The inversion of married women's labour supply and wage: Evidence from Thailand

Lusi Liao

Sasiwimon Warunsiri Paweenawat

Liao, L., Paweenawat, S.W. 2021. The inversion of married women's labour supply and wage: Evidence from Thailand. Asian-Pacific Economic Literature, 35 (1), pp. 82-98.

1. Introduction

- A substantial long-term decline in gender wage gaps has been evidenced in both developed and developing countries in recent years.
  - Personal and job characteristics of women (e.g., education, occupation, and job status), labor market structure (e.g., occupational segregation by gender), as well as institutional, cultural, and social norms.

1. Introduction

- Thailand has historically high female labor force participation rate (around 65%).
- Development process tends to focus on women more than on men
- The structural responses (income and substitution effects) are considerably larger for female than male.
- The changes in the labor supply behavior of married women drives the changes in labor supply for women overall
- In Thailand, married women's real wage rate has over doubled, but their average working hours have dropped during 1985 to 2016

1. Introduction

Figure 1-Average weekly working hours trends for married women (1985-2016) (%)

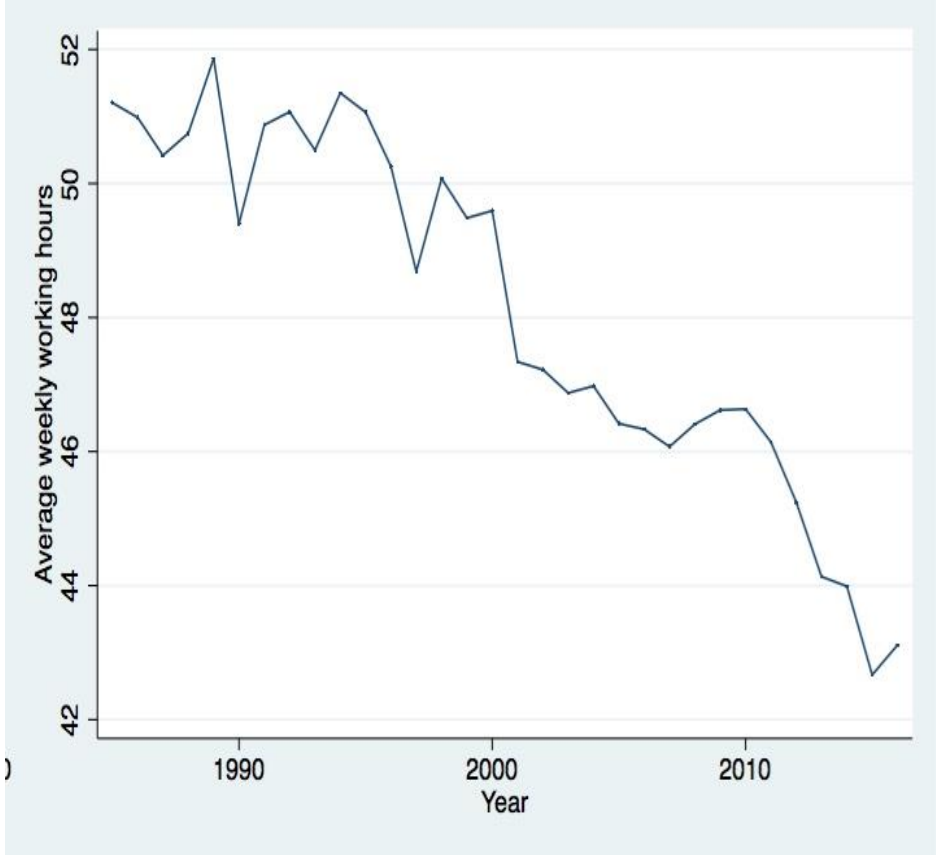
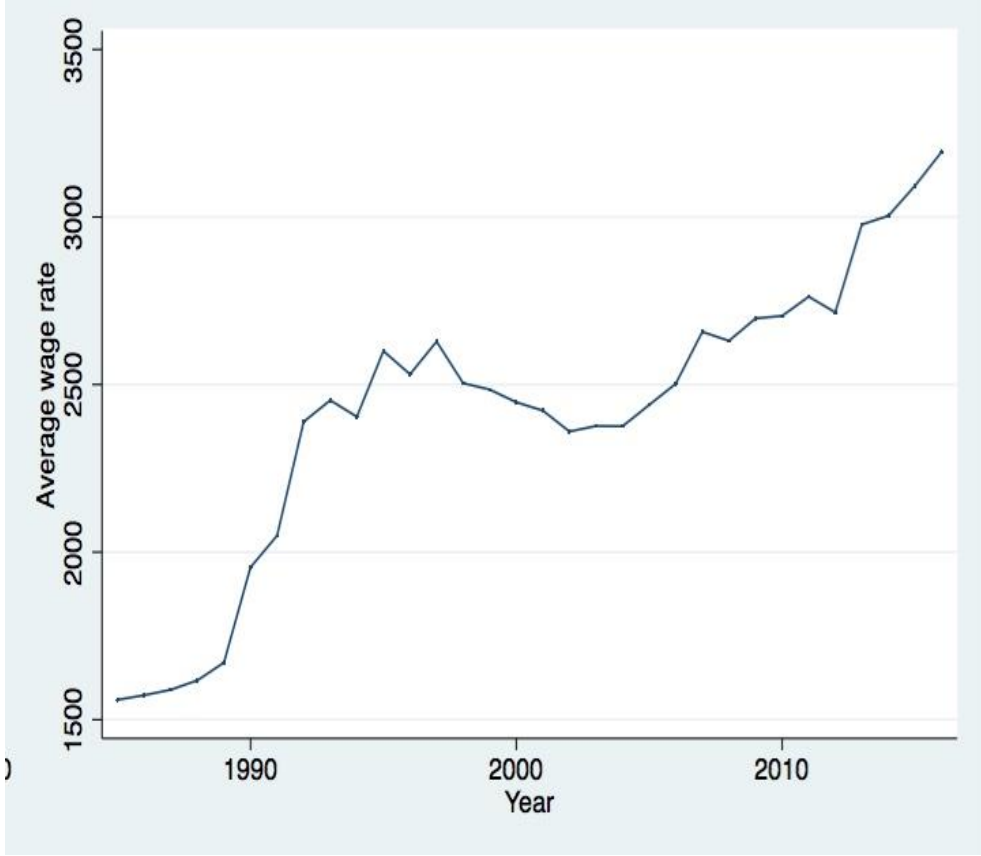


