then "sky-rocketed" for countries with low levels of FLP. Having in mind the negative income effect of an increasing unemployment rate on fertility, we may argue that an overall increase in the female unemployment rate has caused the overall TFR decline (through a negative income effect). The more pronounced increase in the female unemployment rate in the low FLP countries could explain the more pronounced decrease in the TFR in those countries during the last decade.

With increasing FLP, the gender wage gap (FW/MW) declined over time (Figure 8). Referring to New Home Economics, the decrease in the gender wage

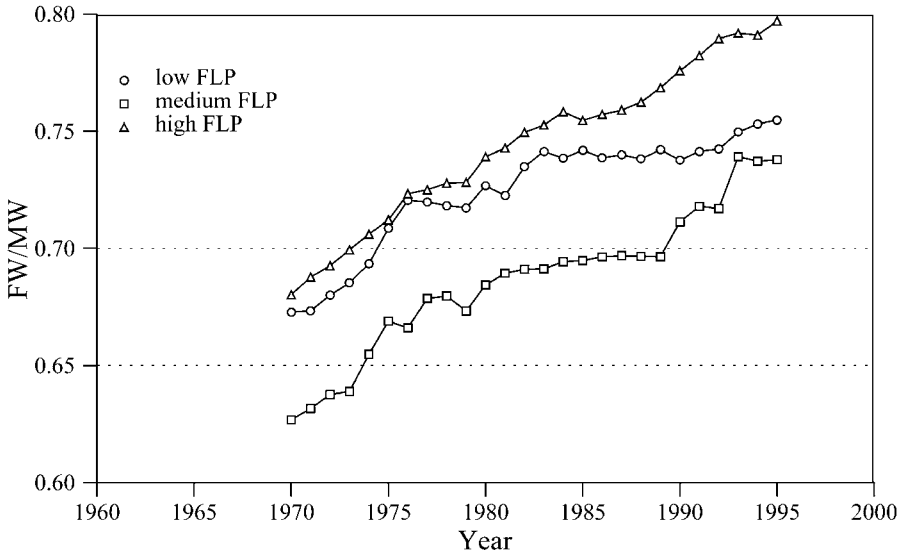

Figure 8. Gender wage-gap in low, medium and high participation countries.

gap implies an increase in the opportunity costs of children, which is followed by a decrease in TFR. However, the level of TFR is not consistently related to the level of the gender wage gap (the low FLP countries that had the highest TFR values had a smaller gender wage gap as compared to medium FLP countries). In the low FLP countries the gender wage gap has stagnated while it increased for high and medium FLP countries in the 80s. However, contrary to economic theory the drop in TFR was even strongest in those countries.

Moreover, we found some weak evidence that female and male wages increased less steeply for low FLP countries (cf. Engelhardt and Prskawetz, 2002). In this case, economic theory is inconclusive since the lower increase in male wages would imply lower fertility while the lower increase in female wages would imply higher fertility. However, the fact that low FLP countries showed the strongest decline in TFR cannot be explained by those developments.

While the labour market status of female and male partners determines the economic/income constraints on fertility, the flexibility in working hours is of central importance for the compatibility of employment and childrearing. It may reflect both women's choices and institutional constraints.

The possibility of part-time work (PART) does not seem to be exceptionally low for our group of countries with low FLP (or, conversely, high in high FLP countries) (Table 1).[4] For instance, the Netherlands is among the countries with low FLP during the 80s and part of the 90s but it has the highest share of part-time employment for women in our sample of countries (most of the increase in FLP in the Netherlands is due to an increase in part-time employment for women; Henkens et al., 2002). In contrast, FLP is among the highest in Finland but the share

Table 1. Proportion of females employed part time in low, medium and high participation countries

		1980	1985	1990	1995	2000
Low participation	BEL		26.2	31.4	32.1	
	GRE		10.8	11.5	13.2	
	LUX		18.5	19.1	28.4	28.9
	IRE		17.8	20.5	26.6	32.2
	ITA		16.0	18.2	21.1	23.4
	NET		45.5	52.5	54.7	57.2
	SPA			11.5	15.9	16.5
Medium participation	AUS	34.9	36.9	38.5	40.2	40.7
	AUT				21.6	24.4
	FRA		20.3	21.7	24.3	24.3
	FRG		25.4	29.8	29.1	33.9
	JPN	28.6	30.0	33.4	34.9	39.4
	POR			11.8	14.5	14.7
High participation	CAN	25.9	28.2	26.8	28.2	27.3
	DEN		32.8	28.6	24.2	
	FIN	10.7	12.3	10.6	11.5	13.9
	NOR			39.8	37.5	33.6
	SWE			24.5	24.1	21.4
	SWI				44.9	44.7
	UK		41.1	39.5	40.7	40.8
	USA	21.9	21.5	20.0	20.3	18.2

