Marriage Squeezes and Married Women's Labor Supply: Cross-City Comparisons

Studies of women's labor force participation that are set in a family context have generally taken marital status as given. In contrast, it is assumed here that marriage markets and labor markets are interconnected. This chapter focuses on one particular application of such interrelationship between the two markets: the labor force participation effects of imbalances in marriage markets due to unequal numbers of men and women. A marriage squeeze for women occurs when a marriage market contains substantially more women than men. According to Hypothesis 1' derived in Chapter 3, a marriage squeeze for men is expected to be associated with lower participation of married women in the labor force than a marriage squeeze for women. This chapter also derives and tests correlaries of Hypothesis 1' regarding factors influencing the effects of marriage squeezes on women's labor supply. Analyses of data for U.S. cities in 1930 and 1980 offer some evidence for Hypothesis 1' and its correlaries. It seems to be the

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case that married women are less likely to participate in the labor force in cities where there is a marriage squeeze for men, i.e. women are relatively scarce, than in cities where men are relatively scarce.This is especially likely to be the case for women with no more than a high school education.

Previous Literature

Demographers have long been concerned with marriage squeezes, which are often defined as a function of sex ratios. Sex ratios are defined as the number of available men relatively to the number of women of marriageable age. Demographers analyzing sex ratios have primarily been interested in the effects of sex ratios on marriage rates. General theories of sex ratio and marriage squeeze effects that were developed independently by Marcia Guttentag and Paul Secord (1983) and this writer (Grossbard-Shechtman 1981,1984) lead to the derivation of additional hypotheses regarding effects of sex ratios on divorce, cohabitation, sorting patterns, and on labor supply (see Chapters 3, 4 and 5). This chapter focuses on the impact of marriage squeezes and sex ratios on the labor supply of married women.

Previous research which has related sex ratios to women's labor supply has not focussed solely on married women. For instance, Guttentag and Secord (1983) and Wilson (1987) hypothesized that women (both married and unmarried) are more likely to work when sex ratios are low. This hypothesis was tested with cross-country data by Ward and Pampel (1985), Ferber and Berg (1991), and South (1988), who all looked at overall female labor force participation.

Likewise, the tests reported in the previous chapter--based on time trends and black-white comparisons--related sex ratios to women's labor force participation, regardless of marital status.

The fact that the rate of labor force participation of both married and unmarried women was lower where the sex ratio was higher could simply follow from the fact that (1) higher sex ratios imply higher marriage rates for women, and (2) married women typically work less than unmarried women. In contrast, the analysis presented here tests how sex ratios and marriage squeezes influence the labor supply of *married* women.

Previous studies of sex ratio and marriage have pointed out to the need for analyzing various educational, ethnic, linguistic, racial, or religious groups separately. For instance, Goldman (1977) constructed separate availability measures for women differing in educational level and race. Marriage patterns have also been analyzed separately for blacks and whites by Schoen and Kluegel (1988), and Lichter, LeClere and McLaughlin (1991), in part due to the tendency for marriage within a race (racial endogamy). People also prefer to marry a spouse of similar origin or speaking the same language (e.g., Schoen and Cohen 1980, Stevens and Schoen 1988.) Whenever possible, the analysis presented here also separates women by educational level and ethnicity.

Theory

The analysis in Chapter 3 lead to Hypothesis 1, the hypothesis on which the present chapter focuses: Hypothesis 1 stated that:

> *A marriage squeeze for men is expected to be associated with lower female labor force participation than a marriage squeeze for women.*

A marriage squeeze of men occurs when there is a relative surplus of men in a marriage market, whereas a marriage squeeze for women occurs when there is a relative surplus of women. If sex ratios are defined as the number of marriageable men divided by the number of marriageable women, it follows that marriage squeezes for men tend to occur when sex ratios are larger than 1, and marriage squeezes for women when sex ratios are smaller than 1. One possible measure of marriage squeeze is the sex ratio in a marriage market. As argued in Chapter 3, higher sex ratios are associated with a higher aggregate demand for women's spousal labor (given the supply by women), and consequently with a higher marriage-market related component of women's value of time. The basic idea is that the scarcer women are, the more men may make women feel desirable, and the more attractive dating options for never-married and divorced women become. This leads to a higher value of time for women, including married women. Given that value of time and labor force

participation are inversely related, it follows that sex ratios and women's labor force participation will be inversely related, and that a marriage squeeze for men may discourage women from participating in the labor force.

This hypothesis applies separately to unmarried and to married women, to the extent that some women's labor supply decisions are influenced by marriage market conditions both before and after marriage. To the extent that marriage market conditions affect married women more than unmarried women, it follows that:

A marriage squeeze for men is expected to be associated with lower female labor force participation than a marriage squeeze for women (Hypothesis 1').

Two alternative explanations also lead to Hypothesis 1, the first based on migration theory and the second on the theory of discrimination in labor markets. First, an alternative interpretation for a negative association between sex ratios and women's labor force participation across geographical areas can be based on job-related migration. If people migrate in order to improve their employment conditions, high sex ratios could be caused by migration of men to areas where men have better job opportunities or by migration of women to areas where women have better job opportunities. In turn, job opportunities are positively related to labor force participation, and sex ratios are related to marriage squeezes. A second alternative interpretation for a negative association between sex ratio and female labor force participation is based on the existence of discrimination in the job market. This theory assumes that employers prefer to employ men rather than women. If men are in relatively short supply (for instance, due to a low sex ratio), employers reluctantly will hire more women.