Figure 2-Average real wage rate trends for married women (1985-2016) (Thai Baht)



1. Introduction

- Besides, lack of studies in the elasticity of female labor supply in Thailand.
- The existing literatures have not paid much attention on the married women group in Thailand, let alone the effect of children and spouses' education.
- Very few sources for comparison.
  - Killingsworth and Heckman (1986)

1. Introduction

The purposes of this paper:

- Study the impact of the changes in wages and the labor supply of married women in Thailand, taking the children effect and spouses' effect into consideration using the LFS from 1985 to 2016.
- Examine married women's labor supply elasticity-subgroup analysis (including education, age, children, income, residence, and industry sector)
- Apply new estimation strategy
  - The imputation technique to correct for sample selection
  - The instrumental variables approach to solve for endogeneity of wage

2. Literature review

- Developed countries - Most studies of married women's labor supply in recent decades have reported positive own wage elasticity and negative spouse wage elasticity.
  - Killingsworth and Heckman (1986)-survey
  - Juhn and Murphy (1997) & Blau and Khan (2007) -wage decile
  - Devereux (2004) -group data
  - Cai (2018) –panel

2. Literature review

- Developing countries - Several studies have found the inverse relationship exists between female labor supply and their wage rate.
  - Licona (2000) -Mexico
  - Dessing (2002) -Philippines
  - Dasgupta and Goldar (2006) - India

2. Literature review

- Thailand – Existing studies concerned about female labor supply, but no attention on married women & no report on the elasticity estimates.
  - Schultz (1990) -negative relationship
  - Paweenawat and McNown (2018) – female; synthetic cohort approach
  - Aemkulwat (2014) - emphasizing on the informal sector ; one-year data ; no spouse's education

2. Literature review

- Contribution - With updated dataset spanning over three decades, our study on married women in Thailand will fill the gap in this area.
  - Applying a different imputation technique to solve for the sample selection bias
  - Using a new series of instruments to solve the endogeneity of wage that caused by measurement error and omitted variables.

