A Note on the Changing Relationship between Fertility and Female Employment Rates in Developed Countries

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Abstract

In this paper we look at a panel of OECD aggregate fertility and labor market data between 1970 and 1995 and we report some striking recent developments. Total Fertility Rates (TFR) were falling and Female Participation Rates were increasing, conforming to a well known long-run trend. Along the cross-sectional dimension, the correlation between TFR and FPR was negative and significant during the 1970's and up to the early 1980's. This seemed consistent with secular comovements. However, by the late 1980's the correlation had become positive and equally significant. We discuss our findings within the framework of standard neoclassical models of fertility and labor supply adapted to macro data, as in Butz and Ward (1979). In order to explain the reversal of the correlation between fertility and participation rates, we consider simple extensions of their framework. First, we discuss the possibility that income effects of female wage increases are important. Next, we turn to three other factors: inflexible working hours faced by individual workers, the possibility of purchasing child care, and unemployment.

1 Introduction

This year (1998) marks the bicentennial of the publication of Malthus's work (1798, 1976) on population. He predicted a positive relation between population growth and income growth based on the hypothesis that people marry earlier and have more children when their incomes are greater. The simplest neoclassical models would also predict the same relationship between fertility and income based on the assumption that children are a normal good. However, the international evidence over the last hundred years clearly contradicts this prediction. As nations became industrialized and as their incomes increased, the fertility rate went down. The recent experience of developing countries confirms this pattern. In response to this gap between existing theories and facts, new models were developed over the last several decades to explain the observed negative association between fertility and income. Some of them introduced the distinction between the quality and the number of children (Becker (1960), Becker and Lewis (1973), and Willis (1973)). Others introduced women's time allocation decisions and emphasized the opportunity costs of women's time (Mincer (1963), Becker (1965) and Willis (1973)). According to the former, income increases may reduce fertility if the income elasticity for the quality of children is sufficiently greater than that for the number of children. The latter drew similar implications by emphasizing that because child rearing is intensive in the mother's time, increasing female wages could have a negative effect on the demand for children.

In this paper we look at a panel of OECD aggregate fertility and labor market data since 1970. Average total fertility rates (TFR) and female participation rates (FPR) since 1970 conform to the above-mentioned pattern. However, a closer look at the data reveals some striking recent developments.

First, in many developed countries the TFR seems to have bottomed out, and in several high-participation countries it has even recovered substantially during the last decade, while the female participation rate has maintained its upward trend.

Second, and most interestingly, the cross-country correlation between female participation rates and fertility rates has reversed its sign. The correlation between TFR and FPR across developed countries was negative and strongly significant during the 1970's and up to the early 1980's. This seemed consistent with the secular comovements, and a negative association between fertility and female employment both across countries and over time was seen as one of the most stable relationships in economic demography. However, by the late 1980's the correlation had become positive and equally significant. This reversal took place abruptly over a few years. Several recent papers (Ermisch, 1989; Rindfuss and Brewster, 1996; Macunovich, 1996; Hotz et al., 1997) have suggested a weakening link between female employment and fertility mainly due to a greater availability of market child care and the rising income effect of wages at high levels of the female wage. However, to our knowledge this is the first study to document and analyze an actual reversal of the correlation between them.

Third, we note that the reversal in the sign of the TFR-FPR correlation occurred simultaneously with the emergence of high (and persistent) unemployment rates. Furthermore, in most countries the fertility rate displays a negative response to unemployment along the business cycle. The cyclical behavior of fertility was the focus of one of the most often cited papers in Economic Demography during the last two decades, the work by Butz and Ward (1979) (BW henceforth). They set up an empirical fertility equation based on female time allocation models (as in Willis, 1973) and estimated it using U.S. aggregate time series data. Their model predicted that the fertility response to business cycles would change from procyclical to counter-cyclical as the female employment rate increased. They argued that as the female employment rate increased, the negative substitution effects of female wage increases during expansions would overcome the positive income effects of increased male earnings. Although their results have recently been disputed by several authors, their work has gained popularity among economic demographers due to its simplicity and apparent conformity with US aggregate data.[1]

In this paper we use Butz and Ward's framework as a 'benchmark' to guide our discussion of OECD aggregate panel data. Although their model was always used with time series data, our first goal is to see whether it can help us understand our observations along the cross-sectional dimension. We then consider simple extensions in order to explain the reversal of the cross-sectrional correlation between fertility and female employment.

