Fewer Young Married Women in the Labor Force: A New Trend with Inflationary Potential?

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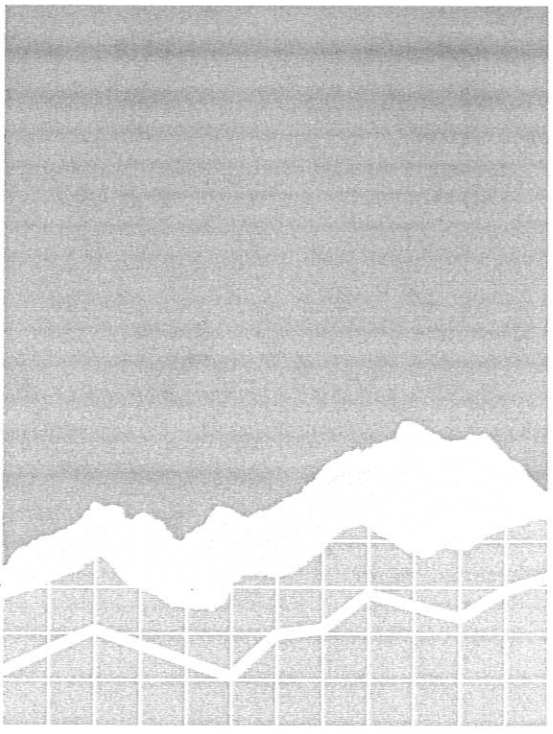

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Fewer Young Married Women in the Labor Force: A New Trend with Inflationary Potential? [1]

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Abstract

Using recent data from the March Current Population Surveys (CPS), including the latest data collected in March 1999, this paper reports a finding of great policy importance: from 1998 to 1999 young married women have experienced a substantial drop in labor force participation and attachment to the labor force. This trend is expected to continue to the extent that it is partially driven by an improvement in women's marriage market conditions experienced by the generation of women born around the passage of Roe versus Wade. This improvement resulted from rapid declines in births in the 1970s and from the difference between the age at marriage of men and women. The lower labor force activity on the part of married women may exarcebate labor shortages and add to inflationary pressure. This decline in activity is part of a generational shift comparable to the generational shift that accompanied the entry of the post war generation into labor and marriage markets. It is predicted that younger generations of women born during the echo of the baby-boom will experience another generational shift and that ten years from now, young married women's labor force participation will experience renewed increases.

Since the 1950s U.S. women have made a massive entry into the labor force. Women's overall labor force participation rate increased from 33.9% in 1950 to 58.9% in 1995. Many expect women's participation in the labor force to continue to climb. This examination of employment changes over the period 1998-1999 reveals that among

[1] The helpful programming assistance of Jeff Woerner and the research assistance of Shandy Rieger are gratefully acknowledged. I also thank UNICON for designing CPS-utilities, which helped in the data processing.

certain groups of women--namely, young married women--employment rates may have reached their peak.

Are the declines in women's activity reported here harbingers of a new long-run trend or are they a temporary digression that will not affect a long run trend of continued growth? This is an important question. If these recent changes usher a new trend, further decreases in women's participation in the labor force may aggravate current labor shortages and add to inflationary pressure. An investigation of the current changes in women's labor force participation and attachment and of its possible causes leads me to conclude that these changes are not temporary.

Recent Trends in Women's Employment

A comparison of the 1998 and 1999 March Current Population Surveys (CPS) reveals a substantial drop in labor force participation among young married women. Among married women ages 25 to 29 the labor force participation rate decreased from 73.6% in 1998 to 69.9% in 1999 (this group's participation rate in 1990; see Table 1 and Figure 1). Among married women ages 30-34 the labor force participation rate went down from 72.7% in 1998 to 70.7% in 1999 (see Table 1 and Figure 2). It is significant that a large decrease in employment occurred among women ages 25 to 29, for that age group includes the median age at marriage: in 1999 53 percent of women ages 25 to 29 and only 23.3 percent of women ages 20 to 24 were married.[2]

Table 1 and Figures 1 and 2 help us see that this decrease in young married women's labor force participation is a new phenomenon. Figures 1 and 2 show that the labor force participation rate of married women between the ages of 25 and 34 increased

[2] This is for the entire U.S. population. Among blacks, a majority of women ages 25-29 were not married.

since 1965. This employment rate continued to increase throughout most of the 1990s, although at a relatively low pace relative to earlier periods. For instance, between 1970 and 1975 the labor force participation of married women ages 25 to 29 had increased by an astounding 11.9%: from 38.5 to 50.4 percent in the labor force! From March 1998 to 1999 the U.S. witnessed the largest decrease in labor force participation of married women ages 25-34 since the end of World War II. [3]

This recent decline in married women's labor force participation is restricted to young married women. No decline was observed among married women older than 34 or younger than 25.[4] The decline did not occur amongst unmarried women.[5] Given that the decline was concentrated in a particular group of women and that this group is relatively small, overall women's labor force participation changed very little and few observers are aware of the decline reported here. Why is this group small? Women ages 25 to 34 in 1999 were born in the years 1965 to 1974 and are part of the baby-bust.