of women in part-time employment is the lowest there. One should keep in mind though that comparing part-time employment across countries might be flawed since its definition varies across countries (OECD, 2002). Most important for our argument is that the data underlying Table 1 neither show a trend over time for single countries nor any exceptional level or development for low FLP countries. The variable therefore neither explains why TFR decreased for all countries nor does it provide any insight into the difference in the TFR development between countries and, consequently, also does not contribute in understanding the change in the cross country correlation between TFR and FLP.

Female working hours (FH) is a further, and possibly less biased (since its definition is more clear-cut), measure which may explain the incompatibility between FLP and fertility. However, similar to the data on part-time work, the time development of female working hours (not shown) neither explains why TFR decreased for all countries nor does it provide any insight into the difference in the TFR development between countries (cf. Engelhardt and Prskawetz, 2002).

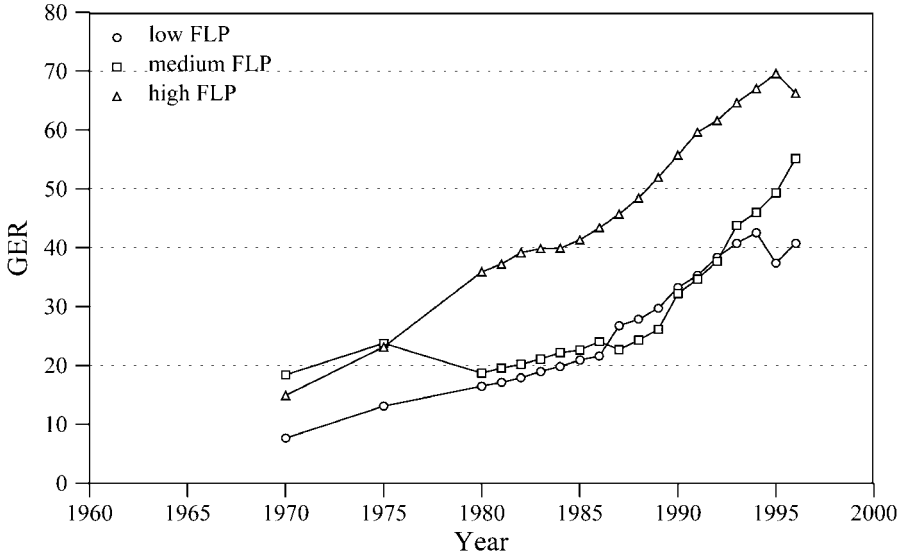

Figure 9. Tertiary gross enrolment ratio of females in low, medium and high participation countries.

A further explanation of why fertility may have declined more rapidly in low FLP countries could be that educational variables have evolved differently in those countries for females. Figures 9 and 10 clearly refute such a hypothesis. Neither the tertiary gross enrolment ratio of females (GER) nor the average number of years of schooling for females (YEARS) evolved differently in low FLP countries as compared to high and medium FLP countries. For all three country groups we observe an increasing trend for both variables over time with a higher level of female education in high FLP countries. These results support the hypothesis that education increases the opportunity costs of child-bearing as evidenced in a decline in TFR for all countries. Indeed, the countries with the lowest education levels had the highest levels of TFR in the 1970s and 1980s. With regard to the difference in TFR declines by FLP groups we may only argue that as female education rises (for countries with both low and high FLP) the implication of high opportunity costs (e.g. due to female and male unemployment and low participation rates of males) may have changed as well. For instance, the opportunity cost of being out of the labour force may increase with the number of years spent in education and an increase in female unemployment may therefore be more severely perceived and imply a more pronounced negative impact on fertility.

