The Effects of Single Mothers' Welfare Participation and Work Decisions on Children's Attainments

Hau Chyi[1] Orgul Demet Ozturk[2]

[1]WISE, Xiamen University

[2]University of South Carolina

July 24, 2008

Motivation

Related Literature

Model

Econometrics

Data and Results

Sample Patterns

Results

Concluding Remarks

Motivation

- Welfare system in the U.S.
  - Who are eligible?
  - What are the benefits?
  - 1996 reform: what changed and how?
- New restrictions on eligibility of TANF program.
  - 5-year welfare time limit and work requirement
- Implications for children's attainments through changes in mothers' behavior ?

Related Literature

- Research on determinants of children's attainments are abundant:
  - Haveman and Wolfe (1995), Duncan and Hills (1997), Dahl and Lochner (2005) and Raquel (2007)
- Lack of information on causal effects of welfare on children's attainments (Currie (1998)).
- Issues:
  - Including children who were ineligible for welfare
  - OLS estimates may be biased
  - Multicollinearity between work and welfare decisions mostly ignored

What Have We Done?

- Study effects of a low-skilled single mother's work and welfare decisions during her child's childhood on child's standardized math test score.
- Use IV method to control potential unobserved heterogeneity problem.
  - IV we propose: predicted quarters of work and welfare use estimated from low-skilled married mothers.
- A median welfare user (12 quarters) expects to gain 4.9 points more in test scores. Median work (14 quarters) is associated with 1.6 points more.

Model Specification

Write a structural form of a child's attainment production function as:

$$\ln O_T = \ln A_0 + \gamma_1 \ln Y_T + \gamma_2 E_T + \gamma_3 W_T + \gamma_4 \ln A_0 W_T + \gamma_5 \ln A_0 E_T + \gamma_6 testAge + u$$

where:

- $\ln O_T$: ln-PIAT math score of a child
- $\ln A_0$: initial ability of the child, where:

$$\ln A_0 = \gamma_7 AFQT + \gamma_8 gender + \gamma_9 race + \gamma_{10} ageless18 + \gamma_{11} edu$$

- Y_T: accumulated family income during childhood.
- E_T: total quarters of mother's work during childhood.
- W_T: total quarters of welfare use.
- u: unobserved characteristics.

Model Specification - Cont.

- Marginal productivity of mother's decisions varies with innate ability, $\ln A_0$ (for example, Raquel (2007).
- For example,

$$\frac{\partial \ln O_T}{\partial W_T} = \gamma_3 + \gamma_4 \times \ln A_0. \tag{1}$$

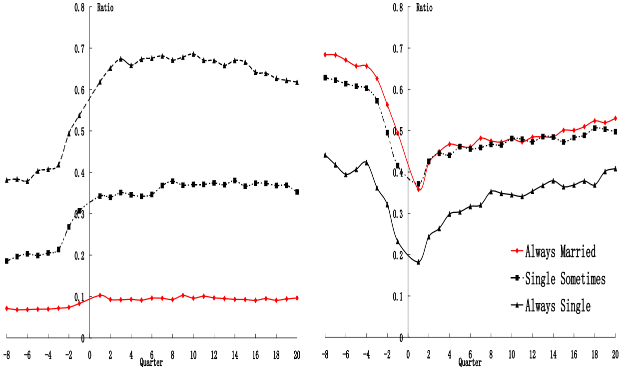
Econometric Concerns

- Correlation between mothers' work and welfare decisions and the unobserved heterogeneity raises the issue of omitted variables bias.
- We will instrument for W and E.

Econometric Concerns - Cont.

- IV we propose:
  - Predicted quarters of work and welfare use estimated from low-skilled married mothers.
- Why do we think it might work?

Decision Patterns of NLSY Low-Skilled Mothers Based on Marital Status



(a) Welfare Use (b) Labor Force Participation

Use the diagnostic functions of **-ivreg2-** to examine the validity of IVs.

Constructing the Instruments

- Assume a mother makes two decisions of work (h_t=0, 1) and welfare use (ω_t=0, 1) in each quarter.
- Let C_{ijt} represent utility from a single mother i's j_{th} alternative in quarter t,

$$C_{ijt} = \beta_j' Z_{it} + u_{ijt}$$

  where:

  - $j = 1$ if mother chooses to (h_t=0, $\omega_t = 0$);
  - $j = 2$: ($h_t = 1$, $\omega_t = 0$);
  - $j = 3$: ($h_t = 0$, $\omega_t = 1$), and $j = 4$: ($h_t = 1$, $\omega_t = 1$).
  - Following Keane and Wolpin (2002), Z includes all X as well as annual state welfare benefit rules estimated by Ziliak (2007) and county characteristics.
- Assuming u_{ijt} follows multivariate normal distribution, we can estimate this model using **-mprobit-**.