Declines occurred in young married women's attachment to the labor force as well as in their labor force participation. Young married women are working less part-time as well as full-time. They are working less year-round and fewer are working only part of the year. Table 2 and Figures 1 and 2 report recent changes in married women's year-round

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[3] There had been a slight decreasein women's labor force participation in 1991 (see U.S. Department of Labor 1992). Also, from 1995 to 1996 there was a slight decrease in the labor force participation rate of women age 30-34: from 75% to 74.7%.

[4] The labor force participation actually increased among women ages 20 to 24, of which only a small fraction (23.3 percent) were married in March 1999. Employment rates for married women ages 35 to 44 went virtually unchanged and a small increase of 1 percent occurred among married women ages 45 to 49 from 1998 to 1999.

[5] Considering women ages 25 to 29, the overall labor force participation rate regardless of marital status decreased only by .9, a much smaller decrease than the decrease of 3.7 percent experienced by married women in this age group. Among women ages 30-34, labor force participation decreased by .8 percent for all women (married or not) and it decreased by 2 percent among married women, as evident from Table 1 and Figure 2.

full-time employment. Given that large proportions of married women are employed part-time and for only part of the year, the full-time year round employment rates of married women of Table 2 are much lower than the labor force participation rates reported in Table 1.

It can be seen that from 1998 to 1999 decreases in young married women's year-round full-time employment were almost as dramatic as the decreases in these women's labor force participation. It appears that the part-time and intermittent employment of young married women declined even more than their overall labor force participation rate, but that full-time year-round employment also declined.

Possible Explanations

Given the strong economy, declining wage opportunities for women can be ruled out as a potential explanation for these trends.[6] With the U.S. experiencing its lowest unemployment and best earnings opportunities in decades, a 'discouraged worker' scenario clearly does not explain why fewer young married women participate in the labor force. Increased parental obligations do not seem to explain these trends either: fertility rates do not seem to have increased during this time.[7]

As evident from Figure 3, during the same period full-time year-round participation increased among young men. For instance, between 1998 and 1999 year-round full-time employment went up from 70 to 73.7 percent among all men ages 25 to

[6] When a small temporary drop in women's labor force participation was reported earlier in the decade, one of the explanations given for it was that the lingering recession was creating fewer job opportunities, see U.S. Department of Labor (1992).

[7] It appears that between 1998 and 1999 the percent of women with children under 3 decreased from 28.7 to 27.8 for women ages 25 to 29 and remained at 26.9 for women ages 30 to 34.

29.[8] These employment trends among young men reinforce the conclusion that economic conditions were not discouraging women from participating in the labor force. They also point to a third explanation for the decreased labor force participation among young married women. In part, the current trends in women's labor force participation and attachment were caused by increases in men's earnings. The men married to the young women who are decreasing their labor force attachment have been earning more (not only because they worked more, but also due to their higher wages and salaries). Some young couples seem to have used these additional earnings to finance traditional marriages involving fully employed men and women who either exit the labor force or work part-time.

That married women often work part-time and are employed intermittently is not new. Despite the dramatic changes that occurred in women's employment since the 1960s, throughout this whole period married women's full-time year-round employment rates have been lower than those of men.[9] Men's earnings have been shown to vary inversely with women's hours of work.

The married women who stay away from the labor force or work part-time tend to engage in household production. For instance, in 1985 men spent an average of 15.7 hours per week on housework, while women's weekly average was 30.9 hours (John Robinson and Geoffrey Godbey 1997). Also in 1985, full-time employed married women averaged

[8] Own calculations based on the March CPS.

[9] Unmarried women had employment rates very similar to those of men. In 1998 43.7 percent of married women ages 30 to 34 were employed year-round, whereas the year-round employment rate among men in this age group was 77.5 percent. Even among married women ages 45 to 49, of whom only 3.7 percent had a child under 3 in 1998, year-round employment was low relative to men's year-round employment: 51.3 versus 77.2 percent.

almost 25 hours a week in home-oriented work, in contrast with 12.7 hours among full-time employed married men (Martha Hill 1985).