It does not follow from a migration interpretation or a discrimination interpretation that marriage squeeze and sex ratio effects on labor supply are likely to be more relevant to married women than to unmarried women. Unmarried female workers are more likely to migrate and to be substituted for male workers than are married female workers. Therefore, according to these theories one expects marriage squeezes and sex ratios to be more related to labor supply among unmarried women than among married women. In

contrast, given the fact that married women are more likely to switch between supplying labor and spousal labor, and given the fact that most unmarried women work regardless of marriage market conditions, it follows from a market theory of marriage that conditions in the market for spousal labor are more relevant to the decision to work of married women than to the decision to work of unmarried women. Consequently,

Hypothesis 1.1

Marriage squeeze effects on the labor supply of married women are expected to be stronger than marriage squeeze effects on the labor supply of unmarried women.

As explained in Chapter 3, a major premise behind Hypothesis 1 is that for women work in the labor market and spousal labor are substitute sources of income. The presence and intensity of marriage squeeze effects is expected to vary with the importance of work as a source of income.

Marriage squeezes for men are expected to be associated with a higher pecuniary component of women's value of time in marriage than marriage squeezes for women. Women who work outside the home primarily for pecuniary reasons are more likely to use their increased compensation within marriage in order to avoid work than women who work to a large extent due to non-pecuniary rewards obtained on the job. Three variables which possibly reflect the relative importance of pecuniary rewards are education, full-time work status, and wage. This leads to Hypotheses 1.2 through 1.4.

Marriage Squeeze and Education

Women with higher education tend to find work outside the home more rewarding than do women with low education. The lower their level of education, the more married women are likely to use their marriage market position as a means to avoid work outside the home. It follows that

Hypothesis 1.2

The lower women's level of education, the more one is likely to find a negative association between marriage squeezes for men and women's rate of participation in the labor force.

Migration theory does not lead to Hypothesis 1.2. According to migration theory more educated women are expected to migrate more as a function of job opportunities, which leads to a stronger (negative) association between sex ratio and labor force participation for more educated women. In other words, high participation rates of women in the labor force and marriage squeezes for women are expected to be associated more positively among highly educated women than among women with low education. Likewise, as men tend to be more educated workers than women, according to discrimination theory one expects a stronger association between marriage squeezes and labor force participation among educated women than among uneducated women.

Marriage Squeeze and Full-Time Work

In light of the marriage market analysis presented here, it follows that the decision to work full-time is more likely to be linked to marriage market conditions women face than is the decision to work part-time. Part-time workers are more likely to enjoy work, and not as likely to translate increased pecuniary compensations in marriage due to marriage squeezes for men (or any other reason) into the luxury of avoiding work. It follows that

Hypothesis 1.3

Marriage squeeze effects on women's labor force participation are more likely to be found for full-time workers than for part-time workers.

Another variable related to the relative importance of pecuniary compensation at work is the wage.

Marriage Squeeze and Wage

The wage a woman can earn in the labor market is going to be related to the way marriage squeezes affect women's labor force participation for at least two reasons. First, higher wages may indicate that a job is more satisfying (unless the wage is higher in order to compensate for unpleasant job characteristics). From this perspective, marriage squeeze effects are likely to be stronger for women with low wages who presumably do not enjoy work much than for women with high wages. Second, where marriage squeezes for men prevail and

women are relatively scarce, that scarcity may affect not only marriage markets--as discussed so far--but also labor markets. If male and female workers are poor substitutes this implies that where female workers are scarce, demand for their work is higher, which may cause both higher wages and more participation in the labor force. Where marriage squeezes for men are not associated with higher wages for women, one may infer that there is not much of a labor market effect of marriage squeeze on female labor force participation and a negative association between marriage squeeze for men and female labor force participation is more likely to be observed. For both of these reasons we expect that

Hypothesis 1.4

The negative effect of a marriage squeeze for men on women's labor force participation is more likely to be found where women's wages are low.

Given possible substitution between work and spousal labor as sources of income, the intensity of marriage squeeze effects is also expected to be a positive function of the importance of the market-determined component of the value of time. In turn, the impact of marriage markets on individual value of time is a negative function of duration of marriage.

Marriage Squeeze and Duration of Marriage

Value of time is likely to vary more with marriage market conditions around time of marriage than either considerably before or after the wedding. The longer a couple is married, the more they may have made marriage-specific investments and the higher the costs of divorce. In turn, the higher the costs of divorce and remarriage, the less important the market-determined component of w^* is expected to be, and the less marriage squeeze effects on the labor supply of married women are likely to be observed. It follows that

Hypothesis 1.5

The longer the duration of marriage, the less one is likely to find a negative association between marriage squeezes for men and the rate of participation of married women in the

labor force.

In turn, duration of marriage may be approximated by age at marriage or age at interview. Therefore, a variation of Hypothesis 1.5 states that Hypothesis 1 is more likely to hold the closer women are to the average age at marriage. Furthermore, marriage squeeze effects on women's labor supply are expected to vary with the proportion of women who are married.

Percent Married

The effect of variations in marriage squeeze on female labor force participation depends on the size of the various curve shifts and on the elasticities of demand and supply in the relevant markets for spousal labor. To understand this, one needs to go back the technical analysis of Chapter 3. Consider a marriage squeeze for men caused by an increase in the number of men, which was caused by a rightward shift in demand for women's spousal labor as depicted in Figure 3.2. The more elastic the supply of female spousal labor at the initial intersection between demand and supply, the smaller the impact of such rightward shift in demand on the equilibrium w^*, and therefore the smaller the effect of a marriage squeeze for men on women's supply of labor outside the home. In contrast, the more inelastic the supply of female spousal labor at the initial intersection of demand and supply, the larger the predicted impact on the equilibrium w^*, the larger the predicted impact on value of time, and the more women's labor supply will be affected.