It is interesting to verify whether the decline in fertility has been accompanied by an equally pronounced decline in any of the proximate determinants of fertility behaviour. While total female first marriage rates (TFFMR) were stable for low FLP countries and declining for high and medium FLP countries up to the early 1970s, first marriage rates have subsequently declined for all three country groups (Figure 11). We observe a convergence of the first marriage rates among the three

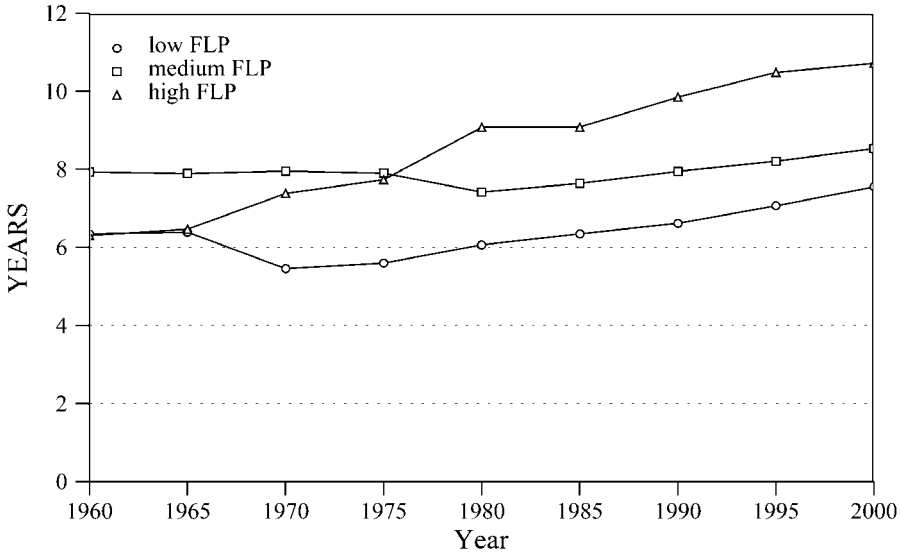

Figure 10. Average years of schooling of females in low, medium and high participation countries.

country groups since the early 1980s. From a time series point of view we may argue that marriage is still a valid proximate determinant of fertility behaviour since the overall decline in TFR was accompanied by a decline in first marriage rates. However, from a cross-sectional view the marriage rate is no longer positively correlated to fertility, as is also shown in Billari and Kohler for European lowest low fertility countries (2002) and in Figure 11. First marriage rates and TFR may still be closely interdependent in countries where long-term commitment to partnership remains the norm. In these countries (e.g. Italy) any decrease in first marriage rates (caused for instance by the declining economic status of men and women) may therefore be linked to the pronounced decrease in TFR.

A further proximate determinant of fertility behaviour may be the total divorce rate (TDR). Increasing divorce rates in all three country groups are consistent with decreasing fertility rates (Figure 12). However, the figure rejects the hypothesis that an exceptionally high divorce rate among low FLP countries may be a driving factor for the pronounced decrease in fertility in those countries. The divorce rate is lowest for low FLP countries over the whole time period considered.

In line with the argument given by Billari and Kohler (2002), long-term partnership commitments in many of the low FLP countries included in our study may have been an obstacle rather than a fortune for fertility. As total female first marriage rates decreased and, respectively, total divorce rates increased in low FLP countries, fertility levels dropped faster as compared to high FLP countries where long-term commitments to partnerships and childbearing are less connected (Prskawetz et al., 2002). One may argue that the decline in female first marriage rates and the increase in divorce rates in high FLP countries was independent of

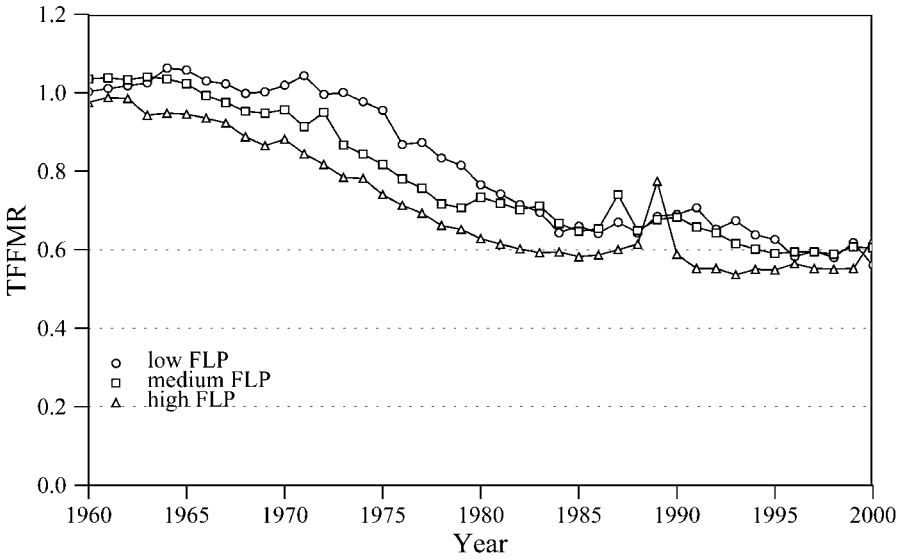

Figure 11. Total female first marriage rate in low, medium and high participation countries.