What seems to have occurred between 1998 and 1999 is that fewer young married women participated in double shifts involving both work at home and in the labor force, and that those who worked a double shift reduced their hours of paid employment. Recent increases in men's earnings financed these moves away from double shifts. This explanation assumes given preferences for various lifestyles, including a given tendency to prefer traditional marriages, and views recent trends as the result of improvements in the ability to finance a preferred lifestyle. Alternatively, young couples may have changed their preferred lifestyle regardless of financial resources. The next explanation assumes that married women never liked the double shift lifestyle, and that they are now more likely to talk themselves out of it.

How much work a couple spends at home or in paid employment can be viewed as part of an explicit or implicit agreement between husbands and wives.[10] They may not have personally negotiated the arrangement and it may be more of an implicit agreement. A similar agreement may have been negotiated by others around them, and they may have followed surrounding lifestyle models.

A desire for comfort is a general preference, a basic value, shared by most men and women of each generation. This desire leads few people to want to engage in a double shift and leads many to want to be married to a double-shifter. Few women have the option of marrying a double-shifter who will share the financial burdens and do most of the work at home. The more men get their way, the more it is likely that women will

[10] See Paula England and George Farkas (1986) and Elizabeth Peters (1986).

accept a lifestyle involving double shift work on their part. The more women get their way, the less women will accept this lifestyle.

Declines in young married women's employment can be explained in terms of younger women's increased ability to negotiate work arrangements suiting women's needs and their consequent decreased willingness to accept double shifts.[11] In turn, today's young women's stronger negotiating position in marriage can be explained by the constant age difference at first marriage and by the small size of the generation born between 1971 and 1975, *the Roe generation* born in the shadow of Roe versus Wade, the ruling that facilitated abortions in the U.S. [12] Given that at marriage men are about two years older than women, rapid declines in births led the number of men interested in marriage to exceed the number of women.

As a result of the typical age difference at marriage (a two-year difference that has remained constant throughout the last fifty years) the women of the Roe generation, currently 25 to 29 years old, are in an advantageous position when dating for marriage. As can be seen in Table 3, there were 112 men for every 100 women in these ages, implying that for every 100 men who found or will find a mate, 12 men ages 26 to 30 in 1999 may possibly be squeezed out of the marriage market (see Table 3).[13] The rapid decrease in

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[11] The hypothesis that marriage squeezes influence willingness to work at home and in the labor force was first presented in David Heer and Grossbard-Shechtman (1981). See also Grossbard-Shechtman and Clive Granger (1998). Others have argued that higher sex ratios encourage marriage and therefore discourage overall labor force participation of women regardless of marital status, e.g. Marcia Guttentag and Paul Secord (1983).

[12] The constant difference in age at dating and marriage is only one of the many resilient features characterizing the dating scene in the U.S. Most men in the U.S. pay for the first date, for example. This custom comes as a surprise to most visitors from Western Europe, where the so-called 'Dutch dating' is widespread and the U.S. norm very rare.

[13] Recognizing the existence of homosexuality does not make much of a difference for this analysis, as long as the percent of homosexuals stays constant over time.

number of births around the time that Roe versus Wade was passed [14]explains why the sex ratio--based on a two-year age difference at marriage--for the Roe generation is so high and why it increased dramatically relative to the preceding Moon generation. As can be seen from Table 3, the Moon generation was also characterized by a marriage squeeze for men, but that marriage squeeze is smaller than that of the Roe generation. With so many men to chose from, young women have been calling the shots. It has become easier for women to negotiate working arrangements in marriage that do not require them to accept a double shift.

Recent trends are particularly striking when compared to the changes that accompanied the coming of age of the large cohorts of women born during the baby boom, especially the baby boom that occurred immediately after the end of World War II.[15] Women born in the years 1946-1950 did not necessarily have different basic values: they may have wanted children and comfort as much as the women who recently entered their first marriage. But when these post war women entered labor markets and marriage markets in the late sixties and seventies they faced low sex ratios for the same reasons that young women in their twenties face high sex ratios today. Post war women faced a sex ratio of 87, i.e. there were 13 extra women for every 100 men two years older, almost the mirror image of the marriage squeeze faced by the men of the Roe generation. Squeezed in marriage markets, post war women accepted double shift arrangements in marriage at an

[14] Some states passed rulings that facilitated abortions shortly before the passage of Roe versus Wade in 1973.

[15] See Grossbard-Shechtman and Granger (1997,1998) and Amanda Bennett (1994). More on work and marriage markets can be found in Grossbard-Shechtman and Shoshana Neuman (1988) and Grossbard-Shechtman and Matthew Neideffer (1997).

unprecedented pace. [16] When the post war women were 25 to 29 years old they experienced a 12 percent increase in labor force participation. [17] This amazing increase mostly occurred among married women, and in most cases it involved married women accepting a double shift. Large numbers of women born in the late forties reluctantly entered the labor force, often working full-time and year-round, while continuing to perform most housekeeping tasks. Later generations of women, the Korean war women and the Sputnik women did not face marriage squeezes comparable to those faced by the post war women (see Table 3). The Korean war and Sputnik generations were also part of the baby-boom, and as a result their sex ratios as calculated in Table 3 are lower than 1. Women continued to be squeezed in marriage markets, and they continued to accept double shift lifestyles. But for them, sex ratios were not as imbalanced, and later baby-boom women did not accept double shifts at the same pace as the post war women. Women's labor force participation and attachment continued to grow, but at a pace much slower than the increases experienced by the post war women.