[1] McDonald (1993) stresses Butz and Ward's ignorance of high serial correlation in estimation, Murphy (1992) questions the specification of their model, and Macunovich (1995) points to their use of incorrect female wage data.

2 Recent Developments in Aggregate OECD Data

In this section we report in more detail our reading of OECD aggregate panel data since 1970. The data include the time series of the total fertility rate (TFR), the female participation rate (FPR) and the unemployment rate (UR) for 21 OECD countries between 1970 and 1995.[2] We think the most interesting features of the data are:

First, **average total fertility rates and female participation rates since 1970 conform to well known long-run historical patterns**. Throughout these years the OECD average fertility rate decreased from 2.45 to 1.63 while the female participation rate increased from 44.1% to 60.8%. However, as shown in Figure 1 the average total fertility rate seems to be bottoming out whereas the female participation rate has maintained its upward trend. The TFR was as low as 1.69 by 1985, and a very modest upswing is noticeable during the second half of the 80's. On the contrary, 43% of the increase in the average FPR occurred in the decade after 1985.

Second, **the cross-country correlation between the female participation rate and the total fertility rate reversed its sign**. Figure 2 shows the correlation coefficients during the period 1970-1995. The correlation between TFR and FPR across developed countries was negative, significant and quite stable around -0.5 during the 1970's and up to the early

[2]Sources: OECD Labor Force Statistics, 1970-1996.

1980's.[3] However, by the late 1980's the correlation was an equally significant but *positive* 0.5, and only small changes occurred during the first half of the 90's. This reversal took place abruptly over a few years, resulting in the step-function pattern apparent in Figure 2. In 1981, the correlation was still -0.44; by 1986 it was close to zero, and by 1989 it was already +0.44. It is also important to note that this finding is robust to several changes in our measure of female employment. In order to see whether it might relate to increasing dispersion across countries in the availability of part-time jobs and/or unemployment rates, we recomputed the time-series of cross-sectional correlations using the female employment rate and the female full-time employment rate instead of participation rates. The reversal was also observed in both cases. Another issue of measurement is our use of participation rates of working-age women (i.e., ages 15-64) rather than those of women in fertile ages. Although the latter would be preferable, we used the former because they were available for a larger group of countries and we were more concerned about small sample sizes.[4]

Third, the reversal in the sign of the TFR-FPR correlation occurred simultaneously with the emergence of high (and persistent) unemployment rates (compare Figures 2 and 3). The average unemployment rate of these OECD countries was 3.6% in the 1970's, with a peak of 5.1% in 1978. By

[3]Significance tests for the correlation coefficient were carried out under the maintained hypothesis that the two variables are jointly normally distributed.

[4]However, for a subsample of 14 countries the correlation coefficient between the TFR and the participation rate of women aged 15-44 also reversed its sign between 1974 (-0.53) and 1993 (+0.56).

1983 it had increased to 8.6%, and it averaged 8.1% between 1984 and 1994.

Participation rates and wages: Our discussion below, following Butz and Ward, highlights the changing implications of wage increases on fertility as wages and female participation rates rise. It is implicitely assumed that female participation rates increase with real wages along the cross-section as well as over time. Verifying that this is the case is more difficult because we need measures of wages which are comparable across countries. We obtained PPP-adjusted wages for a subsample of 16 countries in 1990. The correlation coefficient between PPP-adjusted wages in manufacturing and female participation rates was indeed positive at 0.56.[5]

Behavior within subgroups of OECD countries: Within the OECD we observe great differences in the female participation rate across countries as well as over time. Although the increasing secular trend in the female participation rate is similar for most countries, persistent differences in levels suggest that different countries are in different stages of development and/or constrained by country-specific social factors, customs, etc. Given the importance of the female participation rate in our analysis we divide the 21 OECD countries into three subgroups. The 'high' participation countries are those in which the average female participation rate over the period 1970-1996 was higher than 60%, including USA, Canada, UK, Sweden, Norway, Denmark, Finland and Switzerland. The 'medium' participation countries were Germany, France, Austria, Japan, Australia, New Zealand and Portugal where the female participation rate was in the 50-60% range. The 'low'

[5] PPP-adjustments are not available for the 1970's and 1980's. Wages by gender are only available for an even smaller subsample of countries, so we used average wages.

participation countries (less than 50%) were Italy, Spain, The Netherlands, Belgium, Greece and Ireland.

