The causality between female labour force participation and the availability of childcare

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It is typically found that the labour force participation of women is negatively affected by the presence of young children. This paper focuses on the causality, in the sense of Granger’s definition, between the participation of mothers of young children and childcare provision. It is found that childcare Granger causes participation without feedback, which supports the claim that women could be constrained in their participation by the lack of childcare facilities. The absence of a feedback mechanism raises the issue of childcare supply not reacting to market mechanisms.

I. INTRODUCTION

The past 30 years have witnessed an increase in the labour force participation of British women from 56% to over 70% (Wilson, 2000). However, the increased participation thus far has not been enough to meet the economy’s demand for labour in some of the traditionally female dominated occupations such as nursing and teaching, which suffer from a chronic shortage of staff (Wilson, 2000). As more than 90% of childless women age 30 are already participating, any further increase in female labour force participation has to be met by mothers. It is hypothesised that due to a lack of childcare facilities many women may be forced to reduce their participation in the labour force; over 20% of British women aged 18–44 stated that childcare obligations restricted them from working (Family Resources Survey, 1998). This finding is supported by Mason and Kühn (1992), who, using US data, found that up to 30% of mothers of pre-school age children felt constrained in their employment due to childcare problems.

Childcare may affect female labour force participation due to its cost, uncertainty regarding its quality or preferences. Most of the economic literature has focused on determining estimates of the price elasticity of non-maternal childcare with respect to employment. Estimates range from −0.22 to −0.92 for the US (Blau and Robins, 1988; Connelly, 1992; Ribar, 1995; Kimmel, 1998) or −0.26 for the UK (Lanot and Walker, 1995). The question of quality is more difficult to answer since childcare quality is difficult to be measured (Blau, 2001). As a proxy for quality, Blau (1992) reports that, for the US, childcare workers receive lower monetary compensation compared to women with similar characteristics in other occupations. This might lead to high turnover rates and lower quality care, affecting the supply of childcare and the demand for childcare respectively (see Michalopoulos et al., 1992, Blau, 2001 for discussion on the effect of quality on demand). It is found that women working in childcare are paid 28% less than

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2 Pay rises and ‘golden hellos’ have recently been implemented in these two occupations to attract personnel.
other women, holding age and years of education constant (see Table 1). This differential has remained unchanged over the period 1992–1999. Finally, preference for taking care of one’s own children may not be such an issue as Blau and Robins (1988) predict that 87% of mothers who would be working if childcare were provided at zero cost to the consumer.

Previous studies examining the relationship between childcare and female labour supply have relied on micro-level data and have therefore been affected by self-selection problems concerning the use of childcare and the decision to participate. This note focuses on the question of quantity to determine whether formal childcare availability affects women’s employment decisions rather than focusing on cost. To do so the concept of causality is used as defined by Granger (1969). Finding a causal link from the supply of childcare (hereafter SCC) to the female labour supply (hereafter FLS) would indicate that lack of childcare facilities constrains female labour supply. This analysis focuses on mothers whose youngest child is of pre-school age (less than 5). Additionally a feedback effect from FLS to SCC is also tested for, i.e. whether the market for the provision of childcare reacts to demand, assuming that demand is proxied by female labour supply.

A causal link is found from childcare supply to female participation, but no feedback effect. This confirms previous evidence that female participation is constrained by the lack of childcare facilities. Furthermore, as no feedback effect is found, it appears that the supply of childcare does not react to market mechanisms.

## II. METHODOLOGY AND MODEL

Variable \( x_t \) is said to Granger-cause \( y_t \) if the prediction of present value of \( y_t \) is improved by using past values of \( x_t \) (Granger, 1969). Granger causality does not imply that realizations of \( x_t \) have an impact on future realizations of \( y_t \), and thus should not be confused with the usual sense of causality. This section illustrates the methodology used to test for Granger-causality from \( x \) to \( y \), the same method can be used to test the causality from \( y \) to \( x \). All variables are stationary and expressed in natural logarithm. Let’s assume that \( y_t \) follows an AR model such that:

\[
y_t = \alpha_0 + \sum_{i=1}^{p_1} \beta_i (1 - L)y_{t-i} + \varepsilon_t \tag{1}
\]

where \( L \) is the lag operator, \( \varepsilon_t \) is a random term and \( p_1 \) is the order of the AR process. The optimal representation of \( y_t \) is obtained for a given value of \( p_1 \), say \( p_1^* \). \( p_1^* \), is then the number of lags minimizing the Akaike Final Predicting Error (1969). Following Granger (1969), past values of \( x_t \) are added to the preferred specification of \( y_t \). The optimal number of lagged values of \( x_t \), \( p_2^* \), is determined using the FPE criteria:

\[
y_t = \gamma_0 + \sum_{i=1}^{p_1} \beta_i (1 - L)y_{t-i} + \sum_{j=1}^{p_2} \rho_j (1 - L)x_{t-j} + \mu_t \tag{2}
\]