Marriage squeezes started to be on men when the Kennedy generation came of age and entered labor and marriage markets. But with a sex ratio of about 103, the Kennedy generation did not have to face any dramatic marriage squeezes. By the Moon generation, things got worse for men. But it is not until the coming of age of the Roe generation that we can see the results of dramatic marriage squeezes for men. What we are seeing now is the reversal of the sixties. The extra 12 men of the Roe generation are having an impact on social norms similar to the impact that the 13 extra women had in the sixties, when post

[16] The multi-variate analysis in Grossbard-Shechtman and Granger (1998) shows that this cohort effect can not be explained away by changes in wages or in these women's tendency to have children.

war generations came of age. Roe generation women are finding ways to avoid the double shifts that the post war women felt compelled to accept if they wanted a family. At the same time, all generations of women continue to opt for a simple way of avoiding double shifts: they get married less.

Large marriage squeezes such as the ones faced by the Roe generation are like earthquakes. They affect every aspect of life that is related to relations between the sexes: marriage rates, work arrangements in marriage, and even crime rates. Most criminals are young men. An economic approach to crime considers the decision to engage in crime as the result of a comparison of costs and benefits. When there are so many extra men in markets for dating, mating, and marriage, a criminal record that reduces a man's likelihood of finding a nice mate becomes more of a liability than when there are plenty of extra women eager to find a date, and therefore the costs of crime increase. The benefits of crimes other than rape are not expected to change as a result of marriage squeezes. This explains why the men of the Roe generation seem to have a dramatically lower crime rate than the men of previous generations, especially relative to generations of men born during the baby-boom and unfamiliar with marriage squeezes for men. This explanation accounts for the generational decline in crime documented by Tom Donahue and Steven Levitt (1999) and provides a more convincing explanation than their theory blaming the behavior of generations preceding Roe on large proportions of unwanted children.

Conclusion

An important change has occurred in women's labor force participation: women who recently entered their first marriage are less active in paid employment and less

[17] As shown in Grossbard-Shechtman and Granger (1998), women 25 to 29 had a labor force participation

attached to the labor force. This trend was explained in part as the result of a lifestyle change adopted by the Roe generation, a cohort characterized by rapidly decreasing births and born in the shadow of Roe versus Wade. More women of the Roe generation are finding ways to avoid double shifts, not simply because Roe men have higher earnings. Constant age differences at marriage also allow Roe women to take advantage of their uniquely favorable marriage markets. With 12 extra men for every 100 women, it is easy for Roe women to negotiate lighter work loads in marriage.

The recent decline in young married women's labor force participation is not expected to be of a temporary nature. More than previous generations of women, when dealing with men Roe women can be expected to get things their way. This movement away from double shifts is expected to follow the Roe women, and to a lesser degree the Moon women, throughout their life-cycle. As a result, we can expect these women to have lower labor force participation and attachment throughout their life cycle.

Women's willingness to accept double shifts may soon increase again, however, as the first echo of the baby-boom cohort is coming of age and entering labor and marriage markets. The first echo of the baby-boom born in the years 1976-1980 is expected to experience a balanced marriage market (according to Table 3, this cohort's sex ratio equals 102). As they replace the Roe generation by the end of the coming decade, the women of this first echo generation may find themselves in need of accepting a double shift more frequently than their immediate predecessors, and women's employment may return to its increasing trend.

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rate of 45.2 percent in 1970 and of 57.3 percent in 1975.

Overall labor force participation predictions will depend on effects of marriage squeezes not only on each generation of women's willingness to engage in double shifts, but also on men's. The more lasting the change we are observing for Roe women, and the least they are compensated by increases in Roe men's labor force participation and labor force attachment, the more overall labor markets will be affected, and the stronger will be inflationary pressures accompanying possible labor shortages. The more the Roe generation's lifestyle changes influence subsequent generations not sharing the same marriage squeezes, the larger the expected inflationary pressure. Fears of inflation can be calmed by the thought that Moon and Roe women are relatively small in numbers, but these fears can not be silenced. It is important to continue to watch the variations in women's labor supply and labor demand that are described in this note and to carefully examine the sex ratio hypothesis used to explain some of these variations.