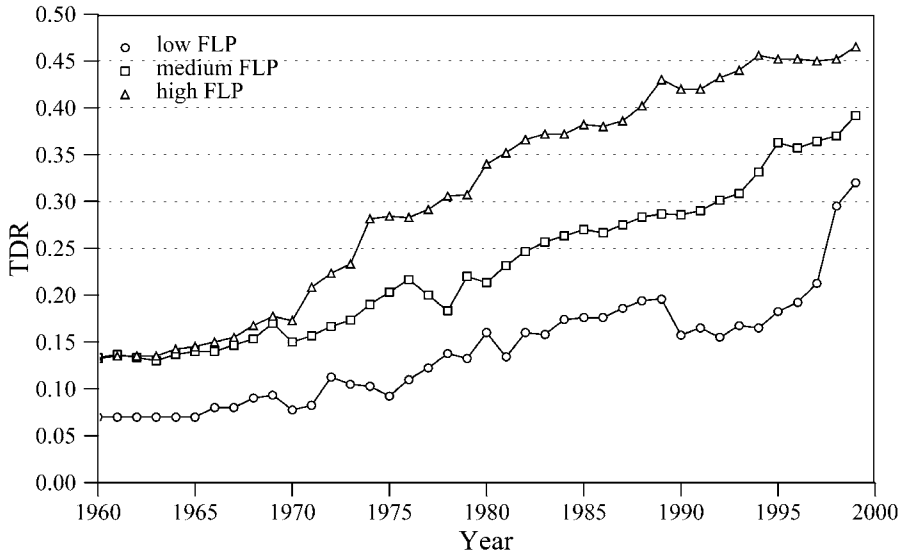

Figure 12. Total divorce rate in low, medium and high participation countries.

the economic status of male and females and more a sign of liberal partnerships. In low FLP countries, the drop in first marriages and divorces was closely connected to the deteriorating economic status of males and most likely not a sign of more liberal partnerships. Moreover, as discussed in Bettio and Villa (1998) a "cohesive family has encouraged very low fertility" in the Mediterranean low FLP countries.

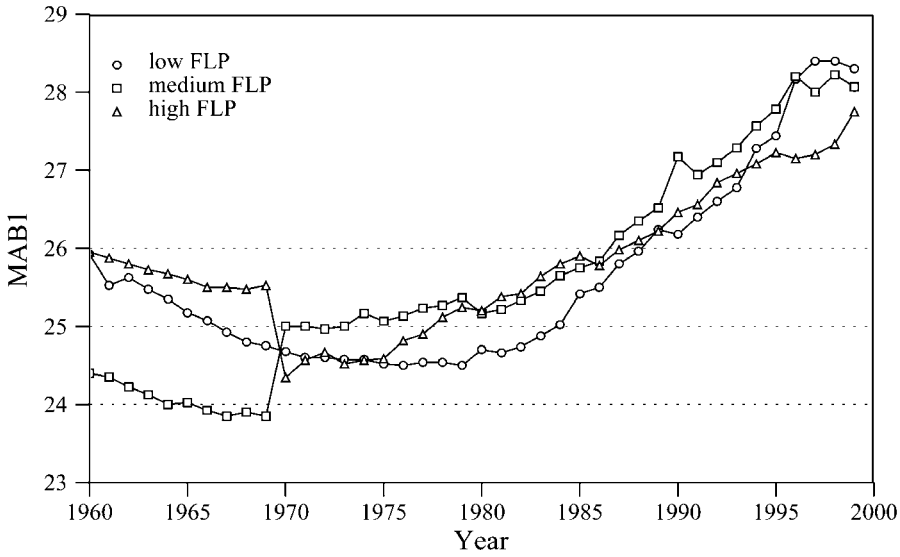

Figure 13. Mean age at first birth in low, medium and high participation countries.