Constructing the Instruments - Cont.

Potential instruments are:

$$\hat{E} = \sum_{t=1}^{20} \widehat{\Pr}(h_t), \text{ and}$$

$$\hat{W} = \sum_{t=1}^{20} \widehat{\Pr}(\omega_t).$$

Issues

1. Using two instruments ($\hat{E}$ and $\hat{W}$) for two endogenous variables (W and E) means exact identification.
   - To be able to test for overidentification, we use:

     $\sum_{t=1}^{20} \widehat{\Pr}(h_t = 0,\ \omega_t = 0),\ \sum_{t=1}^{20} \widehat{\Pr}(h_t = 1,\ \omega_t = 0),$
     $\sum_{t=1}^{20} \widehat{\Pr}(h_t = 0,\ \omega = 1),$

     as instruments.

Issues - Cont.

2. The model:

$$\ln O_T = \ln A_0 + \gamma_1 \ln Y + \gamma_2 E_T + \gamma_3 W_T + \gamma_4 \ln A_0 W_T + \gamma_5 \ln A_0 E_T + \gamma_6 testAge + u,$$

implies we potentially need to instruments for $(W, \; E, \; \ln A_0 W, \; \ln A_0 E)$, which can be impractical.

– We only instrument for W and E, but use the **-orthogonal-** option in **-ivreg2-** to test whether $\ln A_0 W$ and $\ln A_0 E$ are exogenous.

3. Use **-cluster-** to control for intra-family correlation in u

Use -nlsur- to Estimate the Same Model

Another way to estimate the model is **-nlsur-**. Treat:

$$\begin{aligned} \ln O_T &= \ln A_0 + \gamma_1 \ln Y + \gamma_2 E_T + \gamma_3 W_T + \gamma_4 \ln A_0 W_T \\ &\quad + \gamma_5 \ln A_0 E_T + \gamma_6 testAge + u \\ E_T &= Z'h + \epsilon \\ W_T &= Z'\omega + \nu \end{aligned}$$

as a system of simultaneous equations. We can estimate this model by a nonlinear estimation method.

Participation Pattern of the NLSY79 Low-Skilled Single Mothers

Child's age	Welfare	Part-time (300-1500)	Full-time (>=1500)
1	.67 (.47)	.25 (.43)	.17 (.38)
2	.69 (.46)	.31 (.46)	.23 (.42)
3	.70 (.47)	.33 (.47)	.25 (.43)
4	.68 (.47)	.34 (.48)	.27 (.44)
5	.65 (.48)	.36 (.48)	.28 (.45)

† Conditional on work

First-Stage Results for NLSY Test Scores

	E	*W*
AFQT	.0031	.0122***
	(.0031)	(.0044)
Gender	-.5366***	-1.3512***
	(.1057)	(.2018)
.	.	.
Interaction Between *E* and		
AFQT	-.0006**	-.0002
	(.0002)	(.0002)
Gender	.0679***	.0314***
	(.0072)	(.0104)
.	.	.
Interaction Between *W* and		
AFQT	-.0001	-.0009***
	(.0002)	(.0003)
Gender	.0013	.1078***
	(.0057)	(.0118)
.	.	.
Instruments		
$\sum_{t=1}^{5} \widehat{\Pr}(h_t = 0,\ \omega_t = 0)$	.00001	-.0247**
	(.0062)	(.0098)
$\sum_{t=1}^{5} \widehat{\Pr}(h_t = 0,\ \omega_t = 1)$	-.0817***	.0656***
	(.0139)	(.0148)
$\sum_{t=1}^{5} \widehat{\Pr}(h_t = 1,\ \omega_t = 0)$	.5603***	-.3581***
	(.1086)	(.0971)
F Test	.0000	.0000
No. of Obs.	1,833	1,833

$***$: significant at 1% significance level. $**$: significant at 5% significance level.

First Stage Instruments Validity - Correlation with Endogenous Variables

– Shea partial R^2, partial R^2, and F-test

Variable	Shea Partial R^2	Partial R^2	F(4,1812)	P-value
E	.0305	.2345	58.11	.0000
W	.0610	.4681	100.17	.0000

– Tests of joint significance of coefficients of endogenous regressors in main equation and overidentifying restrictions

Anderson-Rubin Wald test	3491.85
(F p-value)	.0000
Anderson-Rubin Wald test	14129.27
(χ^2 p-value)	.0000
Stock-Wright LM statistic	231.74
(χ^2 p-value)	.0000

– Underidentification Test

H_0: Model is unidentified	56.703
p-value	.0000

First Stage Instruments Validity - Cont.