In turn, the elasticity of supply of female spousal labor depends on the proportion of women who are married. The larger the proportion of women who are married, the less elastic the supply of spousal labor. When most women are married, further increases in w^* will generate little entry of additional women interested in marriage or increases in the number of hours married women are willing to work in spousal labor. Under such circumstances a rightward shift in men's demand for women's spousal labor, caused e.g., by an increase in the number of men, is likely to cause a large rise in w^*, and consequently a large decrease in labor supply.[1] This implies that

Hypothesis 1.6

The higher the percent of women who are married, the more

marriage squeezes for men are likely to be negatively associated with (married) women's labor force participation.

In other words, the higher the percent of women who are married, the more Hypothesis 1 (or Hypothesis 1') is applicable.

Accordingly, the elasticity of supply of women's spousal labor is expected to vary across various groups of women as a function of the percent of women who are married in that group. For instance, if a higher proportion of high-class women are married than is the case for low-class women, it follows that a marriage squeeze for men will have more of a discouraging effect on the labor force participation of high-class women than on the labor force participation of low-class women. It also follows that if the percentage of blacks who are married is lower than that percentage among whites, it is expected that marriage squeeze effects on black women's labor force participation will be weaker than marriage squeeze effects on white women's labor force participation.

Hypothesis 1.6 does not follow from migration theory. Where a higher proportion of women are married, female migration is expected to be less sensitive to differences in job opportunities for women. Likewise, Hypothesis 1.6 does not follow from discrimination theory.

The percent of women who are married is expected to affect women's labor force participation not only via marriage squeezes, but also directly. Where a higher percentage of women are married this may capture favorable marriage market conditions for women (for reasons other than a high sex ratio). Accordingly, one expects percent married and participation of married women in the labor force to be negatively related. Causality is not so clear. Favorable marriage market conditions may simultaneously cause more marriage and less participation of married women in the labor force.

The degree to which marriage squeezes have an impact on women's labor force participation is also expected to depend on the elasticity of demand for spousal labor, female labor in particular. If a marriage squeeze for men is interpreted as a smaller supply of women's spousal labor, it follows that value of time will be affected more by marriage squeezes the less elastic the demand. In turn, such elasticity is a function of cost and availability of substitutes.

In interpreting empirical tests of these marriage squeeze

effects based on a comparison of geographical areas one also needs to realize that migration could occur as a result of better marriage opportunities in another city, possibly the result of sex ratio variations across cities. Such migration could reduce variation in sex ratios and thereby weaken marriage squeeze effects on value of time, and consequently, on labor force participation of married women. If variations in sex ratio persist over time, it implies that migration motivated by marriage market factors is limited.

An empirical study of the labor supply of married women also needs to take account of other variables which belong in a theory of labor supply and are known to influence labor supply.

Wage and Income Effects

Employment levels and wages can be related to labor supply in a number of ways. Wages enter both the demand and the supply of labor and are eventually established where demand and supply intersect. The supply of labor is expected to depend on wage opportunities (positively, to the extent that a substitution effect dominates, and negatively, to the extent that an income effect prevails). The demand for labor is a negative function of wages. While there exists widespread evidence of a positive relation between women's wages and labor force participation (see for instance, Mincer 1962, Rotella 1981 using earlier data, Goldin 1983, and Smith and Ward 1985) that evidence is mostly based on microdata sets or inter-regional comparisons based on historical data.

Income from sources other than own wage is expected to raise a married woman's value of time, and consequently to discourage her labor force participation (Mincer 1962). Husband's income from work and income from other sources are all expected to have such negative effect on the participation of married women in the labor force.

There is a wealth of evidence which has accumulated regarding wage and income effects on labor supply (including the labor supply of married women), some of which has been summarized e.g., by Keeley (1981) and Killingsworth (1983). As the following empirical work is based on cross-city comparisons, it is worth reviewing some relevant findings based on similar comparisons performed in the past. For instance, Bowen and Finegan (1969) and Fields (1976) estimated models of labor force participation of married women using cross-city

comparisons for 1940, 1950, 1960, and 1970. They found women's own expected wage was positively related to married women's labor force participation rates, whereas family (nonemployment) income was negatively related to such rates. Bowen and Finegan also found that husbands' earnings were negatively related to the labor force participation of married women.

Fertility and Education

Many studies of married women's labor force participation have controlled for number of children and found a negative relationship between fertility and such labor force participation. However, causality is hard to establish, as fertility and labor supply tend to be simultaneously selected. It is also well-documented that education is positively related to labor supply. Again, causality is difficult to establish as women are likely to select their educational level and their level of participation in the labor force simultaneously.

Testing the Marriage Squeeze Hypotheses

The marriage squeeze hypotheses stated above were tested using data for American cities in 1930 and 1980.[2] There are two major advantages of using data at two points in time: (1) it possibly increases the robustness of the results, and (2) it enables us to make comparisons over time. One expects stronger effects of marriage squeezes on women's labor force participation in 1930 than in 1980 for the following reasons:

1. In 1930, there were higher proportions of married women (e.g., because cohabitation without marriage was less of an option then than it is now), which implies higher potential effects on value of time based on marriage market conditions (Hypothesis 1.6).
2. In 1930, there were fewer substitutes for women's spousal labor, and therefore a less elastic demand by men for women's spousal labor, which implies stronger effects of sex ratios on quasi-wage w^*, women's value of time and women's labor force participation.
3. In 1930 there was more of a tendency for women to work at arduous jobs offering little intrinsic rewards.