Besides partnership formation and dissolution the mean age at first birth (MAB1) belongs to the group of proximate determinants of fertility behaviour. Age at first birth is of particular interest with respect to the postponement of childbearing, which has been cited as one of the systematic patterns of lowest low fertility (cf. Billari and Kohler, 2002). Figure 13 indicates that the drop in fertility in low FLP countries may be related to their more pronounced increase in the age at first birth.[5] While the mean age at first birth was lowest among low FLP countries during the 1970s and started to increase with a lag of about 5 years compared to the high FLP countries, the age at first birth is now highest among low FLP countries. Though a delay in childbearing does not necessarily correlate with a low TFR (e.g. the Netherlands have one of the highest mean ages but their TFR is among the highest while for Greece mean age at first birth is among the lowest although TFR in Greece dropped markedly in the 1980s and 1990s), an increase in age at first birth has lowered the progression probability after the first child at least for part of the low FLP countries included in our study (cf. Billari and Kohler, 2002).

From the previous discussion we may conclude that the female first marriage rate, the divorce rate and the mean age at first birth may still be proximate determinants of fertility behaviour from a time series point of view (we observe a decline in TFR that goes hand in hand with a decrease in the number of first marriages and an increase in divorce and age at first birth). However, the cross-country relationship between partnership formation and dissolution and fertility as well as between the age at first childbearing and fertility became indeterminate during the late 90s (cf. Billari and Kohler, 2002). Nevertheless, our illustrations indicate that for low FLP countries the increase in age at first birth was more pronounced during the

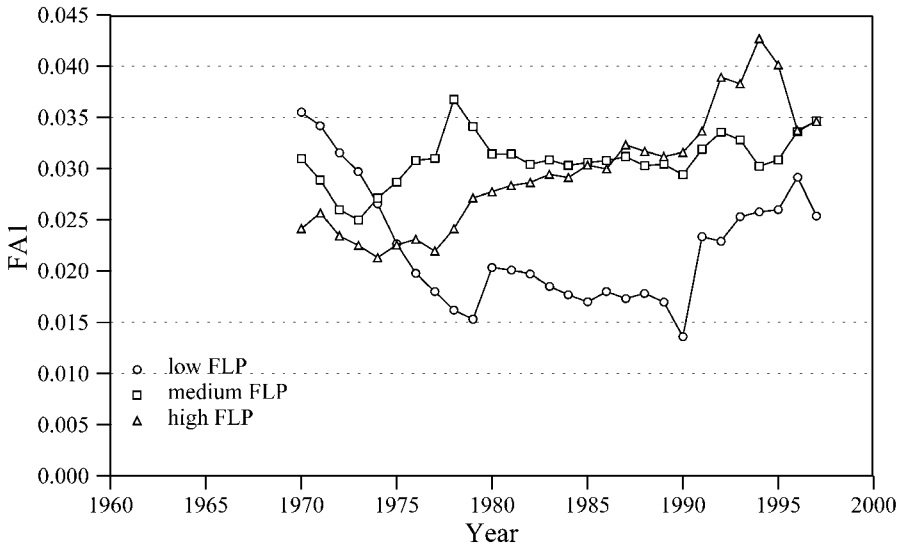

Figure 14. Share of family allowances for first child on the monthly male wage income in low, medium and high participation countries.

last decade. We regard these findings as evidence that the less fortunate economic conditions in those countries may have had a profound impact on these proximate determinants of fertility and therefore reinforced the direct negative impact of economic conditions on fertility.

We conclude our descriptive representations with the consideration of social-policy variables. We calculate the share of family allowances as a percentage of the estimated monthly male wage income to compare the importance of family allowances across countries and present only family allowance for first children (FA1) where differences across countries are most pronounced. Figure 14 indicates that during the last two decades family allowances for the first child have been lowest in low FLP countries and, even more importantly, they showed a decline during the mid 1980s in low FLP countries while they remained stable in high and medium FLP countries.[6] During the early 1990s, family allowances for the first child increased considerably in high FLP countries while the increase was more moderate in low FLP countries (apart from the increase in the early 1990s which is mainly due to an increase in allowances in Spain at this time). We may conclude that the higher share of family allowances in high FLP countries may have had a positive impact on fertility by reducing the opportunity costs of childbearing while the lower level of family allowances in low FLP countries may have further depressed fertility since opportunity costs are higher. However, the share of family allowances cannot generally explain the drop in TFR values.

