

# A Synthetic Cohort Analysis of Female Labor Supply: The Case of Thailand

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# Introduction

◆ **Female labor force participation, earnings, and hours worked have been increasing over the past 20 years.**

◆ **Objectives**

- » To investigate the relationship between these variables for all women
- » To apply a synthetic cohort approach as another way in order to avoid the bias

◆ **Questions**

- » Is the slope for female labor supply function positive or negative ?
- » What is the elasticity of hours worked with respect to wages?
- » What is the response of the employment-population ratio to a change in wages?
- » How do the estimates of these two relations differ across demographic groups?

## Studies of female labor supply in developing countries

- ◆ Schultz (1990) estimates negative wage elasticities for hour worked for women in Thailand.
  - ◆ Yamada (2002) for Peru
  - ◆ Dessing (2002) for the Philippines
  - ◆ Sharif (1991), Dasgupta and Goldar (2005) for India
  - ◆ Licona (2000) for Mexico
- ◆ Psacharopolous and Tzannatos (1989) survey the literature on labor force participation by women in developing countries.
  - ◆ Positive effect of wages on labor force participation rate

## Studies of female labor supply in developing countries (cont'd)

- ◆ Most studies of female labor supply use individual cross-sectional data in the estimation.
  - ◆ Data cannot capture the behavior of labor over time
  - ◆ Estimates may be biased due to omitted individual effect
  - ◆ Panel data allows for control for unobserved individual effects, but such data sets are seldom available, especially in developing countries.
- ◆ In the absence of panel data, Deaton (1985) proposes the construction of synthetic cohorts from the time series of cross-sectional surveys.

## Data and variables

- ◆ National Labor Force Survey (LFS) from the National Statistical Office of Thailand (NSO)
  - ◆ The 3<sup>rd</sup> quarter of each survey year (1985-2004)
- ◆ The main variables used in the estimation
  - ◆ Weekly working hours
  - ◆ Weekly wages (deflated by CPI, 2002 as a base year)
- ◆ Additional variables incorporated in specific model
  - ◆ Business cycle measures – Annual rate change in real GDP
  - ◆ Demographic factors – Age groups, Marital status, Education attainment

## Sample set

- ◆ A woman (age 25-60 years old) is classified as employed if she worked during the survey week, reported the number of working hours, and wages.
- ◆ Constructing a synthetic cohorts from 109,095 obs. sampled from 20 years of survey
- ◆ Eight birth-year cohorts (starting from those born in [1930-1939] to those born in [1970-1974])
- ◆ Birth cohorts are refined further by incorporating 3 education groups: [1] primary school, [2] secondary school, and [3] university
- ◆ 93 cohort-age-education groups

## Female labor supply estimation

- ◆ **The fundamental equation – find relation between the quantity of labor supplied and wages**

$$\ln h_{it} = \gamma + \theta \ln w_{it} + X'_{it}\eta + \alpha_i + u_{it}$$

where  $\ln h_{it}$  is log of weekly hours (or the employment-population ratio).  
 $\ln w_{it}$  represents log of weekly wage and  $u_{it}$  is an error term

$X_{it}$  denotes a set of control variables, each observed for individual women, indexed by  $i$ , at different survey years indexed by  $t$

Unobserved individual heterogeneity (motivation, ability) is represented by  $\alpha_i$

## Female labor supply estimation (cont'd)

- ◆ The fundamental equation – find relation between the quantity of labor supplied and wages

$$\ln h_{it} = \gamma + \theta \ln w_{it} + X'_{it}\eta + \alpha_i + u_{it}$$

Unobserved individual heterogeneity (motivation, ability) is represented by  $\alpha_i$ . If it is correlated with wages, least squares estimators will be biased and inconsistent.

Following Pencavel (1998) and Deaton (1985), individual observations are grouped into cohorts defined by year of birth, age at the time of survey, and level of education attainment, all variables are averages within these cohorts.

## Female labor supply estimation (cont'd)

◆ To find the relationship between work and wages among all women.

$$\overline{\ln h_{akj}} = \gamma + \underline{\theta} \overline{\ln w_{akj}} + \overline{X'_{akj}} \eta + \overline{u_{akj}}$$

where  $\overline{\ln h_{akj}}$  is the average of the log of working hour per week of age group **a** in cohort **k** with education **j**, similarly for the other terms in the equation.

The control variables differ across specifications and include age effect, cohort effect, education effect, business cycle effect, demographic effect.