In 1930 women were mostly employed in manufacturing and domestic service, whereas today most women are employed in white-collar jobs. Consequently, in 1930 a higher proportion of women were likely to work for monetary rewards. This favors the sex ratio hypothesis, which compares monetary returns to work with the returns to homemaking and does not take non-monetary benefits from paid employment into account.

In testing the marriage squeeze hypotheses stated above, it is important to separate foreign-born from natives. Numerous studies have observed pronounced in-group tendencies for marriage with respect to race, religion, and national origin (see for instance Blau, Blum, and Schwartz 1982 for a partial survey of the literature). To the extent that people tend to marry according to ethnic or religious boundaries, it is preferable to run regressions of the labor supply of women of a particular origin using ethnic or religion-specific marriage squeeze estimator(s). People born in the same foreign country tend to belong to the same ethnic-religious groups and to marry each other. They also tend to concentrate in a relatively small number of cities when they migrate. It can be assumed that sex ratios for all foreign-born in a given city are positively correlated with each other. Marriage squeeze effects on the labor force participation of foreign-born women may be stronger than such marriage squeeze effects for native women to the extent that there is more variance in sex ratio among the foreign-born population or that the foreign-born population is characterized by some of the factors which are expected to reinforce marriage squeeze effects on female labor supply, such as high emphasis on work for pecuniary rewards and high marriage rates for women.

The inclusion of foreign-born gives a further advantage to the 1930 data. In 1930 there was a larger number of cities with a substantial proportion of its population born abroad than in 1980[3]. In 1980 only a small number of cities had a number of foreign-born large enough for the calculation of sex ratios and labor force participation rates for women in their twenties.

In view of the low rate of intermarriage between blacks and whites, and given the small numbers of blacks in many of the cities,

the analysis was restricted to white women, most Hispanics defining themselves as white.

Empirical tests were limited to young women, for their value of time may be most related to marriage market opportunities (see Hypothesis 1.5). Marriage squeezes are expected to have a larger effect on recently married couples, who are most likely to be aware of marriage market conditions, than on couples married for a longer time. The longer a couple has been married, the more it is likely that transactions within a marriage become influenced by factors unrelated to marriage market conditions, such as affection and the power of habit. Ideally, I would have liked a sample of recently married young women. Instead, as age at marriage was not available, I used data on women around the average age at marriage in the U.S.

It also follows from the theory (Hypotheses 1.2 and 1.3) that one would want to focus on full-time workers and on uneducated women. In the case of the 1980 data it was possible to extract data by education and full-time work status. The available 1930 data did not enable calculation of sex ratios or participation rates by education or full-time work status.

The model that was estimated included participation of married women in the labor force on the left-hand side and measures of marriage squeeze on the right-hand side. In addition, other variables that are possibly related to married women's labor force participation were included in the equation: proxies for the demand for women's and men's labor, female wage level, and regional dummies.

Given the simultaneous relationship between labor force participation and fertility, reduced forms of labor force participation were estimated.

I first report the analysis of the 1930 data, and then proceed with the 1980 data.

U.S. Cities, 1930

Hypotheses relating marriage squeezes to women's labor supply were first tested with data on 67 U.S. cities in 1930. The cities included in both samples were the largest cities for which information was available.

The sample was restricted to women between ages 25 to 34. This age group seemed an appropriate age group for our test: a

majority of women aged 25 to 34 (73 percent) were married, and given their age, they were relatively recently married.

The following independent variables were included:

Sex Ratio (*SR*). In this study, the indicator of marriage squeeze was the sex ratio defined as a continuous variable. Even though younger women tend to marry men older than themselves, in the computation of sex ratios I was not able to add men older than 34.[4] It is possible to define sex ratios as the total number of men divided by the total number of women, or alternatively, as the number of unmarried men divided by the number of unmarried women (demographers have always put women in the denominator). As can be seen from Table 6.1, which presents means and standard deviations for all the variables included in the model, I tried both definitions of sex ratio.

The advantage of the measure including all men and women is that it gives a more accurate picture of the real marriage opportunities before marriages actually occur. But people may not become aware of such opportunities if they do not look at the statistics. They are more likely to become aware of the ratio of unmarried men to unmarried women, especially after the market has already been cleared of a lot of participants. In view of men's older age at first marriage, it appears from Table 6.1 that the overall sex ratios are considerably lower than the sex ratios among the unmarried, and that sex ratios among the foreign-born were substantially higher than sex ratios among natives.

Demand for Labor. The variable *VALUE* was included as an indicator for the demand for labor typically performed by women. *VALUE* is the value added by the five industries that employ most women (food processing, clothing, paper, leather and tobacco). This variable, constructed by Rotella, was found to be a significant determinant of employment levels in Rotella (1980, 1981).

It can also be argued, as did Haines (1979), that women's employment opportunities are negatively related to men's employment opportunities in mining and heavy industry. Such a negative relationship could result from sex segregation in the occupational and industrial structure, so that there was little substitution between male and female workers, or could be caused by

men's higher earnings inducing women to stay home. Haines found women's employment to be significantly lower in areas with high proportions of men employed in mining and heavy industry. Accordingly, I constructed a *MINING* variable as the percentage of men aged 25 to 34 employed in mining and heavy industry, and included it in the regressions of female labor force participation.[5]

Wages. *(W_f)* actually stands for women's earnings (wages and hours of work could not be easily separated).

Region. Regional dummies were also included as possible proxies for the demand for labor. Dummies were included for two regions of the United States: West and South.