Figure 4 displays the secular increase of female participation rates for all subgroups, except for the 1990's during which the FPR was stagnant in 'high' participation countries. The differences between subgroups have therefore persisted throughout the whole period.

On the contrary, fertility rates in Figure 5 show a complete reversal between the subgroups. The average TFR of 'high' participation countries, starting at 2.19 in 1970, declined fairly rapidly at first but it bottomed out around 1.65 in the early 1980's and it actually recovered thereafter, to 1.86 in 1990 and 1.79 in 1994. In several countries this recovery was substantial (USA, Sweden, Denmark, and Norway; see Figure 6). In contrast, the average TFR of 'medium' and 'low' participation countries declined monotonically between 1970 and 1994. However, the decline was considerably larger for the latter ('low': 2.72 to 1.46; 'medium': 2.54 to 1.60). Thus, TFR's had 'crossed' by 1987.

Clearly, these differences in the evolution of fertility and the female participation rates drove the reversal of the cross-sectional correlation between them. Fertility rates among some of the 'low' participation countries have reached unprecedented low levels. However, the reversal of the correlation was not driven just by this extraordinary 'fertility crisis'. When the 6 'low participation' countries are excluded from the cross-sectional correlations, we still observe a reversal.

Another important difference between the subgroups is the evolution of unemployment (Figure 7). Although we see a generally increasing trend for all subgroups, the increase was much more spectacular among the 'low' participation countries and the difference has persisted over the last two decades. Our conjecture is that high unemployment in the 'low' participation countries is likely to have contributed to a faster decrease in fertility.

Fertility and the Business Cycle

In most countries the fertility rate shows a negative response to unemployment along the business cycle, i.e., fertility is procyclical. The cyclical behavior of fertility has received much attention since the work of Butz and Ward. They predicted the emergence of countercyclical fertility in the US, resulting from the secular increase in female participation rates. Of course, what measure of 'cyclicality' is appropriate is not obvious. In accordance with a well established practice in the Real Business Cycles literature, we used the Hodrick-Prescott filter to obtain the cyclical component of each country's time series at business cycle frequencies, and we computed the correlation between the cyclical components of fertility and unemployment rates. We interpret a negative (positive) correlation as evidence of procyclical (countercyclical) fertility. Fertility was procyclical for 15 out of 21 countries. These included all 6 'low participation' countries but also the two highest participation countries (Sweden and Denmark) and, by a small margin, the US.[6]We conclude that there is little evidence in this panel in support of Butz and Ward's conjecture.

[6]The correlation of fertility with the unemployment rate lagged one period was in general even more negative:: its value was negative for 19 out of 21 countries.

3 Discussion

We begin with a review of the fertility equation in Butz and Ward. In their study and in others that replicated it, secular and cyclical movements of aggregate fertility in a given country were seen as responses to time-series variation in male and female wages. Instead, we focus on the changes which we have observed for the time-series of cross-sections. When fertility variation is interpreted as resulting from differences in wages along *both* the cross-sectional and time-series dimensions, we believe that the arguments and predictions given in BW are hard to reconcile with the empirical findings reported in the previous section. We are thus led to consider simple extensions of their framework. First, we discuss the possibility -which they ignored- that income effects of female wage increases are important. Next, we turn to three new factors: inflexible working hours faced by individual workers, the possibility of purchasing child care, and unemployment. It is hard to deny the importance of these elements, which were absent from BW, for individual decision-making regarding both labor supply and childbearing. For the purpose of exposition we discuss the implications of each new element separately, but they are not meant to be mutually exclusive. In any case, additional data and structure which are beyond the scope of this note would be needed to distinguish between them.[7]

[7] Another possibility is that part of the variation in the TFR in our panel is due to timing effects. Suppose all countries were experiencing a transition to a new fertility regime in which the timing of births is delayed while completed fertility stays the same. Along such a transition, the TFR would undershoot before returning to its original level. If higher participation countries are at a more advanced stage of this transition, we might

Benchmark Model (Butz and Ward, 1979)