    Not relate to the unobserved heterogeneity, but highly associate with wage; correct some degree of the measurement error in wages (Baker and Benjamin 1997, Juhn and Murphy 1997, Blau et al. 2003)

3. Data and variables

- Labor Force Survey (LFS) from 1985 to 2016
  - National Statistical Office of Thailand
  - The third quarter of the year
  - Married female sample age between 25 to 60
  - Weekly working hours,weekly wages calculating from the monthly wage rate divided by 4.3
  - Wages are deflated by the Thailand Consumer Price Index

3. Data and variables

Table1 Selected Explanatory Variables of Married Female Sample, 1985-2016

	(1) No. Of Observations	(2) Mean	(3) Standard Deviation	(4) Min	(5) Max
Age	136,948	39	9	25	60
Weekly working hours	136,948	44	12	0	98
Number of children	136,948	1.303	1.101	0	12
Weekly log wage	136,948	7.443	0.847	1.829	11.878
Weekly log spouse wage	136,948	7.662	0.816	2.523	12.320
Own Education:	136,948				
Primary level	136,948	0.557	0.498	0	1
Secondary level	136,948	0.275	0.449	0	1
University level	136,948	0.160	0.373	0	1
Spouse Education:	136,948				
Primary level	136,948	0.470	0.499	0	1
Secondary level	136,948	0.343	0.475	0	1
University level	136,948	0.178	0.378	0	1

Note-The explanatory variables also include age squared, and 5 region categories.

3. Data and variables

Estimation Model and Econometric Difficulties

- Apply the classical model for estimating the labor supply behavior of married women (Mincer 1962) :

$$H_i = a_0 + a_1 lnW_i + a_2 lnW_i^S + a_3{}'X_i + u_i \qquad \text{(a)}$$

where H_i is the weekly hours of work for individual i ;

W_i is the own real weekly wage rate ; Ws_i is spouse's real weekly wage rate ;

X_i is a vector of control variables ; u_i is the disturbance term. ;

✧Use OLS yields a biased and inconsistent result

4. Basic Estimation Strategy

To correct sample selection :

- Wage imputation for missing wages(Juhn 1992, Juhn and Murphy 1997)
  - Constructing wage regression for the group that has similar characteristics with missing-wage group
  - The group that works for less than 25 hours per week has the most similar features with the missing-wage group.
- To address the issue of selection bias that might result from this imputation technique, we also include the inverse Mill's ratio in the estimation as a correction term following the Heckman two-step method

4. Basic Estimation Strategy

Table 2 Means for Missing-wage Group and Those Working Less Than 25 Hours, Married Women 25-60

	(1) Missing-wage Group	(2) Less Than 25 Hours	(2)-(1) Difference
Age	42.3696	42.9978	0.6282
Primary level	0.7658	0.7696	0.0039
Secondary level	0.1917	0.2348	0.0431
University level	0.0382	0.0490	0.0108
Spouse primary level	0.6362	0.6584	0.0223
Spouse secondary level	0.2241	0.2029	-0.0212
Spouse university level	0.0498	0.0424	-0.0074
No children	0.2658	0.2639	-0.0019
Number of children=1	0.3102	0.3168	0.0066
Number of children=2	0.2809	0.2809	0.0000
Number of children=3	0.1004	0.0960	-0.0044
Number of children more than 3	0.0428	0.0425	-0.0003
Total Children age under 18	1.3633	1.3554	-0.0079

4. Basic Estimation Strategy

To correct for endogeneity:

- Instrumental variable approach
  - Both own wage and spouse's wage as endogenous variables in the model
  - Take a series of dummy variables indicating the wage decile for both own and spouse wage as excluded instruments.
  - The deciles can correct some degree of the measurement error in wages (Baker and Benjamin 1997, Juhn and Murphy 1997, Blau et al. 2003)
  - IV pass all tests

4. Basic Estimation Strategy

Estimation Procedures

- Firstly, we estimate the inverse Mills ratio (λ_i)

$$P_i = \beta_0 + +\beta_1 X_i + \varepsilon_i \qquad \text{(b)}$$

$$P_i = \begin{cases} 1 & if\ P_i > 0 \\ 0 & otherwise \end{cases}$$

where $P_i=1$ denotes the individual i participate in the labor market;

X_i are the variables that affect the participation decisions

(including: own & spouse education, number of children, regional dummies , age, and age squared).