Table 1. Labor Force Participation of Married Women in the U.S.- Ages 20 to 34

Age Group	1990	1995	1998	1999	1999-1998
20-24	65.0	65.1	67.5	66.6	-0.9 (1.4%)
25-29	69.7	70.1	73.6	69.9	-3.7 (5.0%)
30-34	69.6	72.8	72.7	70.7	-2.0 (2.8%)

Source: Current Population Surveys, 1990-1999 (March)

Table 2. Full-Time Year-Round Labor Force Participation of Married Women in the U.S.

Age Group	1990	1995	1998	1999	1999-1998
20-24	33.3	29.3	33.3	32.1	-1.2 (3.6%)
25-29	39	44.2	45.4	43.6	-1.8 (4.0%)
30-34	38.3	43	43.7	42.9	-0.8 (1.8%)

Table 3. Thirteen Generations and their Sex Ratios (United States, 1916-1980)[18]

Year of Birth	Midpoint Year	Generation Name	Sex Ratio (SR)[19]
1916-1920	1918	World War I	.949
1921-1925	1923	Early Twenties	.927
1926-1930	1928	Pre-Depression	.98
1931-1935	1933	Depression	1.00
1936-1940	1938	New Deal	.943
1941-1945	1943	World War II	.907
1946-1950	1948	Post WW II	.874
1951-1955	1953	Korean War	.948
1956-1960	1958	Sputnik	.971
1961-1965	1963	Kennedy	1.027
1966-1970	1968	Moon	1.06
1971-1975	1973	Roe	1.12
1976-1980	1978	First Echo	1.02

[18] Copyright: Shoshana Grossbard-Shechtman, SDSU, October 1999. Source: Census data from 1940 to 1990.

[19] Ratio of men age 22 to 26 to women age 20 to 24 or men age 27 to 31 to women age 25 to 29 calculated based on Census data. The age group depends on the Census year. Sex ratios for last two generations were calculated based on the 1990 Census using younger age groups.

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Figure 1. Percent in labor force, all (MFLF) and full-time year round (FMYR), married women ages 25-29