The aggregate fertility equation in BW can be written as follows:

$$B = K \cdot B_w(Y_m, W_f, X) + (1 - K) \cdot B_n(Y_m, X)$$

where K is the female participation rate, W_f is the mean female wage, Y_m is mean male earnings, X is a vector of other characteristics and B_w and B_n the birth probabilities among working and non-working females, respectively. This equation is founded on a standard static time allocation model at the micro level (Willis(1973)). Only mother's time and market goods are required for childrearing. It is assumed that all men participate in the labor force. Fertility of a working woman depends on her wage, her husband's earnings and other factors. Since the wage is not the shadow price of a non-working woman her fertility depends only on the husband's earnings and other factors. The female participation rate K is the fraction of women whose labor market productivity is above their reservation wage. In general, K would depend on the joint distribution of male and female wages and other characteristics. It is assumed that it can be written as a function of mean male and female wages. The fertility response to (male and female) wage increases is then

observe both an upswing in their TFR and a reversal of the correlation between TFR and participation. We believe these 'timing' effects are of minor importance and, as in BW and many other studies, we ignore them in our analysis.

$$
\begin{aligned}
dB &= \underbrace{K(dB_w/dW_f)dW_f}_{A} + \underbrace{dK/dW_f(B_w - B_n)dW_f}_{B} \qquad (1)\\
&\quad + \underbrace{K(dB_w/dY_m)dY_m}_{C} + \underbrace{(1-K)(dB_n/dY_m)dY_m}_{D}\\
&\quad + \underbrace{(dK/dY_m)(B_w - B_n)dY_m}_{E}
\end{aligned}
$$

This expression can be used to study the time-series variation of aggregate fertility in a given country. This is what Butz and Ward did for the US, looking at both secular trends and cyclical behavior. We will use it to analyze the patterns along the cross-sectional dimension, too. We thus interpret differences in aggregate fertility and female participation rates along the cross-section of countries as responses to different levels of male and female wages. A negative (positive) sign for (1) results in a negative (positive) correlation between fertility and participation. Clearly, the cross-section of mean male and female wages shifted upwards between 1970 and 1995. We ask ourselves, can we account for the reversal of the correlation during this period?

According to Butz and Ward, "transitional" fertlity responses of women entering or exiting the labor force are proportional to squared wage differentials. Therefore, terms B, E in eq. (1) are second order effects which can be ignored in an approximation. Furthermore, at low wages and accordingly in a low participation regime general wage increases affect fertility mostly through male income (i.e., $|C, D| \gg |A|$). Although higher male income increases not only family income but also the shadow price of non-working wifes' time, the former effect is expected to dominate leading to a positive effect in term D. As wages increase, more and more women choose to work so female wages become an important determinant of couples' fertility decisions. Wage increases for a working woman induce both income and substitution effects on fertility. Assuming that the latter dominate, fertility decreases ($A < 0$) and the total fertility response to (male and female) wage increases may become negative. Butz and Ward argued that this could explain the end of the 'baby-boom' and the subsequent 'baby-bust', as well as the emergence of counter-cyclical fertility when the female employment rate is high. Paraphrasing BW, 'good times' are the most expensive times to have children (due to high wages); if many women are in the labor force this will yield a negative association between business cycles and fertility. Along the same lines, the negative correlation between fertility and participation in the cross-section of OECD countries during the 70's is consistent with the hypothesis of dominant substitution effects. However, if substitution effects for working women were strong enough in the 70's to produce this result, why did the correlation become positive in the 90's when the average fraction of working women in the cross section was even larger? Thus, the explanation offered by BW for US time series is hard to reconcile with the cross-sectional facts.[8]

Income and Substitution Effects of Female Wage Changes

Before turning to extensions of the basic BW framework, we discuss the

[8] Of course Butz and Ward did not 'fail' to explain the cross-sectional patterns, since they never claimed their model could do so. In taking their framework to the cross-sectional data, we are making the strong assumption that cross-sectional differences in aggregate characteristics (other than wage levels) can be ignored. We are aware of these differences, but we still believe this to be a useful exercise.

implications of changes in the relative importance of income and substitution effects associated with female wage increases. In BW the possibility of a positive effect of female wages on fertility is mentioned but it is ignored.

According to standard (static) labor supply theory, a wage increase is likely to lead to an increased labor supply at low wages as the substitution effect dominates over the income effect. However, the net wage effect on labor supply becomes less positive as the wage increases and it may even become negative at sufficiently high wages. The same logic applies to the effect of female wages on fertility if we think of childrearing as a time-intensive task (i.e., as a form of 'leisure'). At sufficiently high levels of the female wage, further wage increases could either reverse the negative sign of term A in eq. (1), or else reduce its absolute value. This could result in an increased demand for children.[9] Thus, an increasing importance of income effects is one factor which could yield the reversal of the cross-country correlation between fertility and female participation over time. Similarly, the fertility response to business cycles would become more procyclical as wages and the labor supply of working women increase.