	GMM2S	CUE
Weak Identification test		
H_0: Instruments are weak	10.049	10.049
Stock-Yogo weak ID test critical values:		
5% maximal IV relative bias	11.04	
10% maximal IV relative bias	7.56	
20% maximal IV relative bias	5.57	
30% maximal IV relative bias	4.73	
10% maximal IV/LIML size	16.87	4.72
15% maximal IV/LIML size	9.93	3.39
20% maximal IV/LIML size	7.54	2.99
25% maximal IV/LIML size	6.28	2.79

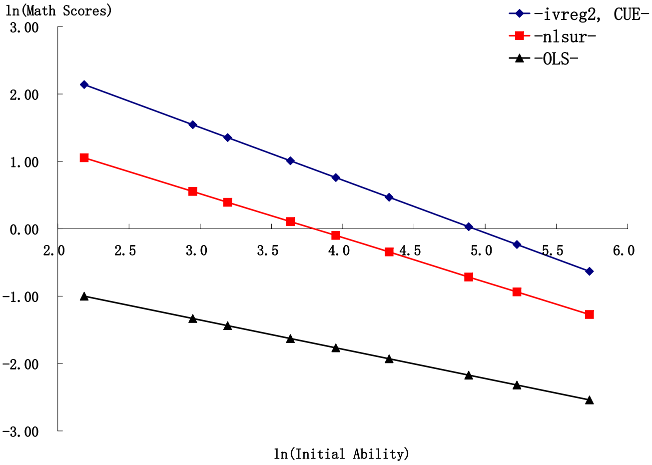
First Stage Instruments Validity - Cont.

	GMM2S	CUE
Overidentification test		
H_0: Instruments are orthogonal to errors	7.638	7.736
p-value	.1058	.1013
Endogeneity Test		
H_0: OLS estimator is consistent with IV estimator	39.041	39.041
p-value	.0000	.0000

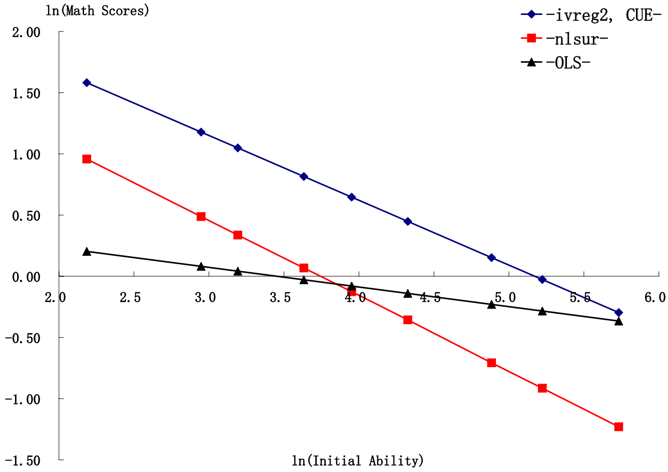
Results for NLSY Test Scores

	GMM2S	CUE	**-nlsur-**
E	.1191***	.1223***	.104***
(γ_2)	(.0209)	(.0209)	(.0151)
W	.2894***	.2819***	.181***
(γ_3)	(.0180)	(.0177)	(.0086)
$\ln A_0 \times W$			-.0486***
(γ_4)			(.0010)
$\ln A_0 \times E$			-.0284***
(γ_5)			(.0013)
Initial Ability			
AFQT	-.0033**	-.0033**	-.0039*
(γ_7)	(.0016)	(.0016)	(.0016)
Gender	.4890***	.4731***	.392***
(γ_8)	(.0714)	(.0706)	(.0591)
.	.	.	.
Interaction Between E and			
AFQT	.0001**	.0001**	
	(.0000)	(.0000)	
Gender	-.0125***	-.0122***	
	(.0024)	(.0024)	
.	.	.	
Interaction Between W and			
AFQT	.0003***	.0003***	
	(.0001)	(.0001)	
Gender	-.0303***	-.0289***	
	(.0046)	(.0045)	
.	.	.	

Total Effect of Welfare on Ability for a Median User (Welfare = 12 Quarters)



Total Effect of Work on Ability for a Median User (Work=17 Quarters)



Future Plans

- Incorporating longer-run results
- Separate effects of full- and part-time work