Means and standard deviations can be found in Table 6.1.

Model. The first equation that was estimated is

$$MFLFP = \beta_0 + \beta_1 SR + \beta_2 VALUE + \beta_3 MINING + \beta_4 W_f + \beta_5 SOUTH \qquad (6.1)$$

where *MFLFP* is the percentage of married women in the labor force.[6] Following Hypothesis 1', it is expected that β_1 is negative. It is also expected that β_2 and β_4 are positive, and that β_3 is negative.[7]

Even though equation 6.1 contains a measure of employment opportunities for women *(VALUE)* and of employment opportunities for men *(MINING)*, as well as a measure of women's earnings *WAGEF*, employment opportunities are far from being perfectly controlled for, so that it is possible that poor employment opportunities for women, reflected in a low participation of married women in the labor force *(MFLFP)*, attracted few women through migration, thereby causing a low sex ratio. Moreover, high sex ratios may be caused by migration of men to areas where they have better opportunities and incomes relatively to that of women (Wrigley 1961; Haines 1979). It is also possible that discrimination in the labor market causes a negative relationship between sex ratios and female labor force participation. Equation 6.1 thus cannot distinguish between such alternative explanations.

As an additional test for the sex ratio hypothesis, a second equation, which includes the labor force participation among unmarried women, *UFLFP*, was estimated:

$$MFLFP = \beta_0 + \beta_1 SR + \beta_2 VALUE + \beta_3 MINING + \beta_4 W_f + \beta_5 SOUTH + \beta_6 UFLFP \quad (6.2)$$

According to the sex ratio hypothesis, the sex ratio is expected to influence *MFLFP* more than *UFLFP* (Hypothesis 1.1) and, consequently, one predicts a negative coefficient of Sex Ratio *(SR)* when unmarried women's *LFP (UFLFP)* is included in the regression of married women's labor force participation *(MFLFP).* According to the alternative explanations based on migration and discrimination at work, once *UFLFP* is controlled for, one does not expect that the coefficient of sex ratio will be statistically significant in a regression of *MFLFP.* If the coefficient of sex ratio is significantly negative after control for UFLFP one can consider this as evidence for the sex ratio hypothesis.[8]

Logarithmic transformations were made of all variables, excluding the regional dummies. All regressions were estimated with Ordinary Least Squares.

Results, 1930

All regressions were estimated for three groups of white women: foreign-born, native, and all white women. As mentioned above, given observed tendencies for group endogamy, marriage markets differ by national origin.

Table 6.2 reports regression results following the first model (equation 6.1) which does not include labor force participation rates among unmarried women *(UFLFP).* Table 6.3 presents results based on the second model (equation 6.2), which includes *UFLFP* as one of the variables explaining *MFLFP.*

Most regressions show that as predicted, the higher the sex ratio, the less married women participate in the labor force. The sex ratio takes a negative sign in most regressions. All regressions estimated on the basis of intercity variations in foreign born labor force participation and sex ratios indicate a significant sex ratio effect, whether sex ratios were computed for the total population age 25 to 34 (col. 2) or were limited to the ratio of unmarried men to unmarried women in that age range (col. 1), and whether or not

UFLFP is included (Table 6.2 or Table 6.3). While sex ratio effects on the labor force participation of married women appeared strong for foreign-born women, sex ratios did not seem to have much effect on the labor force participation of native married women: regression 3 in Table 6.2 indicates a negative coefficient which is statistically significant at the 90 percent level.

Once *UFLFP* is controlled for, the labor force participation of native married women does not seem to be affected by sex ratio variations (Table 6.3).

When all white women are combined, Table 6.2 indicates a sex ratio effect that is statistically significant (at the 95 percent level) if sex ratios are computed for the unmarried population. This coefficient of sex ratio remains negative in Table 6.3, after control for *UFLFP*, but only at the 90 percent level.

It appears, therefore, that sex ratio effects on women's labor supply were stronger amongst the foreign-born than amongst the native white U.S. population. This may be related to the greater variance in sex ratio found among the foreign born, the higher percentage of foreign born who were married [9] (stronger effect on w^* as postulated in Hypothesis 1.6), a higher demand for marriage by more tradition-bound foreign born men, a more inelastic supply of marriage by more tradition-bound women, or language or cultural barriers affecting foreigners' job opportunities. Also, as mentioned above, Hypothesis 1' depends on the assumption that women work not for pleasure, but out of financial necessity. Their culture of origin may discourage foreign-born women from wanting to leave the home, and they may be more likely to work out of financial necessity than native women. Interestingly, in unreported regressions, it was found that a sex ratio defined for natives had no effect on the participation of the foreign born, and vice versa. A comparison of Tables 6.2 and 6.3 indicates that the inclusion of unmarried women's LFP had a small impact on the sex ratio coefficients in the regressions of foreign born married women's LFP, but that this is not so for native women. In Table 6.3, which controls for unmarried women's LFP, the size of the sex ratio coefficients in columns 1 and 2 are almost identical to those found in Table 6.2, where unmarried women's LFP was not included amongst the explanatory variables. This suggests a sex ratio effect on foreign-born married women's labor force participation which is

unrelated to job-motivated migration or discrimination against women. The same is not true for native women. In columns 3 and 4 of Table 6.3, sex ratio coefficients do not differ significantly from zero, whereas unmarried and married women's labor force participation are strongly related.