Further indicators that may reduce the incompatibility of childrearing and labour force participation by reducing the opportunity costs of children are the enrolment ratios of children in pre-primary education. Figure 15 plots the gross

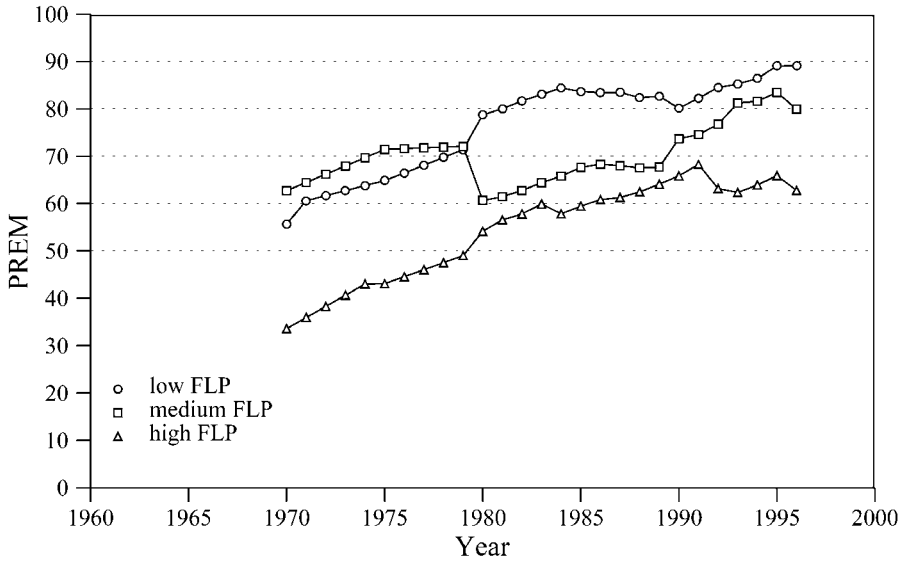

Figure 15. Gross enrolment ratio of children in pre-primary education in low, medium and high participation countries.

enrolment ratio of children in pre-primary education (PREM).[7] Surprisingly, the enrolment ratio has been highest among low FLP countries and lowest for high FLP countries since the late 1970s. We are cautious to interpret these findings as evidence for the higher compatibility of child-rearing and labour force participation in low FLP countries since a well established literature (on the micro as well as macro level) exists, showing that family policies are lacking in many of the countries where we observe the lowest levels of fertility in the 1980s and 1990s (Gornick et al., 1997). More likely these results may be evidence for the fact that a higher gross enrolment ratio of children in pre-primary education is not contributing significantly to lowering childcare costs and time costs of raising and educating a child. One explanation may be that in countries where the enrolment ratio of children in pre-primary education is low, alternative childcare systems are available for children at pre-primary education age. As previous studies have shown, the availability of childcare at younger ages may have a higher variance across countries (OECD, 2001). Moreover, our measures of child care and direct payments for children do not completely capture the whole story. Recently, Apps and Rees (2001, p. 15) conclude from a formal analysis that "this result tells us that in two otherwise identical economies, the one which places more weight on subsidising bought-in child care and less on direct child payment will have both higher fertility and higher female labor supply".

4. Discussion

In this study we have tried to identify the factors that may explain country heterogeneity in the negative association between fertility and female employment. Our methodological approach is purely descriptive due to severe restrictions of part of the available macro data. To account for country-heterogeneity we start off by building country groups that are homogeneous with respect to the development of their female labour participation rates. This grouping is implemented in a dynamic way accounting for country-specific heterogeneity in the increase in female employment. We then proceed to analyse several economic and social variables that have changed along with women's labour force participation. For each variable, our strategy is (1) to examine whether the variable's trend over time is consistent with the development of the TFR in relation to one of the theories outlined in section 2, (2) to discuss whether the difference with regard to FLP in the variable's level is consistent with those theories, and (3) to conclude whether we can observe an interaction between the variable's trend and its interaction with FLP groupings. Our findings are summarised in Table 2.

