

# **Cohort-Level Sex Ratio Effects on Women's Labor Force Participation in the U.S.A**

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# Women's labor force participation (LFP) rates in the U.S.

- Marked increase between 1965 and 1980, the improvement being most remarkable for married women. For instance, during these fifteen years, the LFP rate of married women ages 25 to 29 rose from 33 percent to 58 percent in the labor force, an increase of 25 percentage points.
- In contrast, in the next fifteen years—from 1980 to 1995—the LFP rate for this age group grew by only 11 percentage points, to 69 percent of the labor force.
- Furthermore, between 1995 and 2005, the LFP rate of married women ages 25 to 29 decreased slightly to 66.5 percent. Likewise, during the same ten years, the LFP of married women ages 30 to 34 decreased by 2.5 percentage points.

# Previous studies

- Early paper by Heer and Grossbard-Shechtman (1981) documented the large increase in LFP among female baby-boomers
- Studies based on the Current Population Surveys (CPS): Pencavel (1998) and Grossbard-Shechtman and Granger (1998) documented considerable variation in women's LFP rates across cohorts and the limited explanatory power of fluctuations in wage and income
- We add to these studies by
  - including cohort-level sex ratios in our regressions of LFP,
  - including data for 1995 to 2005, and
  - including regional variation.
  - examining how sex ratio effects on women's LFP rates differ by educational attainment.
  - analyzing both married women and women of any marital status

# Explanations of such historical trends

- In the past, explanations have principally focused on the effects of wages, income, educational attainment, and the number of children born to potential labor force participants.
- In this paper, we argue that historical fluctuations in cohort size, due principally to the changing number of births in adjacent cohorts, cause fluctuations in sex ratios that affect marriage market conditions and help explain trends in female LFP

# Prediction: Negative sex ratio (SR) effects on female LFP

Prediction found in two economic theories of marriage:

- Grossbard's demand and supply (D&S) model of marriage (Grossbard-Shechtman's 1984, 1993) include prediction of sex ratio effect on FLFP
- Chiappori, Fortin, and Lacroix (2002) based on Chiappori's (1988, 1992) collective model.

# The problem according to Grossbard-Shechtman (1984)

- **Maximize**  $U_i (l_i, h_i, s_i, h_j, x_i,)$  **subject to**
  - $I + w l_i + y h_i = P x_i + y h_j$  and
  - $T = s_i + l_i + h_i$

Leads to first order condition, where  $y$  is a quasi-wage

$$\frac{MU_s}{MU_x} = y + \frac{MU_{h_i}}{MU_x} = w + \frac{MU_{l_i}}{MU_x}$$

# Sex ratio effect on LFP:

- Via  $y$ , the quasi-wage: higher sex ratio leads to higher quasi-wage
- Note that the actual  $y$  typically has two components: a market-established  $y$  + a component that depends on the particular situation of the two persons involved (cf wage that is based on market wage and on internal bargaining between worker and firm)
- It is the market component of the quasi-wage that is influenced by sex ratios

# Comparing GS (1984) to other models

Comparing to Chiappori, Fortin and Lacroix, who also have a sex ratio effect:

- Both models are two-step decision-making models. In both models, **Step 2** consists of individuals deciding on their labor force participation by **maximizing their own utility subject to a budget constraint that includes pre-determined access to the spouse's income**. In both models, access to the spouse's income is determined in Step 1. **However, Step 1 is quite different in the two models.**

# What is similar in the two models:

- Step 1: involves negotiations between two partners leading towards agreement. If male primary earner and female secondary earner, step 1 involves a monetary or quasi-monetary transfer from male to female
- Step 1 agreement depends on intra-household bargaining as well as effect of competitive market forces, including the insight that female secondary earners will get more access to male income if sex ratios are higher.
- Grossbard-Shechtman (1984) explicitly models the competitive component of quasi-wage and not the determinants of the quasi-wage that are the product of bargaining

Comparing Step 1 (process by which potential worker possibly obtains access to spouse's income) in Grossbard-Shechtman to other models with step 1  
in blue: what is common / in red: what is different

**Two person models**

- Married households **potentially pool all their resources** together. Internal bargaining leads to **agreement** on the sharing of all these resources.
- If males are primary workers and females secondary workers, **sharing rule implies that female obtains access to male income**
- Note that **work in household production is not included in some models such as** Chiappori, Fortin and Lacroix (2002) but is included in other two person models such as Apps and Rees.