Also, the hypothesis that job-motivated migration simultaneously creates high sex ratios and low female labor force participation rates leads one to predict significantly negative sex ratio coefficients in regressions of unmarried women's LFP, possibly more so than in regressions of married women's LFP (unmarried women are more likely to migrate as a function of job opportunities than are married women). In separate regressions of the participation rate of unmarried women, *UFLFP*, it was found that the coefficient of sex ratio was not significantly different from zero, in contrast to the significantly negative coefficient of sex ratio in the LFP regressions for married women.[10]

Other noteworthy results include the strong positive effect of the demand for labor *(VALUE)* on married women's LFP and the negative coefficient of *MINING*.[11] The latter result suggests that in cities with more job opportunities for men in mining and heavy industry, (1) there were possibly fewer job opportunities for women, or (2) men's higher income made it less necessary for women to go to work. These two variables indicating demand for labor are significant in both Tables 6.2 and 6.3. In contrast, the effect of female wage (W_f) is insignificant in all regressions, possibly because it is the result of both demand and supply differences across cities.[12] Regional patterns appear to matter. In comparison to married women in the northeast, married women elsewhere in the country were more likely to participate in the labor force. This became even more so after inclusion of *UFLFP* in the regressions.

U.S. Cities, 1980

Most data for this study were extracted from a 1 percent sample of the 1980 Census for most large U.S. cities defined as Standard Metropolitan Statistical Areas (SMSAs).[13] For the main variables used in this study, city averages were calculated from micro-level data. Given the considerations mentioned earlier, data were extracted for

young women close to the average age at marriage. Sex ratios and labor force participation rates were calculated for married white women between the ages of 25 and 28, and income data for men and women between the ages of 30 and 31. Separate data were extracted for married white women in this age group who did not complete more than a high school education. As stated in Hypothesis 1.2, the lower women's educational level the more one is likely to find a marriage squeeze effect on the participation of married women in the labor force.[14] The dependent variable used in this study was full-time labor force participation of married women.

Full-time Labor Force Participation. In line with Hypothesis 1 it is more likely to find marriage squeeze effects on full-time labor force participation of married women than on part-time participation. Average full-time labor force participation rates were computed for married women age 25 to 28 in each city, the alternative being either no work at all or part-time work.

The independent variables were calculated as follows:

Marriage Squeeze. The construction of a marriage squeeze index was based on two steps: calculation of sex ratios and creation of an "Excess males" variable. First, sex ratios were calculated as the number of men between the ages of 27 to 30 divided by the number of women between the ages of 25 to 28. A two year difference in age at marriage was chosen, in line with the average age difference at first marriage in the United States in 1980.[15] Sex ratios could also be defined as the number of unmarried men divided by the number of unmarried women in these age groups. The advantage of the measure including all men and women is that it gives a more accurate picture of marriage opportunities before marriages actually occur.

Second, a variable called "Excess males" was constructed. This variable was equal to the difference between the number of men and the number of women participating in the same marriage market, relatively to the number of women, provided that the sex ratio exceeded the mean sex ratio by 1 standard deviation or more (the operational definition of a marriage squeeze for men).

For each city I calculated marriage squeeze measures (based on sex ratios) and married women's labor force participation rates for all women and for women with low education. Low education was defined

as a high school degree or less. In calculating sex ratios for women with high-school education or less, I used the number of men with three years of college or less, given the tendency for husbands' educational level to exceed that of their wives.

Table 6.4 shows the calculated rates of full-time labor force participation for white married women between the ages of 25 and 28 in the two groups selected for this study: all women and women with low education. It can be seen that women with lower education tended to work less than women with more than a high school degree.

The second row in Table 6.4 shows average sex ratios for the selected groups of women. By design, sex ratios for women with a high school diploma are expected to exceed 1, as men with higher educational achievements are also included. The mean value of the marriage squeeze index, *EXCESSM*, is low, especially when calculated for people of all educational levels. For many cities--cities without a marriage squeeze for males--this variable took the value 0, and for the cities with such marriage squeeze the amount of excess men was divided by the number of women.

Income. Expected income was computed based on the income of full-time workers between the ages of 30 and 31: *FINCM* in the case of women, and *MINCM* for men.[16] As expected, it can be seen from Table 6.4 that the mean income of individuals with low education is lower than the mean income of all individuals.

Wage. *(WAGEM)* For each city, I also obtained data on the average hourly wage paid to production workers in manufacturing, directly from the Bureau of Labor Statistics. Given that most such blue-collar workers are men, this variable is a proxy for husband's wage, especially in the case of women with low education.

Regional dummies were also included.

Model. The equations that were estimated have the same format as equation 6.1 mentioned above, the differences lying in the definitions of the variables. The model was estimated separately for women of all educational levels and for women of low education.

$$MFLFP = \beta_0 + \beta_1 EXCESSM + \beta_2 FINCM + \beta_3 MINCM + \beta_4 EXCESSM.FINCM + \beta_5 WAGEM + \beta_6 SOUTH \quad (6.3)$$

Following the theory presented above, it is hypothesized that β_1 is negative (Hypothesis 1'), and more so in the case of women with low education than in the case of more educated women (Hypothesis 1.2). To the extent that *FINCM* is a proxy for expected female wage, and the substitution effect dominates the income effect, β_2 is expected to be positive. According to Hypothesis 1.4 the negative effect of a marriage squeeze for men on the participation of married women in the labor force is likely to depend on the wage these women earn. Among women with higher wages we expect less of a negative effect of *EXCESSM*, i.e. the coefficient β_4 is expected to be positive. To the extent that *MINCM* and *WAGEM* are proxies for husbands' income, β_3 and β_5 are expected to be negative.

A model aimed at testing Hypothesis 1.6 was also estimated with the 1980 data. Such model adds two variables to the model in equation 6.3: the percent of women who are married and an interaction term between percent married and excess male. Based on Hypothesis 1.6, it is expected that this interaction term will be negative.