In sum, trends in the labour market and demographic indicators are compatible with the overall drop in TFR according to the theories of New Home Economics and the theory on proximate factors for fertility. Trends in the variables that would be representative for the role incompatibility hypothesis and the ease in combining work and child-rearing (working hours, proportion females employed part time, or gross enrolment ratio of kids in pre-primary education) cannot be related to the trends in fertility (cf. first column in Table 2). Among all variables considered, only the levels of educational and demographic variables can explain the higher levels of fertility among low female participation countries (cf. second column in Table 2). These variables include the female tertiary gross enrolment ratio, the average years of schooling of females, the total female first marriage rate, the total divorce rate and the mean age at first birth. The fact that fertility declined most among low female participation countries (cf. third column in Table 2) can partly be explained by three variables that showed a distinct pattern for low female participation countries. These are the female unemployment rate, the mean age at first birth and the share of family allowance for first child. Differently we may argue that many of the variables considered show parallel trends for low, medium and high participation countries but that those changes induced a more pronounced drop in TFR values in low FLP countries which are more likely to adhere strong family values and social norms that still see women as the main provider of childrearing activities.

The descriptive evidence on the cross-national patterns do not, of course, prove that the change in the cross-country correlation between fertility and female employment is due to country-specific changes in income structures and societal level circumstances in combining fertility and female employment. More evidence would be needed in order to build a strong case for such a relationship. Therefore, multivariate panel analyses are planned to control simultaneously for developments in different societal areas.

Table 2. Observed relationships between social variables, female labour force participation and fertility

Social variable	Consistent with development of TFR:		
	Trend	Level by FLP	Trend*FLP
Male labour force participation rate	+	–	–
Male unemployment rate	+	–	–
Female unemployment rate	+	–	+
Gender wage gap	+	–	–
Proportion females employed part time	–	–	–
Female working hours	–	–	–
Female tertiary gross enrolment ratio	+	+	–
Average years of schooling of females	+	+	–
Total female first marriage rate	+	+	–
Total divorce rate	+	+	–
Mean age at first birth	+	+	+
Share of family allowances for 1st child	–	+	+
Gross enrolment in pre-primary education	–	–	–

Note: '+'/'–' indicates that the observed trend of the social variable, the level of the variable by FLP, or the trend*FLP interaction is consistent/not consistent with the development of TFR.

A clear message of our aggregate descriptive representations is that female labour force participation represents only one dimension in a set of indicators determining cross-country differences in the economics of the family. Moreover, to better understand cross-country differentials in fertility it is necessary to consider a broader spectrum of confounding indicators such as those related to male and female economic status, institutional arrangements and the role of proximate determinants of fertility across countries. Further factors to be included in future research might be housing, transportation and environment difficulties, precariousness of employment, certain family policies but also housing policies and the proximity of schooling institutions. Finally, recent availability of comparative time series of age specific labour force participation for various OECD countries will allow a closer look into the components of fertility changes (tempo versus quantum effects) as they relate to age specific changes in labour force indicators.

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Notes

[1] The countries included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Greece, Ireland, Italy, Japan, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

[2] Since data on male labour participation rates are lacking for several countries prior to 1970 and after 1994 we present country averages only for 1970–1994. Over this time period, we are still missing data for Greece, the Netherlands, Portugal and Spain. However, the overall trend of male labour participation is independent of those missing values.

[3] Since data on male and female unemployment rates are lacking for several countries prior to 1974 we present country averages only for 1975–1999.

[4] Since data on part-time employment are lacking for several time periods and countries we present the part-time employment for each country and selected time points instead of presenting country averages for our three country groups.

[5] We do not have data on the mean age at first birth for Australia, Canada, Japan, most of the time periods in Luxembourg, nor on early time periods for Norway and Spain.

[6] Data on family allowances for first children are missing for several time periods and for the USA and France. The high levels of family allowances for the medium FLP countries is mainly driven by the high allowances in Austria.

[7] We do note have data on the gross enrolment ratio of children in pre-primary education for the time period before 1970. Data are also incomplete for several countries. However, the general picture in Figure 15 is not perturbed by these omissions.

Appendix A: Country grouping

1. Ahn and Mira (2002): Grouping of countries by FLP over the time period 1970–1996:

High FLP ($> 60\%$)	Medium FLP ($50\% << 60\%$)	Low FLP ($< 50\%$)
FIN	AUT	GRE
SWE	FRA	IRE
DEN	FRG	ITA
UK	AUS	SPA
USA	JPN	NET
NOR	POR	BEL
CAN	NZL	
SWI		

2. Our grouping: Grouping of countries by FLP over the time periods 1960–1969, 1970–1979, 1980–1989, 1990–1999. In addition to Ahn and Mira (2002) we also include Luxembourg while we exclude New Zealand due to different data sources on which the FLP series is based before 1985 and after 1985.

