4-1-2019

The Casual Effects of Wages on Labour Supply for Married Women — Evidence from American Couples

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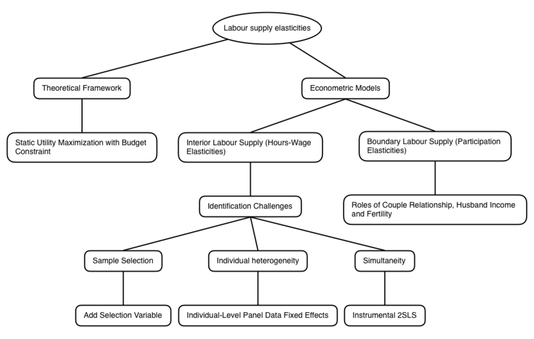
Motivation

❖The research question: How to consistently estimate the causal effects of own-wages on hours of work (i.e., the hours-wage elasticities) for married women?

The negative correlation between average wages and labour supply is misleading, because relevant factors are not held constant and endogeneity problems have not been taken into account.

❖ After modeling the interaction between husbands and wifes, and alleviating self-selection, individual heterogeneity, and simultaneity bias, we find consistent, significant and positive causal effects of wages on labour supply.

Outline and Methods



Theoretical Framework

➢Theoretical model: The representative married woman's utility is maximized subject to her budget constraint that is connected to her husband's labour income through the couple relationship variable.

$$\underset{\{c,f\}}{Max}\ U = \alpha lnc + \beta\frac{f^{1-\gamma}}{1-\gamma}, \gamma > 0, \alpha > 0, \beta > 0$$
$$s.t.\ c = w(1-f) + \theta(w^H + v)$$

where

- c: composite consumption;
- f: dedication to her family; time spent on housework, child care, household production; assume h+f=1 where h is the time of work;
- α: relative importance of consumption;
- β: relative importance of dedication to family;
- w: wife's wage rate;
- w^H: husband's wage rate;
- v: non-labour income and family wealth;
- θ: the proportion of husband's wages and non-labour income that goes to the wife; measure of couple relationship.

Interior Solution and Comparative Statics

The FOCs give the optimal hours of work equation:

$$\frac{\alpha}{\beta}w(1-h^*)^\gamma = wh^* + \theta(w^H + v)$$

Implicit differentiation yields:

(1) The partial effects of own wages on labour supply (hours-wage elasticity) $\frac{\partial lnh^*}{\partial lnw}$:
- The sign is uncertain. When h^* is low, it is positive;
- When h^* is high, it could be negative, i.e., a backwards-bending labour supply curve.

(2) The partial effects of couple relationship on labour supply $\frac{\partial lnh^*}{\partial \theta}$:
- It is negative. Closer couple relationship results in lower willingness to work;
- $\frac{\partial lnh^*}{\partial \theta} \to 0$ as $w >> (w^H + v)$, i.e., higher relative wages lead to independence and a diminishing role of couple relationship.

(3) The partial effects of husband's wages on wife's labour supply (cross-wage elasticity) $\frac{\partial lnh^*}{\partial lnw^H}$:
- It is negative. Higher husband's wages reduce his wife's work hours;
- $\frac{\partial lnh^*}{\partial lnw^H} \to 0$ when $w >> w^H$, i.e., the effects of husband's wages disappear when wife's wages dominate husband's income.

(4) The partial effects of non-labour income on labour supply $\frac{\partial lnh^*}{\partial v}$: It has the same effects as the husband's wages.

(5) How the wife's working decision changes with the value of her dedication to the family: $\frac{\partial lnh^*}{\partial \beta}$:
It is negative. A higher value placed on her dedication to family (e.g. more children) lowers her probability of working.

Boundary Solution

Married women choose not to work (h=0) when the market wage is lower than their reservation wage, where the reservation wage is:

$$w^R = \theta\beta(w^H + v)/\alpha$$

The wife's reservation wage increases with

- husband's wage w^H,
- non-labour income and family wealth v,
- couple relationship θ,
- value of family β.

A higher reservation wage implies a lower probability to work outside the family.

Empirical Analysis

➢The data source is the PSID survey from 2005 to 2015. We construct a panel data set containing 2732 married women aged between 17 and 55 who lived with their husbands.

➢The baseline linear pooled OLS model (Model 1):

$$ln\_wife\_work\_hours_{it} = \beta_0 + \beta_1 ln\_wife\_wage_{it} + \mathbf{Z_{1it}}\alpha + \mu_{it}$$

where

- i: individual married woman; t: year.
- β_1 is the coefficient of interest – the causal effects of wages on labour supply (Marshallian labour supply elasticity).
- $\mathbf{Z_{1it}}$ are exogenous control variables suggested by the theoretical model.