The equations were estimated for the two education groups (high-school or less and all levels of education). In each regression, the marriage squeeze index and the income variables were adapted to the relevant group of women. Given that the data are city averages, the dependent variable varies continuously between 0 and 1, and the regressions were estimated using Ordinary Least Squares.

Results, 1980

Tables 6.5 and 6.6 summarize the results based on a cross-city comparison for 1980. Table 6.5 presents regression results for women of all educational levels. It can be seen that the coefficient of *EXCESSM* (excess males) is negative, as predicted, but that result is significant only at the 90% level. This result confirms Hypothesis 1'. Evidence is also found for Hypothesis 1.4, as the interaction of *EXCESSM* and *FEMALE INCOME (FINCM)* has a positive sign and is also significant at the 90% level. As expected own wages encourage women to be in the labor force and male wages discourage the

participation of married women.

Table 6.6 presents regression results for women with low education. Here the excess males index is computed based on sex ratios defined for women with low education (see definition in Table 6.4). The difference between the two regressions in Table 6.6 is that equation 2 also includes the percent married and an interaction between excess males and percent married.

Hypothesis 1' was confirmed in both regressions of Table 6.6. The effect of a marriage squeeze for males (measured by *EXCESSM*) is significant in both regressions (at the 95% level in equation 1). In both regressions the interaction between *EXCESSM* and *FINCM* is positive, as predicted, and significant at the 95% level. That the effect of a marriage squeeze for men is more significant in the case of women with low education (Table 6.6) than in the case of women at all educational levels (Table 6.5), is evidence in support of Hypothesis 1.2. In general, the results in Table 6.6 indicate that the model utilized fits women with lower education better than women at all educational levels (Table 6.5). This can be seen, for instance, from a comparison of the R-square coefficients.

Table 6.6 also indicates that the negative effect of a marriage squeeze for men is stronger in the West than in other regions of the country (other than the South). Furthermore, it was found that in cities where a larger proportion of all women had a low educational level the rate of participation of married women in the labor force was lower, which can be interpreted as additional evidence of an own wage effect. The interaction between the proportion of women with a low education and *EXCESSM* was found to be positive, which implies that the effect of a marriage squeeze for males is weaker where there are fewer people with a college education. The availability of fewer men with a college education seems to depress the marriage opportunities of women with low education, thereby encouraging them to work (other possible interpretations of such interaction term--which would possibly reinforce the negative effect of *EXCESSM*--seem to matter less).[17]

The coefficient of proportion married was found to be negative (regression 2 in Table 6.6). This indicates that where women are more likely to be married they are also less likely to work while married, i.e. the amount of spousal labor and the value of spousal

labor are positively related. However, no evidence was found for Hypothesis 1.6: the effect of *EXCESSM* did not depend on the percent of women who are married.

In both regressions in Table 6.6 the coefficients of women's earnings *FINCM* were not significant and the sign of *MINCM* was negative and significantly so. Wages of production workers in manufacturing, which was predicted to be negatively related as well, was not found to have a significant effect in these regressions. So it appears that in each table at least one indicator of men's earning power has a significantly negative coefficient. Similarly, Bowen and Finegan's (1969) analysis of earlier Census data had found husband's income and family income to be negatively related to the participation of married women in the labor force. Fields' (1976) analysis of the 1970 Census found a significantly negative effect of family income, but not of husbands' income.[18] Southern residence does not have a significant impact on the labor force participation of married women of all origins. This may indicate that North-South differences in cultural tradition within the native (mostly culturally homogeneous) population are minimal.[19]

Table 6.6 also indicates that in larger cities, with more women in the age group and educational category studied here, married women are less likely to participate in the labor force. This could indicate more opportunities for women in the larger cities, possibly due in part to more (non-work) assets spent by husbands on their wives.

Conclusions

It was found that both in 1930 and in 1980 young white married women were less likely to participate in the labor force in cities with more advantageous marriage market conditions. In the 1930 study, better marriage market conditions were measured in terms of higher sex ratios. In the 1980 study, the indicator used was a measure of the relative excess number of men, given that there is a high sex ratio. In cities where marriage markets are more advantageous to women, married women are less likely to participate in the labor force. Significant sex ratio and marriage squeeze effects on labor force participation were found for white married women in

their late twenties. The 1930 study found such effects for both foreign-born women and men of all origins. the 1980 study found marriage squeeze effects for both women with less than a college education and women at all educational levels. The various tests using different data sets, definitions, and models, thus point to the possible validity of Hypothesis 1'.

Marriage squeezes and sex ratios are generally overlooked in studies of labor supply. No previous studies of labor force participation by married women had included sex ratios or indicators of marriage squeeze among their explanatory variables. Previous cross-city comparisons of married women's labor force participation by Bowen and Finegan (1969) and Fields (1976) did not include sex ratios, but included the number of women (the denominator of the sex ratio). Bowen and Finegan (1969) found that in cities with more women compared to men (ages 14 and over), fewer married women were working. In Field's (1976) analysis of the 1970 Census the number of women was found to be insignificant. In contrast, I found that in 1930, where there were more men compared to women, which is associated with a higher sex ratio, fewer married women were working. In 1980, where there was more of a relative excess of males, fewer married women were working full-time. The discrepancy between previous studies based on data from 1940, 1950, 1960, and 1970 and the present study based on data from 1930 and 1980 can be explained by the fact that previous analyses (1) pooled women of all ages together and (2) did not include sex ratios or an index of marriage squeeze. In contrast, I concentrate on women between the ages of 25 and 34 (in the 1930 study) and between the ages of 25 and 28 (in the 1980 study) and look at the effect of either sex ratios or an index of marriage squeeze.