Discrete Working Hours

The model by Butz and Ward assumes a continuous labor supply response to wage changes. One implication of this is that the response of labor supply to wage increases is smaller among the newly participating women than among those who were already working. Therefore, the fertility response will also be smaller for new labor force entrants.In their empirical work, they

[9]There is empirical evidence of this for Britain in Ermisch (1989), for the US in Macunovich (1996).

even ignored the contribution by new entrants on the grounds that it is proportional to squared wage differentials, i.e., a second order effect compared to the one for working women.

In the real world, workers are not usually allowed to choose their hours of work freely. Although one can argue that people can choose different occupations which involve different restrictions on working hours, employers' preferences, fixed costs of participation and institutional restrictions such as the fringe benefit system give a substantial advantage to full-time work. A majority of women work more or less the same amount of hours.

If individuals's labor supply choice is restricted to either full-time work or no work, the effect of a wage increase on fertility is not the same as in the continuous working hour case. In fact, the implications for fertility turn out to be quite different from those in BW. Under the fixed hours restriction a wage increase for a working woman has an income effect only, since her hours of work are not allowed to change. If children are a normal good, this will result in higher fertility. For the new entrants, fertility could drop substantially as their labor supply increases from no work to full-time work.

Therefore, if hours are fixed higher female wages contribute to lower fertility only through their effect on new participants, but this effect is likely to be large and it could induce a negative correlation between fertility and participation. However, the increase in participation rates in response to wage increases is likely to be greater when wages and participation rates are low, and to get smaller as fewer and fewer women are not working. Furthermore, as wages and participation increase we would expect income effects coming from working women through both own and husband's wage (terms A, C in eq. 1) to become more important and to compensate the reduction of income effects in term D. The result is that in a high participation regime the fertility rate is more likely to be positively associated with the participation rate. This is consistent with the reversal of the cross-country correlation.

Purchased Child Care

Parental fertility decisions are likely to be different if child care services can be purchased. Many researchers have suggested the increasing availability of market child care as a possible explanation for the recent fertility upswing in some developed countries. Ermisch (1989) sets up a model of family size decisions in which couples choose a combintation of mother's time and purchased child care. One of the main implications of the model is that the changing effect on fertility of increases in women's wages (negative at first, but positive eventually at high enough wages) will be further facilitated by the availability of market child care.

Let us introduce market child care into the aggregate fertility equation. The price of market child care affects the aggregate birth probability both directly through B_w and B_n (mostly the first), and indirectly through the participation rate. Other things equal, the higher the price of child care the lower the fertility rate. Increases in the price of child care should also reduce the participation rate and this could reduce the aggregate birth probability if $B_n > B_w$. The total effect of changes in the price of child care on fertility would be the sum of these two effects. Furthermore, the availability of market child care as a substitute for the mother's time will also change the effect of increases in female wages on the birth probability of working women.

The price of market child care should be related to average female wages, since child care services are provided mostly by women. Therefore, as the mean female wage increases the price of child care is also likely to increase. However, we assume that the price of child care declines relative to average female wages as female wages increase (see Blau (1992) for some evidence from the US). We argue as follows. First, as the female participation rate increased, women also tended to work in higher-skilled, higher-wage occupations. To the extent that child care services are carried out by relatively unskilled labor, we would expect the price of child care to fall relative to the average female wage. Second, as more women work, there is greater political pressure for more generous child care subsidies which reduce the net price of child care faced by parents. It is also likely that more jobs which are compatible with childrearing, such as jobs with flexible working hours, work done at home, etc., will be created as more women demand such jobs. Under the assumption that purchased child care services are used by working mothers only, the fertility response equation will be

$$\begin{aligned} dB &= K\left[\underbrace{(dB_w/dW_f)}_{A1} + \underbrace{(dB_w/dC)(dC/dW_f)}_{A2}\right] dW_f \\ &\quad + \left[\underbrace{(dK/dW_f)}_{B1} + \underbrace{(dK/dC)(dC/dW_f)}_{B2}\right](B_w - B_n)dW_f \\ &\quad + \underbrace{K(dB_w/dY_m)dY_m}_{C} + \underbrace{(1-K)(dB_n/dY_m)dY_m}_{D} \\ &\quad + \underbrace{(dK/dY_m)(B_w - B_n)dY_m}_{E} \end{aligned}$$