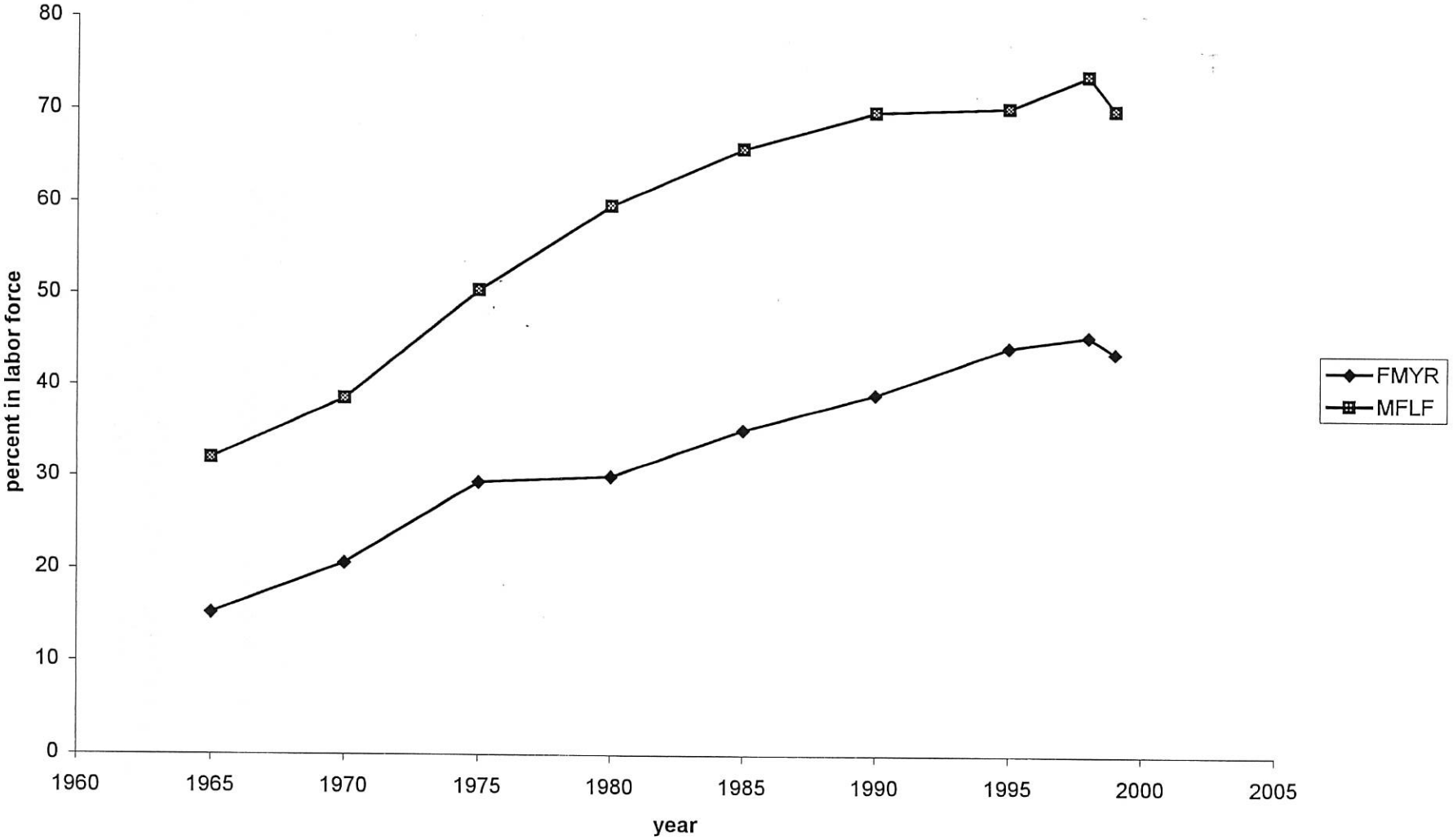


Figure 2. Percent in labor force, all (MFLF) and full-time year round (FMYR), married women ages 30-34