$\mathbf{Z_{1it}} = (ln\_husband\_wage_{it}, couple\_relationship_{it}, wife\_wage\_type_{it}, family\_wealth_{it}, number\_children_{it}, age\_youngest_{it}, region_{it}, wife\_education_{it}, wife\_health_{it}, wife\_age_{it}, wife\_race_{it})$

Identification Challenge I: Sample Selection

➢We observed wages and hours of work only for the employed women who were self-selected into the labour force.

The hours of work equation:

$$ln\_wife\_work\_hours_{it} = \begin{cases} \beta_0 + \beta_1 ln\_wife\_wage_{it} + \mathbf{Z_{1it}}\alpha + \mu_{it} & if\ wife\_lfp_{it} = 1 \\ unobserved & if\ wife\_lfp_{it} = 0 \end{cases}$$

The selection equation:

$$wife\_lfp_{it} = 1 \quad if \quad \mathbf{M_{it}}\gamma + \nu_{it} > 0$$

where $\mathbf{M_{it}}$ include exogenous variables $\mathbf{Z_{1it}}$ and other exogenous variables that determine the labor force participation choice.

➢Adding the selection variable (inverse Mill's ratio) into the hours of work equation helps to correct the sample selection bias (Model 2).

Identification Challenge II: Individual Heterogeneity

➢The unobserved individual-specific characteristics, such as preference for work, ability, and family tradition, could bias the effects of wages on labour supply.

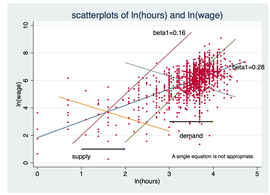
➢The panel data fixed effects model controls for the individual heterogeneity by including the individual-level fixed effects component a in the model (Model 3).

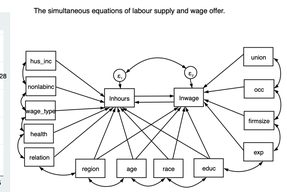
$$ln\_wife\_work\_hours_{it} = \beta_0 + \beta_1 ln\_wife\_wage_{it} + \beta_2 selection\_variable_{it} + \mathbf{Z_{1it}}\alpha + a_i + \varepsilon_{it}$$

$$E(a_i | ln\_wife\_wage_{it}, selection\_variable_{it}, \mathbf{Z_{1it}}) \neq 0$$
$$E(\varepsilon_{it} | ln\_wife\_wage_{it}, selection\_variable_{it}, \mathbf{Z_{1it}}) = 0$$

Identification Challenge III: Simultaneity

➢What we observed in labour market were the equilibrium wages and hours of work that are determined by the intersection of labour supply and labour demand curves. We need to separate labour supply from labour demand to identify the causal effects of wages on hours of work.

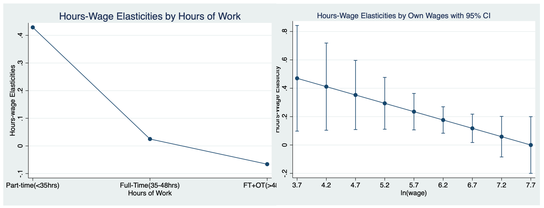




➢We use demand shifters as instruments for the endogenous variables in the labour supply equation and run the 2SLS regression with panel data fixed effects (Model 4).

Findings and Conclusion

The evidence of a backwards-bending labour supply curve: the hours-wage elasticities turns to negative when hours or wages are very high.



The results from four specifications:

The interior labour supply (hours of work) regression models:

Explanatory Variable	Model 1 Pooled_OLS	Model 2 Pooled_OLS_Selec	Model 3 Panel_FE	Model 4 Panel_FE_2SLS
ln(wife wage)	0.2880*** (.0044)	0.2857*** (.0044)	0.2682*** (.0159)	0.1633*** (.0464)
Couple relation	-0.0086*** (.0016)	0.0050* (.0020)	0.0061 (.0034)	0.0069 (.0040)
ln(husband wage)	-0.0582*** (.0044)	-0.0407*** (.0047)	0.0056 (.0087)	0.0091 (.0092)
Sample Selection Correction Selection variable(IMR)	no	-0.3732*** (.0317)	-0.2885*** (.0674)	-0.3414*** (.0838)
Other Controls	yes	yes	yes	yes
Individual fixed effects	no	no	yes	yes
Year fixed effects	no	no	yes	yes
Simultaneity Bias Correction	no	no	no	yes
N	8544	8544	8544	8378

Notes: The outcome variable is ln(wife work hours).
Other controls include: wife wage type, weekly family transfers, weekly family social security income, family wealth, wife education, wife health, wife age, wife race, and region.
All models are using vce(robust). Robust standard errors are in parentheses.
* p<0.05; ** p<0.01; *** p<0.001

❖The causal effects of wages on labour supply (the hours-wage elasticity) decrease from 0.29 to 0.16 as we alleviate various endogeneity problems.
❖Holding other factors constant, a 1% increase in a married woman's wages raises her hours of work by 0.16% on average.
❖The hours-wage elasticities are much larger and more significant for part-time female workers than full-time female workers.
❖There is evidence of backwards-bending labour supply curves.