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Recreation, home production, and intertemporal substitution of female labor supply: Evidence on the intensive margin

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ABSTRACT

The predicted labor supply responses to wage and price variations are important when discussing the economic efficiency of taxes and subsidies, and their extent may also be relevant to the analysis of economic fluctuations. This paper presents new estimates of the wage intertemporal substitution elasticity (ISE) for the intensive margin of female labor supply. It likewise explores this margin's sensitivity to changes in the price of recreation and home consumption goods. Our estimated wage ISE (0.9) implies that, at average time allocation values, female labor force participants will increase their annual labor supply by around 14 hours when offered a 1% increase in the wage rate. Approximately 7 hours of this increase will be from less time spent on leisure and the other 7 from less time spent on home production. Annual labor supply is reduced by around 7 hours when the price of home consumption goods rises by 1%, this extra time being almost entirely devoted to home production. An elasticity of substitution between time and goods in home production of approximately 2 is also estimated.

1. Introduction

The pioneering study on the intertemporal labor supply decisions of married women by Heckman and MaCurdy (1980, 1982) estimated a wage elasticity that integrated the intensive and extensive margins of labor supply in its response. As the extent to which a labor supply response is spread between marginal variations in market work and variations in the probability of working is of considerable economic and policy interest, posterior research has attempted to estimate the size of each individual margin. Zabel (1997), for example, estimated wage elasticities for the intensive and extensive margins of married women's intertemporal labor supply centered, respectively, at 0.38 and 0.42. The corresponding estimates obtained

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by Altonji (1982a) were 0.75 and 0.87. In both studies, the sum of the estimated elasticities is substantially below the 2.23 estimate obtained (based on 1350 hours of market work) by Heckman and MaCurdy (1982).[2]

The estimation procedure used by Heckman and MaCurdy (1980, 1982) assumed that labor supply falls continuously to zero in response to variations in wages. Yet, if there are fixed costs associated with entry into the labor market, the lowest number of hours that a worker will work may substantially exceed zero (see, e.g., Cogan, 1981). Hence, Zabel (1997) and Altonji (1982a) relaxed the continuity assumption and estimated discontinuous labor supply schedules. Zabel's (1997) estimates were obtained using household Euler equations for labor supply and labor force participation. However, Domeij and Flodén (2006) have recently demonstrated that the Euler equation approach induces a significant downward bias in the estimated elasticities when liquidity constraints are ignored.[3] Although Altonji (1982a) pursued an alternative approach, in which family expenditure on food was included in the labor supply and participation equations to control for unobserved expectations and wealth, his empirical results for married women were very preliminary. This paper presents new estimates of the wage ISE for the intensive margin of female labor supply. In a similar way to Altonji (1982a), we employ data on family expenditure on restaurants to control for unobservable expectations and wealth. In addition, we test our econometric model against a variety of specification failures. As discussed below, Zabel's (1997) and Altonji's (1982a) estimates for the extensive margin may be further biased. The estimation of the extensive margin is left for future research.

The sensitivity of women's intertemporal labor supply to price changes of goods consumed in recreation and home production activities is also explored. Gronau and Hamermesh (2006) have recently documented that leisure is the daily activity (apart from sleep) on which more time is consumed per dollar spent on the course of the activity. Hence, variations in recreation goods prices might significantly alter the demand for leisure, and require, in turn, a reallocation of time to other pursuits. In González Chapela (2007), for instance, the price of recreation goods was found to influence men's intertemporal allocation of time between market work and leisure. As the extent to which women vary hours of market work in response to wage changes has been found to be greater than that for men,[4] this different response could extend to a model in which recreation goods and leisure were non-separable within the period.

Although a simple dichotomy of market work and leisure may be a useful starting point for analysis, Rupert et al. (2000) have shown that estimates of intertemporal substitution elasticities obtained from life-cycle data on hours and wages may be problematic if work done at home is excluded from the analysis. Hence, in the life-cycle labor supply model presented in Section 2, consumers will not only be allowed to substitute leisure at one date for leisure at other dates in response to wage or price changes, but also to substitute work in the market for work in the home at a given date. Furthermore, they will be able to substitute time for expenditure in response to fluctuations in the price of goods used in home production. The result of the analysis will be a three-activity system—leisure, home production, and market work—that will allow us to identify empirically the labor force participants' willingness to substitute hours intertemporally in response to wage or price changes.

The data and econometric approach employed to estimate this system of structural equations are discussed in Section 3. The main empirical results are presented in Section 4. Our estimated wage ISE for the intensive margin of female labor supply is in the neighborhood of 0.9 for the population of U.S. women of prime age. (For married women, the corresponding estimate is approximately 1.2.) As predicted in Domeij and Flodén (2006), this estimate is substantially higher than that obtained in Zabel (1997). It is also somewhat higher than Altonji's (1982a) preliminary estimate, a result that seems driven by the different instruments for wages and family expenditure utilized. The estimated wage ISEs for leisure and home production time that we have obtained, -0.1 and -0.7, respectively, suggest that female labor force participants will reduce both annual time spent on leisure and on home production by some 7 hours when offered a 1% increase in the wage rate. The intensive margin of female intertemporal labor supply appears as unaffected by variations in recreation goods prices, although it does react to changes in the price of home consumption goods: Our estimated market time elasticity with respect to the price of home consumption goods is in the neighborhood of -0.7. Thus, annual market time is reduced by some 7 hours (and annual home production time increased by around 6 hours) when the price of home consumption goods rises by 1%. If home production were excluded from the model's specification, part of this effect would be misleadingly attributed to recreation goods. A more detailed summary of the paper is provided in Section 5.

2. Theoretical model

Consider a consumer (i) with preferences at age t represented by the utility function

$$U(c_{it}, x_{it}, s_{it}, l_{it}, h_{it}) = \frac{c_{it}^{1-\eta^{-1}}}{1-\eta^{-1}} + \frac{\psi_{it}}{1-\gamma^{-1}}\left(x_{it}^{1-\sigma^{-1}} + \alpha_{it} l_{it}^{1-\sigma^{-1}}\right)^{\frac{1-\gamma^{-1}}{1-\sigma^{-1}}} + \frac{\kappa_{it}}{1-\mu^{-1}}\left(s_{it}^{1-\theta^{-1}} + \chi_{it} h_{it}^{1-\theta^{-1}}\right)^{\frac{1-\mu^{-1}}{1-\theta^{-1}}}, \quad (1)$$

whose specific functional form allows concrete interpretations to be given to the estimated parameters. In this expression, recreation goods (x) and leisure time (l) are combined to produce recreation such as going to the theatre, whereas home

[2] The intertemporal substitution elasticity (ISE) that integrates the intensive and extensive margins of labor supply in its response equals the sum of the two marginal ISEs. The proof is straightforward and follows on from the Law of Iterated Expectations (see Appendix A).

[3] The literature has highlighted other sources of downward bias. See Domeij and Flodén (2006) for further discussion.

[4] For male estimates, see, e.g., MaCurdy (1981), Altonji (1986), Reilly (1994), Mulligan (1999), and Ham and Reilly (2002). Blundell and MaCurdy (1999) survey the intertemporal labor supply literature.