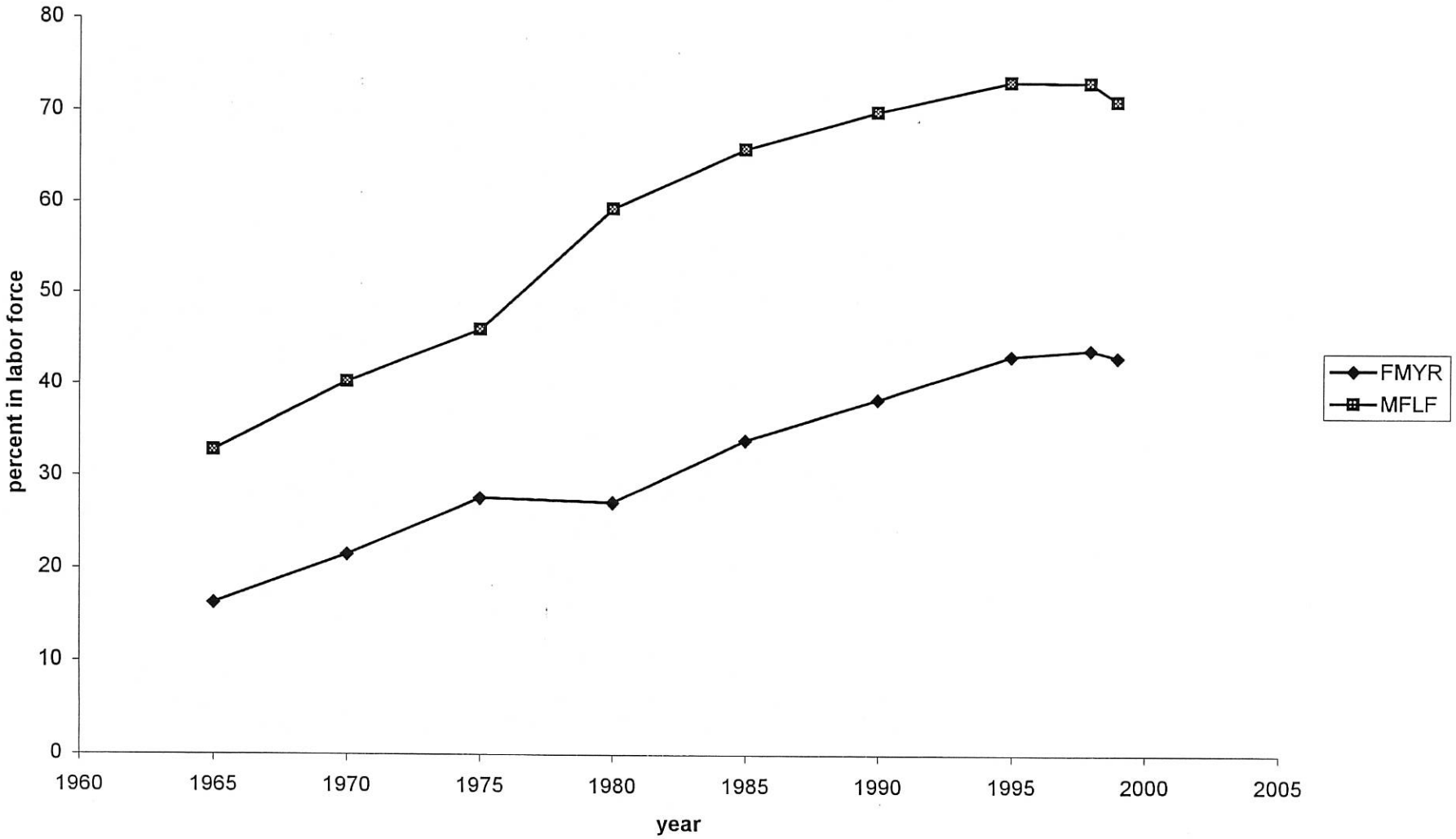
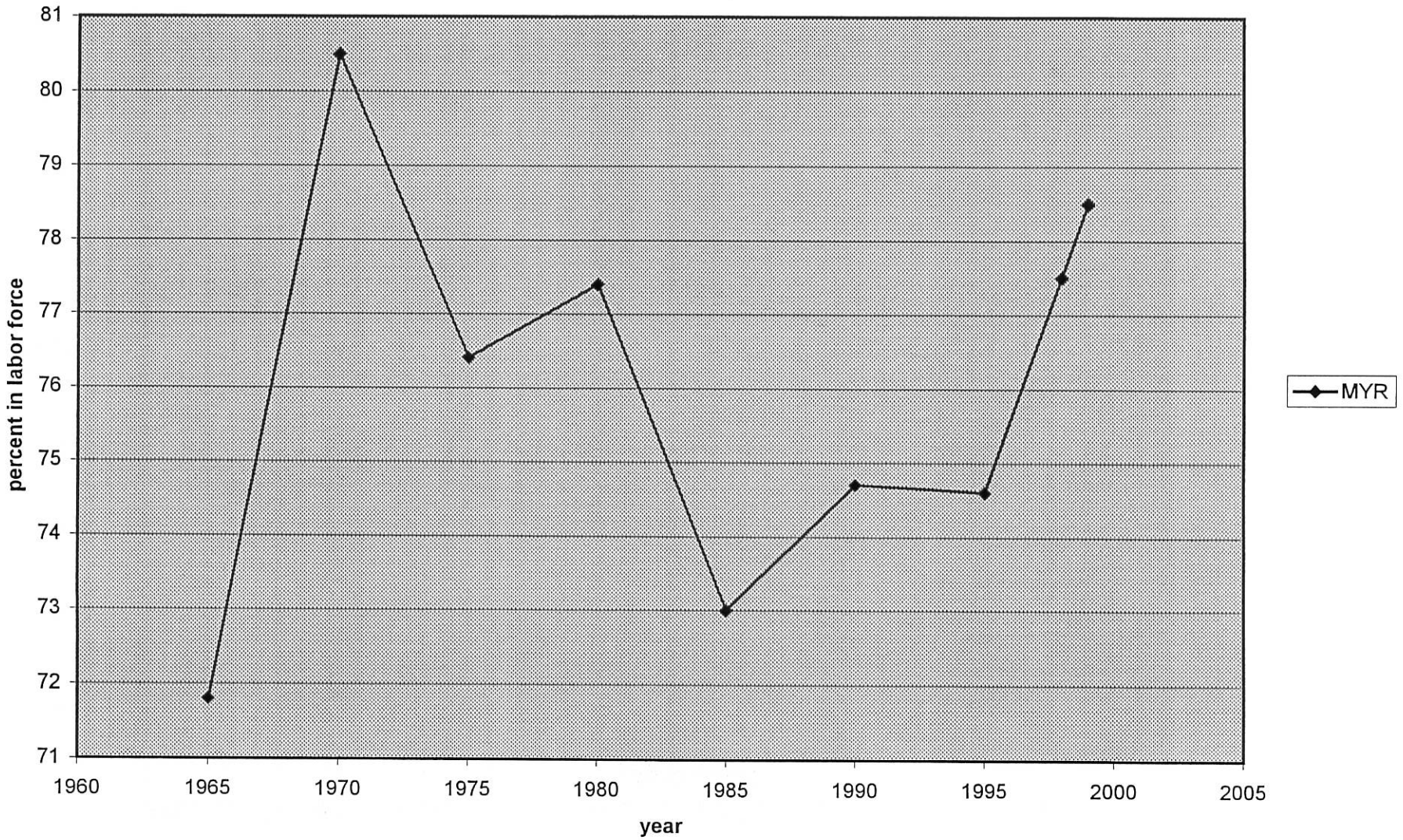


Figure 3. Percent in labor force full-time year round, men ages 30-34



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Marriage Market Imbalances and Trends in Women's Labor Supply in the U.S.