**Grossbard**

- One spouse **supplies the marital household production work** demanded by the partner at **quasi-wage levels** that are **agreed upon**. Individual **spouses never join a collective that pools all resources** (as is the case with Lundberg and Pollak's (1993) "Separate Spheres" model).
- If males are primary workers and females secondary workers, **exchange of work for quasi-wage implies that female obtains access to male income**

# Predicted SR effect on female LFP and own education

According to Grossbard (1984, 1993), the impact of sex ratios on women's LFP will be stronger for less educated secondary workers who :

- (1) in Step 1, more educated people may be more likely to seek non-material quasi-wages for work in marital household production, leading to a smaller income effect in Step 2, and
- (2) more educated women may have more egalitarian marriages in which work in marital household production is more frequently replaced by contracts to outsiders, such as restaurants and child care workers. This also leads to lower material compensation for household production in Step 1 and a smaller income effect in Step 2.
- For both of these reasons, we predict a smaller correlation between marriage market conditions and women's labor force participation among college-educated couples than among less educated couples
- If women are primary earners or the couple has an egalitarian relationship, no net quasi-wage payments to women and the story is different
- Prediction: positive effect of interaction between SR and female education

# Predicted SR effect on female LFP and male education

- Marriage market conditions may depend on the extent to which men are willing to let women obtain access to their income. A higher sex ratio is more likely to induce women's withdrawal from the labor force if men have a more attractive financial position (on the importance of sex ratios incorporating men's earning power see Lichter et al. 1995).
- It is predicted that there will be more of a negative correlation between married women's LFP and sex ratios at higher levels of male education and income.

# Predicted Sex ratio effects on FLFP and marital status.

- On the one hand, married women's FLFP is likely to vary MORE with SR than that of women of any other marital status (single, cohabiting, separated, widowed or divorced) because access to men's income (Step 1) is more likely to vary with SR in the case of married women
- On the other hand, married women's FLFP is likely to vary LESS with SR than that of women of any other marital status since the LFP of women of any marital status is expected to vary with sex ratios for two reasons: (a) effect on women's access to men's income, and (b) sex ratio effects on marital status (the higher the sex ratio, the more women are likely to be in couple, and women in couple--especially marriage--work less in the LF).
- Analysis of LFP of married women is more likely to provide evidence supporting the arguments found in the Grossbard and Chiappori models (effect via access to male income, not marriage and cohabitation rate)

# Previous findings

- cross-city comparisons have provided evidence of a negative association between sex ratios and married women's labor supply. (Grossbard-Shechtman and Neideffer 1997, Chiappori, Fortin and Lacroix 2002).
- However, it could be a spurious correlation: good labor demand conditions for women may simultaneously lead women to participate more in the labor force and attract female migrants, thereby lowering sex ratios.
- However, migration cannot occur across different birth cohorts

# What causes cohort-level variation in SR?

1. fluctuations in cohort size.
2. on average, men dating or marrying a particular group of women tend to be older than they are.

For instance, if a particular cohort is larger than a preceding cohort, the sex ratio calculated for that particular group of women will be less than one. Example: cohorts of women born at the beginning of a baby boom and likely to marry men born prior to that baby boom who belong to smaller cohorts.

Vice-versa, if a particular cohort of women is smaller than a preceding cohort, the sex ratio will be larger than one. For example, cohorts of women born at the beginning of a baby bust will typically marry men born prior to that baby bust who belong to larger cohorts.

Cohort-level sex ratio effects will be stronger if the difference between male and female age at marriage does not vary over time.

Assuming a constant age difference at marriage, in the U.S.A. over the period 1965-2005, the cohort-level SR fluctuated between .87 (Post WW II cohort born 1946-50) and 1.07 (Roe generation born 1971-75) See Table 1

# Previous cohort-level evidence on SR effects on FLFP

- Heer and Grossbard-Shechtman 1981, Guttentag and Secord 1983: explain why in the U.S. there was rapid growth in the LFP of young married women ages in the years 1965-1980 (low sex ratio cohorts)
- Grossbard-Shechtman and Granger 1998), using average data for the period 1965-90, show that women born during a baby boom (baby-boomers) were more likely to participate in the labor force than baby-busters
- Note: women entering ages 25 to 29 in the period 1980-95 were born during the baby-bust. Relative to their baby-boom counterparts (such as the cohort born in 1946 that reached age 25 in 1971), these baby-bust women (such as the cohort born in 1964 that reached age 25 in 1989) have experienced a substantially slower growth in participation in the labor force.
- Easterlin (1980) offers an alternative explanation : growing cohorts face worse income opportunities than the ones encountered by their parents when they were growing up, therefore they will have lower income and fewer children. To separate explanations: control for income and children.