1960–1969:

High FLP (> 50%)	Medium FLP (40% << 50%)	Low FLP (< 40%)
FIN	DEN	IRE
JPN	FRA	ITA
SWE	FGR	LUX
SWI	UK	NET
AUT	USA	BEL
	AUS	CAN

Notes: We exclude Norway from this time period since the FLP has been obtained from two different data sources before and after 1970. Data for Greece, Spain and Portugal are not available for this time period.

1970–1979:

High FLP (> 50%)	Medium FLP (40% << 50%)	Low FLP (< 40%)
FIN	AUT	GRE
JPN	FRG	IRE
SWE	AUS	ITA
SWI	BEL	LUX
DEN	CAN	NET
FRA		SPA
UK		
USA		
NOR		

Note: Data for Portugal are not available for this period.

1980–1989:

High FLP (> 60%)	Medium FLP (45% << 60%)	Low FLP (< 45%)
FIN	AUT	GRE
SWE	FRA	IRE
DEN	FRG	ITA
UK	AUS	LUX
USA	BEL	NET
NOR	JPN	SPA
CAN	POR	
	SWI	

1990–1999:

High FLP (> 65%)	Medium FLP (50% << 60%)	Low FLP (< 50%)
FIN	AUT	GRE
SWE	FRA	IRE
DEN	FRG	ITA
UK	AUS	LUX
USA	BEL	SPA
NOR	JPN	
CAN	POR	
	SWI	
	NET	

Appendix B: Variables, definitions, and sources

TFR: Total fertility rate = Average number of children that would be born alive to a woman during her lifetime if she experiences a given set of age specific fertility rate observed in a population during a given year.
Source: United Nations Demographic Yearbook, New Cronos (Eurostat Database), German Federal Statistical Office.

FLP, MLP: Female and male labor participation rate = Number of females (males) working part- or full-time or actively seeking employment at ages 15–64 divided by the total female (male) population aged 15–64.
Source: Comparative Welfare Data Set assembled by Huber et al. (1997), OECD Labor Force Statistics.

FW, MW: Female and male hourly wages = Male and female hourly wages in manufacturing in national currency, standardized by the purchasing power parity (PPP) indexes in US $. For some countries wage series are estimated by Gauthier (2002).
Source: ILO Yearbook of Labour Statistics, Comparative Family Benefits Database assembled by Gauthier (2002), National Accounts of OECD Countries.

FW/MW: Female-male wage ratio = Female hourly wages/Male hourly wages.
Source: See female and male hourly wages.

FUR, MUR: Female and male unemployment rate = Number of females (males) aged 15 to 64 actively seeking employment divided by the respective number of persons aged 15 to 64 in the labor force.
Source: Comparative Welfare Data Set assembled by Huber et al. (1997), OECD Labor Force Statistics.

FH: Female working hours = Weekly working hours of full-time employed females in non-agricultural activities.
Source: ILO Yearbook of Labor Statistics.

PART: Proportion females in part time = Number of females in part-time employment as a share of the female employment.
Source: OECD Labor Force Statistics.

GER: Female tertiary gross enrolment ratio = Percentage of the official school population corresponding to the same level of education in a given school year.
Source: Unesco, on-line statistics: http://unescostat.unesco.org/en/stats/stats0.htm.

YEARS: Average years of school of females.
Source: de la Fuente and Doménech (2002), Barro and Lee (2001), available at: http://www2.cid.harvard.edu/ciddata/barrolee/Appendix.xls.

TDR: Total divorce rate = Proportion of divorced couples in a hypothetical cohort who at each age x experienced the relevant age specific divorce rate applying in a particular year.
Source: Council of Europe (2001).

TFFMR: Total female first marriage rate = Proportion of females who would ever marry for the first time in a hypothetical cohort of persons who at each age x experienced the relevant age specific first marriage rates applying in a particular year.
Source: Council of Europe (2001).

MAB1: Mean age at 1st birth.
Source: New Cronos CD 2001, Council of Europe (2001).

PREM: Gross enrolment ratio of kids in pre-primary education = Total gross enrolment in pre-primary education, regardless of age, expressed as a percentage of the official pre-school-age population in a given school-year.
Source: Unesco, on-line statistics: http://www.uis.unesco.org/en/stats/stats0.htm.

FA1: Family allowances for 1st child = Share of monthly family allowances as a percentage of the estimated monthly wages.
Source: Comparative Family Benefits Database assembled by Gauthier (2002).

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