4. Basic Estimation Strategy

The second step, we impute the missing wage based on the group that works for less than 25 hours per week using wage regression of the form

$$lnW_i = \alpha_0 + \alpha_1 X_i + \epsilon_i \qquad (c)$$

where Xi is a vector of control variables that affect the wage
(including three education-level dummy variables, number of children, regional dummy variables , age and age squared)
ϵi is the error term.
The predicted values are obtained for the regression.
Imputed wage is equal to the actual wage unless the individuals have missing wage.

4. Basic Estimation Strategy

Using the estimates from the third step, we compute the wage elasticities

$$\varepsilon^{own} = \frac{\widehat{a_1}}{\bar{H}} \qquad \text{(e)}$$

$$\varepsilon^{spouse} = \frac{\widehat{a_2}}{\bar{H}} \qquad \text{(f)}$$

Where $\hat{a}_1$ and $\hat{a}_2$ are the estimated coefficients on log own wage and spouse wage from the last step

H denotes the mean working hours.

4. Basic Estimation Strategy

The third step, we estimate the selection corrected labor supply regression with instrumental approach (2SLS)

$$H_i = a_0 + a_1 lnW_{Im} + a_2 lnW_S + a_3{}' X_i + u_i \qquad \text{(d)}$$

is estimated on women observed positive hours of work

Where the log imputed wage lnW_{Im} and lnW_S are the endogenous variables

We control for own &spouse education, number of children, four regional categories , age and age squared, and inverse Mill's ratio from the first stage.

5. Estimation Results

Table3 - OLS Estimations for Labor Supply of Married Women 1985-2016

	OLS			
	Model1	Model2	Model3	Model4
Own log wage	-7.551***	-7.482***	-6.210***	-5.807***
	(0.106)	(0.108)	(0.172)	(0.185)
Spouse log wage	-1.623***	-1.636***	-1.157***	-1.162***
	(0.0655)	(0.0656)	(0.0688)	(0.0688)
Number of children		-0.0981***		-0.190***
		(0.0307)		(0.0324)
Control for own and spouse education	No	No	Yes	Yes
Control for number of children	No	Yes	No	Yes
Observations	136,948	136,948	136,948	136,948
Elasticities(at means)				
Own log wage	-1.262	-1.273	-1.038	-0.971
Spouse log wage	-0.279	-0.286	-0.199	-0.200

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Estimation Results

Table4 - Instrumental Variable Labor Supply Estimations of Married Women 1985-2016

	IV			
	Model1	Model2	Model3	Model4
Own log wage	-10.10***	-10.15***	-13.73***	-14.35***
	(0.146)	(0.15)	(0.28)	(0.302)
Spouse log wage	-0.973***	-0.959***	-0.931***	-0.924***
	(0.0856)	(0.086)	(0.0862)	(0.0863)
Number of children		0.0667**		0.381***
		(0.031)		(0.036)
Inverse Mill's Ratio	-18.33***	-18.45***	-23.60***	-24.75***
	(0.218)	(0.229)	(0.403)	(0.448)
Control for own and spouse education	No	No	Yes	Yes
Control for number of children	No	Yes	No	Yes
Observations	136,948	136,948	136,948	136,948
Elasticities (at means)				
Own log wage	-1.724	-1.697	-2.295	-2.399
Spouse log wage	-0.171	-0.165	-0.160	-0.159

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include four region categories, age and age squared. Own wage equal to actual wage unless individual's wage is missing. The regressors include age, age squared, three education categories, number of children and four region categories.

5. Estimation Results

- OLS has a downward bias – Pencavel (1986), Shultz (1980), Heckman (1980), Dooley (1982), Senesky (2003)

- Consistent with previous studies -
  - Schultz (1990) using the SES of Thailand, estimates married women's hours of work equation concerning the husbands' wage by maximum likelihood approach.
  - Paweenawat and McNown (2018) also find inverse relationship between female labor supply and wages using LFS from 1985 to 2004.