$\theta$  = The wage elasticity of labor supply for hours-work equation  
(The response of employment-population ratio to a change in wages)

## Female labor supply estimation (cont'd)

- ◆ **To apply a synthetic cohort analysis following the procedures of Pencavel (1998) and Deaton (1985) in the analysis of Thailand**
  - » Eliminating the bias arising from measurement error and individual heterogeneity
- ◆ **To correct endogeneity bias from using cohort means**
  - » Employing cohort educational attainment - the proportion of women of each cohort in three educational categories (as IV for cohort wages)
- ◆ **To allow labor supply responses to differ across various groups**
  - » Disaggregating the full sample by demographic factors including marital status, cohort, age group, education level, and living areas

# Female labor supply relations for all women

| Controls                              | WLS<br>(1)          | IV<br>(2)           | E_P<br>(3)         |
|---------------------------------------|---------------------|---------------------|--------------------|
| 1. Age and Cohort                     | -0.234*<br>(0.0079) | -0.223*<br>(0.0129) | 0.110*<br>(0.0083) |
| 2. Age, Cohort, and Selected Adjusted | -0.246*<br>(0.0165) | -0.252*<br>(0.0267) |                    |
| 3. Age, Cohort, and Business Cycle    | -0.233*<br>(0.0079) | -0.223*<br>(0.0129) | 0.106*<br>(0.0081) |
| 4. Age, Cohort, and Marital Status    | -0.227*<br>(0.0065) | -0.223*<br>(0.0122) | 0.110*<br>(0.0056) |
| 5. Age, Cohort, and Living Areas      | -0.233*<br>(0.0061) | -0.223*<br>(0.0121) | 0.110*<br>(0.0062) |
| A number of observations              | 93                  | 93                  | 93                 |

Note –

(1) IV stands for instrument variable, which is the proportion of women of each cohort in three educational categories.

(2) \*Significant at 0.05 significant level

## Female labor supply relations for all women (cont'd)

- ◆ **Estimates differ very little across these different specifications and estimated techniques (WLS vs IV).**
- ◆ **A downward sloping female labor supply in Thailand**
  - » Wage elasticity of female labor supply is -0.22 to -0.25.
  - » Most Thai workers are low-wage earners.
  - » When wage decreases, workers tend to work more in order to keep the same level of consumption.
- ◆ **The employment-population ratio responds positively to a wage increase.**
  - » A 10% increase in real wage raises the employment-population ratio by 1%.

## Disaggregated estimates by marital status

| Age   | Married<br>(1)       | Non-Married<br>(2)   |
|-------|----------------------|----------------------|
| 25-35 | -0.261*<br>(0.0196)  | -0.302*<br>(0.0218)  |
| 36-45 | -0.217*<br>(0.00948) | -0.267*<br>(0.0117)  |
| 46-60 | -0.158*<br>(0.00665) | -0.199*<br>(0.00715) |
| All   | -0.201*<br>(0.00807) | -0.259*<br>(0.0119)  |

\*Significant at 0.05 significant level

◆ The non-married group has higher absolute wage elasticity than the married group at the different age levels.

◆ If facing similar wage shock, married women have a cushion of husband's income.

\* **Confirmed by my recent study** - “The Inversion of Married Women’s Labor Supply and Wage: Evidence from Thailand,” with Lusi Liao, *Asian-Pacific Economic Literature*, 35(1): 82-98 (May 2021)

# Married women's labor supply (Liao and Paweenawat, 2021)

## ◆ The impact of changes in wages on married women's labor supply, considering children and husband

- » Applying Instrumental Variables (IV) approach - A series of dummy variables indicating the wage decile for both own and spouse wage (IV)

- *Synthetic Cohort Analysis in Robustness Check*

## ◆ Downward sloping married women's labor supply in Thailand

- » Negative own and spouses' wage elasticities across all subgroups

- Married women are more responsive to their own wages than spousal wages.

## ◆ The number of children has a positive impact on married women's labor supply.

\* **Extended to my recent study** - “Alternative Boomerang Kids, Intergenerational Co-residence, and Maternal Labor Supply,” with Lusi Liao, *Review of Economics of the Household* (Forthcoming 2022)

## Maternal labor supply (Liao and Paweenawat, Forthcoming 2022)

- ◆ **The effect on co-residence on married women's labor supply accounting for children effect.**
  - » Main contribution - Traditional family structure in Asia (Extended family)
    - The impact of intergenerational co-residence (a woman living with her parents or husband's parents) on maternal labor supply
  - » Applying Instrumental Variables (IV) approach - Percentage of households with co-resident parents in the region (IV)
- ◆ **Women living with parents are 21% more likely to participate in the labor market than those who do not.**
- ◆ **The presence of older parents in household increases women's working hours**
  - » Women co-residence with parents working 10 hours more per week

## Conclusion

- ◆ **The downward sloping female labor supply occurs in Thailand.**
  - » Under different model specifications, and other estimation techniques, estimated elasticities are similar
- ◆ **Negative relationship between married women's labor supply and their own wages/husband's wages.**
- ◆ **Children have a significant impact on the maternal labor supply.**
  - » Co-residence increases the female labor force participation and extends the working hours of Thai women.
  - » Policy suggestion - Childcare facilities (Accessibility/Quality/Affordability/)



THANK YOU