# **Other Variables Affecting Female Labor Force Participation**

- Income and wages
- Education
- Fertility
- Trend

# Data

- data on sex ratios : using the assumption that the male/female age difference at marriage is fixed and equal to two years (holds for most of the period that we cover) actual fluctuation between 1.6 and 2.7 (DECREASED over time, even though SR INCREASED) Sex ratios are calculated from Census data for five-year age groups by dividing the number of all men two years older by the number of all women ages 20-24 or 25-29
- Other data : Current Population Surveys (CPS, March files) for four regions (Northeast, Midwest, South and West) covering the period 1965 to 2005 at five-year intervals.
- Women 25 to 44 (most likely to be mothers of young children)
- cohort-level sex ratios are merged into the CPS data according to women's birth year and region of residence.

# We estimate the following models:

1. parsimonious model of women's LFP that excludes any potentially endogenous regressors
2. Model that also includes wages, female education, and number of children under 6.
3. Model 2 + interactions between SR and female education
4. (for married women only): Model 3 + male education + interactions SR and male educ.

Models were estimated for 2 samples:

- Married women
- Women of any marital status

Models were estimated

- for US as a whole
- By region

# Findings

- Evidence of sex ratio effects for married women as well as for women of any marital status for the U.S. as a whole as well as in most U.S. regions.
- Can the negative association between women's LFP and sex ratio be interpreted according to an economic model of marriage-related decision-making such as Chiappori (1988) or Grossbard-Shechtman (1984)?
- If US as a whole, SR variation includes regional variation and can be caused by migration related to FLFP (reverse causality)
- If women of any marital status, SR effect on FLFP can be explained in terms of SR effect on marital status
- REGIONAL RESULTS FOR MARRIED WOMEN INDICATE THAT SEX RATIOS AFFECT WOMEN'S ACCES TO MEN'S INCOME AS PREDICTED AC TO ECONOMIC MODELS OF MARRIAGE.

# Results for Married Women, by region

- Parsimonious model: SR effects on FLFP are negative in all regions (Table 3A)
- Model with female wages, education, and number of young children: SR effects on FLFP are negative in all regions (Table 3B)
- Model that also includes interaction terms between SR and female education: SR effects on the FLFP of women are negative for women with low education in the West and for women with high education in the Midwest. SR effect continues to be negative for the Northeast. SR effect disappears in the South
- Model that adds male education: SR + male income effects on FLFP are negative in Northeast (for low education women) and South; SR negative in West for low education women; SR negative in Midwest for high education women
- CONCLUSION: PLENTY OF EVIDENCE THAT SR AND FLFP ARE NEGATIVELY RELATED, AS PREDICTED
- PREDICTION THAT THIS SR EFFECT SHOULD BE STRONGER FOR WOMEN WITH LESS EDUCATION HOLDS FOR NORTHEAST AND WEST. THE OPPOSITE IS THE CASE IN THE MIDWEST

# Practical implication

- Our results help explain why in recent years we have observed some drops in women's LFP, such as a decrease of 3.5 percentage points between 1995 and 2005 in the LFP rates for married women ages 30 to 34 (see Table 1). During those years, the women who entered these age groups were women of the Moon and Roe generations, women characterized by high sex ratios.
- In contrast, when women from cohort characterized by low sex ratios entered this age group we observe rapid increases in LFP. For instance, married women of the Post World War II generation, born in the years 1946-1950, experienced an increase in LFP of 13.5 percentage points when they entered the same age category between 1970 and 1975.
- Results can be used to predict FLFP

# Directions for further work

- International comparisons (e.g. the generation of the forties in Sweden)
- other dimensions of labor supply, such as the labor supply of men, and the attachment of men and women to the labor force (where attachment includes both participation in the labor force and the intensity of the participation).
- try various alternative measures of sex ratio, including measures that only take singles into account or that consider a range of possible age differences, following the method developed by Goldman et al. (1984).
- Education-sensitive SR measures