where C denotes the child care price. Notice that terms C, D and E are the same as before. Intuitively, at low wages few women purchase child care, therefore the effect of increasing female wages with and without child care would be similar ($A2, B2 \simeq 0$). At high wages, many more women work and working women substitute market child care for their own time. However, we have just argued above that the effect of mean female wages on the price of child care (dC/dW_f) should be small, so we still wouldn't expect $A2$ and $B2$ to be large. In turn, the income effect of female wage changes on fertility becomes more important relative to the substitution effect because the price of childrearing depends less on the mother's wage and more on the price of market child care. Therefore, at higher wages (i.e., in the 90's) the direct effect of higher female wages on fertility (term $A1$) becomes less negative (or more positive) when we consider market child care, facilitating the reversal of the correlation between fertility and female participation. The increasing importance of child care weakens the link between the female wage and the price of children for working women which contributed to the negative correlation between fertility and participation. Notice that this increasing importance of market childcare may be partly (but not only) an endogenous response to higher female wages.

Unemployment

Standard economic models of fertility such as BW do not consider unemployment under the implicit assumption of fully flexible wages. In that case business cycles are supposed to affect the household's constraints through wage variation. This assumption is now harder to accept since the unemployment rate has been close to 10% during the last 15 years in many countries, especially in Europe. As shown in Figure 5, since the mid 1980s the OECD average unemployment rate has been close to 8% with many countries experiencing a double-digit unemployment rate. In this context the business cycle is likely to work through the employment state.

Unemployment (i.e., a 'zero' wage) induces a strong income effect for households in which the husband is unemployed, while it should yield both income and substitution effects if a participating wife becomes unemployed. When the female participation rate is low, income effects due to the loss of the husband's income should be relatively more important. In particular, countries with lower wages and female participation rates experience a higher incidence of households in the'zero-earnings' state, with devastating effects on fertility.[10] This should contribute to a positive correlation between fertility and participation. We think that the dramatic decline in fertility throughout the 1980s and 1990s in Spain, Italy, Greece and Ireland has been caused partly by high unemployment rates during this period (Figures 8-9). The negative effect of unemployment on fertility in those Southern European countries must have been stronger since young males and females have been affected most acutely by it and most unemployed youth usually do not receive unemployment subsidies due to the lack of previous employment experience.

Further negative effects on fertility of unemployment are likely if we think in a dynamic context. If couples expect sustained unemployment, the subsitution effect of female unemployment will be further offset by the income effect due to a reduced expected lifetime wealth. Furthermore, more wives

[10]We are implicitely making the simplifying assumption that the female's participation decision is independent of her husbands employment state. Also, notice that the formation of new households (marriage) is delayed by high unemployment among the young; we think of these hoseholds which do not form as 'zero-earnings' households.

will participate in the labor market as an insurance strategy against negative shocks to their husband's wage or employment, therefore leading to lower fertility. Also, fewer employed wives would quit their job to have children since an exit from the labor market could seriously damage their future labor market prospects (C. Boix, 1997). This effect would be more important the greater the uncertainty in the labor market or the higher the unemployment rate. Also, to the extent that business cycles affect households through unemployment rather than wages, fertility should become more procyclical, contrary to what Butz and Ward predicted.

Finally, it is remarkable that fertility in 'low participation' countries has reached a much lower level than the mimimum level experienced by most high participation countries. The average mimimum fertility rate experienced by the high participation countries was 1.58 while continued decline in low participation countries lead to mimimum fertility in 1996 of 1.40 including Ireland and 1.29 excluding Ireland. What is surprising is that the average female labor force participation rate among the high participation countries was 64% when they reached the minimum fertility while that of the low participation countries was still below 50%. During the second half of 1980s and the early 1990s when the fertility recuperation occurred in some high participation countries, the female participation rate in these countries was around 70% and unemployment rate was relatively low (below 5%). This suggests that as the participation rate increases from fairly low levels and unemployment rate stays high in low participation countries, the fertility rate could decrease further.

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Figure 1: OECD Avg. Fertility and Female Participation Rates

Figure 2: Cross-Country Correlation Between TFR and FPR

Figure 3: OECD Avg. Unemployment Rate

Figure 4: Female Participation Rates in 3 Subgroups

Figure 5: Fertility Rates in 3 Subgroups

Figure 6: TFR in USA, Sweden, Denmark and Norway

Figure 7: Unemployment Rates in 3 Subgroups

Figure 8: TFR in Spain, Italy, Greece and Ireland

Figure 9: Unemployment in Spain, Italy, Greece and Ireland