\( x_t \) is said to Granger-cause \( y_t \), if the FPE obtained when estimating Equation (2) with \( p_1^* \) and \( p_2^* \) lags for \( y_t \) and \( x_t \) respectively is less than the FPE obtained when past values of \( x_t \) are not included. To summarise \( x_t \) is said to Granger-cause \( y_t \) if \( FPE(p_1^*, p_2^*) < FPE(p_1^*) \).

## II. EMPIRICAL RESULTS

The data on FLS and SCC used for the period 1992q1–99q4 for the UK are compiled from the Quarterly Labour Force Survey. Childcare regulation was largely modified by the Children Act 1989, which was fully implemented by October 1991. This means that the series of SCC is not affected by changes in childcare regulation. FLS is measured as the percentage of women, aged 16 to 59, whose youngest child is less than five,\(^3\) considered active in the labour force (ILO definition). This proportion increases 11 points over the period from 43%–54% (see Figure 1). SCC is measured as the proportion of childcare workers in the labour force.\(^4\) SCC increases by 50% over the period (see Figure 2). This increase hides variations in the evolution of the different types of childcare over the period.

Three providers of childcare can be distinguished: nursery, childminder and playgroups, which are mostly run on a self-help basis by parents. Over the period, the number of places in England increased by 120% for nurseries, 30% for childminders but decreased by 16% for playgroups.

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\(^3\) In the UK, compulsory schooling starts at age five.

\(^4\) Childcare personnel is identified by using the Standard Occupational Classification codes for childcare and related occupations including nursery nurses, playground leaders, educational assistants and other childcare and related occupations.
Furthermore, day nurseries are run either by local authorities or privately. Over the period, places in public nurseries have fallen by 35% (DfEE, 1999). Hence, due to a drop in publicly and community provided care, the cost of childcare is likely to have increased over the period. To reduce the cost of childcare for poorer families, the Working Families Tax Credit was introduced in 1999. It includes a subsidy for childcare of up to 70% of costs up to £150 per week.

For the analysis, the log of FLC and SCC is used. Both series are integrated of order 1 when including a trend but are stationary after differentiation (see Table 2). However, the series are co-integrated (see Table 2) hence they are generated by an Error Correction Model and are thus characterized by a long-term equilibrium. The presence of co-integration can be considered as an advantage since ‘for a pair of series to have an attainable equilibrium, there must be some causation between them to provide the necessary dynamics’ (Granger, 1988, p. 203). The method described above is used to test the Granger causality between the supply of childcare and female labour supply.
Table 3 reports the results of the causality tests. The supply of childcare, lagged by five quarters, Granger causes female labour supply: \( \text{FPE}(6,5) = 0.937 \times 10^{-4} \). Including past information on the supply of childcare improves the prediction on mother’s labour supply. These results confirm that the labour supply of mothers of young children is affected by childcare availability. On the other hand, female labour supply does not Granger-cause childcare supply as \( \text{FPE}(2) < \text{FPE}(2,1) \). In other words, the supply of childcare is not sensitive to the participation in the labour market of mothers of young children, which is assumed to be a proxy for the demand of childcare. These results are to be taken with caution. They may be due to the short horizon covered by the data, or by the proxies used to define the childcare market. It is possible that the supply of childcare is poorly measured by the variable used or that the demand for childcare is not represented by the participation of mothers of young children (see Lanot and Walker, 1995, for evidence on the use of childcare by non-working mothers). Also, the official childcare supply is considered while 26% of primary care of children aged under five is done by relatives or neighbours (General Household Survey, 1998/1999). Keeping in mind these caveats, it appears that the supply of childcare is sticky. This could be due to regulations creating difficulties for new entrants on the supply side, and higher costs for users on the demand side of the childcare market.

IV. CONCLUSIONS

This paper examines the causality between female labour force participation and the supply of childcare. It is found that childcare Granger causes participation of women with young children, with no feedback effect. Thus a lack of childcare facilities would limit the participation of women in the labour force. An increase in the demand for childcare generates either an increase in price or the creation of a queue (Chevalier and Viitanen, 2001) but has no effect on the supply.

If the increase in the labour force is to come mostly from an increase in mothers’ labour supply then it appears that there is a case for a governmental intervention in the market for childcare, either by creating new facilities, by facilitating entries, or by lowering costs for users, as is the case with the WFTC.

REFERENCES