5. Estimation Results

- At relatively low level of development, women increase their hours of work when wage falls considering the subsistence constraints, which will limit choice for leisure and work (Mincer 1962 & Khan 1995)
- Negative income effect on the response of the supply of working hours to the changes in the wage rate
  - Other developing countries - Dessing (2002), Dasgupta and Goldar (2006), Licona (2013)
- Labor supply of women in the family is negatively affected by the husbands' wage changes
- The number of children has a significant positive impact on the married women's labor supply.

6. Elasticity Disaggregation

- Use Model4 that controls for both number of children and education attainments
  - Education groups/age groups/number of children groups/ lower &higher income groups/urban &rural area/ agriculture &non-agriculture.

- We find the negative own and spouses' wage elasticities across all subgroups during 1985 to 2016, except that the university degree obtainer and high-income group have positive own wage elasticity.

6. Elasticity Disaggregation

- Primary--Reluctant to work for the subsistence ; University--career development， higher the substitution effect
- Younger--Invest more in education, career development and place career ahead or equally with marriage

Education Group			**Age Group**		
Primary level	Own log wage	-0.761	*25-35*	Own log wage	-1.615
	Spouse log wage	-0.117		Spouse log wage	-0.142
Secondary level	Own log wage	-2.993	*36-46*	Own log wage	-2.938
	Spouse log wage	-0.236		Spouse log wage	-0.139
University level	Own log wage	0.810	*47-60*	Own log wage	-3.147
	Spouse log wage	-0.142		Spouse log wage	-0.145

6. Elasticity Disaggregation

- With kids--Spend more time for household; Without kids--lower family cost
- High income--A dominant substitution effect

Number of Children			**Income Level**		
No child	Own log wage	-2.134	*Lower*	Own log wage	-1.917
	Spouse log wage	-0.206		Spouse log wage	-0.171
With Children	Own log wage	-2.519	*Higher*	Own log wage	0.129
	Spouse log wage	-0.134		Spouse log wage	-0.183

6. Elasticity Disaggregation

- Urban workers—higher income, better working environment
- Agricultural--a lower wage and education levels, subsistence

Region			**Industry**		
Urban Area	Own log wage	-2.247	*Agriculture*	Own log wage	-0.779
	Spouse log wage	-0.176		Spouse log wage	-0.339
Rural Area	Own log wage	-2.749	*Non-Agriculture*	Own log wage	-2.459
	Spouse log wage	-0.105		Spouse log wage	-0.265

7. Robustness Check

- Check for marriage proneness and correct for marriage selection

Table11 Instrumental Variable Estimations for Marriage Selection Correction

	Model1	Model3
Own log wage	-11.51***	-10.86***
	(0.0699)	(0.13)
Control for own education	No	Yes
Control for number of children	No	No
Observations	284,475	284,475
Elasticities(at means)		
Own log wage	-1.925	-1.816

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

7. Robustness Check

- Check for the changes in the elasticity overtime

Table12 - Instrumental Variable Estimation for Different Time Periods

	1985-1994	1995-2004	2005-2016
Own log wage	-4.996***	-10.14***	-5.566***
	(0.382)	(0.254)	(0.268)
Spouse log wage	-0.631***	-0.697***	-0.388***
	(0.191)	(0.136)	(0.134)
Observations	19,260	56,223	61,465
Elasticities(at means)			
Own log wage	-0.808	-1.712	-0.931
Spouse log wage	-0.106	-0.121	-0.067

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

7. Robustness Check

- Group Data Estimation

Table13 - Group Data Estimation for Married Women 1985-2016

	WLS
Own log wage	-3.586***
	(0.594)
Spouse log wage	-2.544***
	(0.935)
Observations	287
Elasticities(at means)	
Own log wage	-0.611
Spouse log wage	-0.444

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

8. Conclusion

- The negative relationship between married women's labor supply and their real wage, which is robust using different estimation techniques, indicating a dominant income effect.
- Under the different disaggregation,the dominant substitution effect is found for married women obtaining university level education and high income.
  - These elasticities are good implications for the labor policies to take effect on the married women's labor supply.