Some models attempted to separate between the explanation offered here and alternative explanations for a negative relationship between sex ratios and married women's labor force participation. The results for 1930 included labor force participation among unmarried women in regressions of married women's labor force participation. The fact that in some cases sex ratios still explain variation in the labor force participation of married women after inclusion of unmarried women's labor force participation support the marriage market story told in this book.

Also supportive of the marriage market story are the findings based on 1980 data that excess male effects on married women's labor force participation seem to be more likely to be found for women with low education (Hypothesis 1.2) than for women at all educational levels, and the finding that excess male effects on married women's labor force participation were stronger where women had lower wages (Hypothesis 1.4).

Also, as predicted from the theory, results seem to be stronger for 1930 than for 1980. This would not follow from a migration hypothesis, as one expects migration costs to be lower in 1980 than in 1930, and therefore more migration to occur as a function of job opportunities in 1980 than in 1930. The stronger findings for foreign-born than for natives (or total population) in 1930 are also consistent with the theory of marriage presented in this book.

These results make sense in light of a market theory of labor and marriage. Alternative explanations of a negative association between sex ratios and married women's labor force participation do not seem to explain all the findings reported here. The findings also indicate that in analyzing the effects of marriage squeezes, it is important to separate educational levels and to take account of cultural background. These results indicate that marriage squeeze and sex ratios matter not only when it comes to explain marriage rates, but also when explaining labor supply. It is hoped that further tests with better and more kinds of data and based on improved methods of estimation will shed more light on the validity of the hypotheses presented here.

Notes

1. High sex ratios can also lead to higher rates of marriage among women. Here I focus on other underlying factors that could cause variations in percent married. It may be desirable to use a simultaneous model to estimate percent married and labor supply.

2. The choice of 1930 data was prompted by Elyce Rotella's generous offer to let me use the data she collected. At the time I started working with the 1980 data, these were the latest census data available.

3. According to the sample of cities included

here, the percent foreign-born was 23 percent in 1930. There were more than 67 cities in which the foreign-born made up at least one percent of the white population.

4. In fact, the age difference at marriage is itself to some extent a function of the sex ratio.

5. Using the tables published by the U.S Bureau of Census (1930), Volume IV (Occupations by States), Table 12, the total number of men aged 25 to 34 employed in extraction of minerals, machinists, and operatives and laborers in iron and steel, machinery, and vehicle industries was divided by the total number of employed men aged 25 to 34 for the same city.

6. For the purpose of this discussion, a distinction is made between formalized marriage and living-together arrangements, and "married" means "formally married."

7. Education was not included in the final regressions. A variable measuring the percent of women aged 16-17 enrolled in school was consistently insignificant. Such result can also be explained by selective migration of educated women to cities with better job opportunities for women. Earlier versions also included men's earnings; the latter variable was dropped due to its consistently insignificant effect.

8. An alternative to running Regression 2 would be to run regressions of the same type as model (1) for unmarried women. According to the Migration Hypothesis *SR* should have a negative sign in such regression, and its coefficient should be at least as large as the coefficient of *SR* in a regression of *MFLFP* (for married women). According to the Sex Ratio Hypothesis sex ratios should have stronger effects on married women than on unmarried women.

9. The proportion of women who were married was 73 percent.

10. The results of such regressions are available upon request.

11. The elasticity of *VALUE* in the regressions for all women is half or less of that in the regressions for foreign-born women. This is probably due to the fact that *VALUE* does not include white collar jobs. Probably 50 percent of the native women were employed in white collar jobs.

12. Men's wages consistently appeared insignificant in all regressions. This suggests that men's migration caused men's supply of labor to follow variations in the demand for men's labor. Men's migration may cause sex ratio variations more than women's migration.

13. My goal was to include all 100 largest SMSAs in 1980. Technical constraints brought the sample down to 85 cities.

14. I also extracted data for foreign-born. As none of the regressions for the foreign-born were significant, these results are not reported. In a previous version of this chapter I reported results for foreign-born women based on erroneous computations from the 1 percent sample of the 1980 Census.

15. In fact, difference in age at marriage is endogenously determined. Where sex ratios are higher, and men find it relatively harder to marry, larger or smaller age differences may occur, depending on which age groups are more represented in a particular city. Such adjustments are definitely occurring when sex ratios vary over time, but they may also be found where sex ratios vary across cities (Bergstrom and Lam 1989.)

16. The variable is a composite of both wage income and income from other sources. At this age most income is derived from work, and the income of full-time workers is a good proxy for wage. It should be noted, however, that even where income from work is available, there exists a combination of an income and a substitution effect.

17. This alternative interpretations implying a negative sign for the interaction between *EXCESSM* and proportion with low education are (1) that where a higher proportion of women have low education, female wages are lower and the negative effect of *EXCESSM* is expected to be stronger, and (2) that where a higher proportion of women have low education there is less potential competition from college graduates in the marriage market for women with less education, and the negative effect of *EXCESSM* (as defined here) is expected to be stronger.

18. The results presented here may differ from previous cross-city comparisons based on Census data due to the difference in the age of the population studied (women age 25-28 here, in contrast to all women older than 14 in Bowen and Finegan and all women older

than 16 in Fields), to the difference in definitions of income, or to actual changes in the effect of men's income on the supply of married women to the labor force.

19. Another recent study of women's labor force participation which indicates the absence of South vs. non-South difference is Ono (1991).