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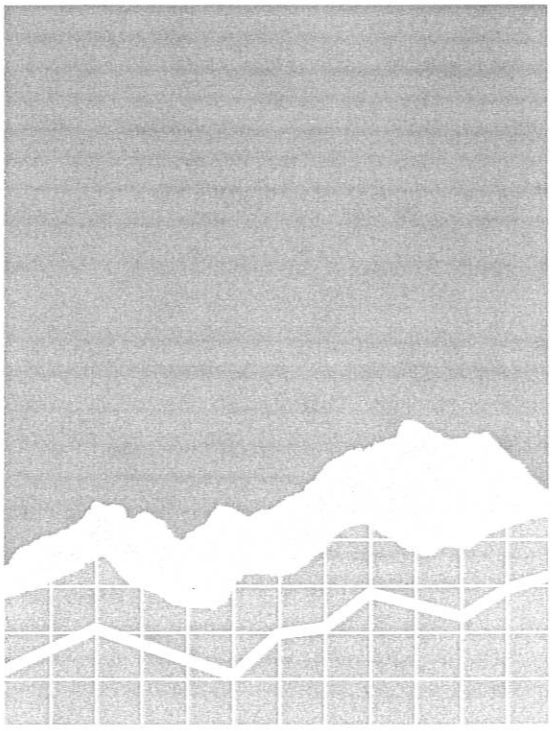

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Marriage Market Imbalances and Trends in Women's Labor Supply in the U.S.

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ABSTRACT

The dramatic increase in women's labor force participation in the 1970s and the slow increases and small decreases observed recently are partially explained by changes in marriage market imbalances. When the sex ratio—the ratio of men to women participating in the same marriage market—is larger than one, marriage market imbalances favor the women who are in excess demand. The opposite is true when the sex ratio is smaller than one. The size and direction of marriage market imbalances vary with cohort size, given that men's average age at marriage exceeds that of women. An empirical study of 5-year age groups based on recent data indicates that women belonging to cohorts facing higher sex ratios have experienced slower growth in labor force participation and attachment relative to women who experienced marriage market imbalances favoring men.

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1. Introduction

In the U.S. women's rate of labor force participation has been increasing for most of the last 100 years. [1] This upward trend has varied over time and across age groups. Extraordinarily rapid growth in women's labor force participation occurred between 1965 and 1980. Consider the case of women ages 25 to 29, for instance. From 1965 to 1980 their labor force participation increased from 39 percent to 67 percent: for fifteen years this participation grew at an average of almost 2 percent a year. Since 1980, women's labor force participation has grown at a much slower pace, especially among younger groups. For example, the labor force participation of women ages 25 to 29 increased from 67 percent in 1980 to 77 percent in 1999, an average yearly growth of only .5 percent.

The rapid growth in women's labor force participation in the late 1960s and 1970s was in part the result of another unique historical phenomenon: the baby-boom that occurred mostly after World War II (see the French study by Deville (1977), U.S. studies by Heer and Grossbard-Shechtman (1981) and Guttentag and Secord (1983), and a Canadian study by Kempeneers (1991)). In the U.S. the baby-boom is usually defined as the years 1946-1964, years characterized by unusually high numbers of births.

Grossbard-Shechtman and Granger (1998) have shown that the cohorts experiencing the fastest growth in labor force participation are not necessarily the large cohorts that are conventionally defined as the baby-boom. If we define *growing cohorts* as generations larger than the generation preceding them, and categorize generations in five-year age groups, in the U.S. 'growing cohorts' par excellence are the generations born right after World War II, in the years 1946-1950. This is the beginning of the conventionally defined baby-boom. The generations born between 1950 and 1960, cohorts that are also conventionally considered as part of the baby-boom, were large in size but grew at a slow rate and irregularly and therefore do not belong in the 'growing cohorts' category. [2]

It is not common knowledge that in the U.S. some of the cohorts born prior to the conventionally defined baby-boom in fact are 'growing cohorts'. 'Growing cohorts' started with the five-year cohort born in the years 1936-1940, a group that I call the New Deal generation (see Table 1). This cohort is relatively small compared to later cohorts, but it grew at a fast rate as fertility regained when the U.S. started coming out of the Great Depression. Growing cohorts

also include those born in the first years of World War II, and by implication, the five-year age group called World War II in Table 1.

Pooled time-series analysis for the years 1965-1990 revealed that women born in growing cohorts experienced faster increases in labor force participation than women born in cohorts that were either stable in size or shrinking (Grossbard-Shechtman and Granger 1997). Taking account of a time trend, auto-correlation, fertility, wages, and Gross National Product, it was shown that 'born in a growing cohort' explained a large part of the variation in women's labor force participation over this period. This finding is consistent with Pencavel's (1998) finding that in the U.S. generational differences in labor force participation account for considerable variation in labor force participation over time after one controls for other variables typically included in economic models of labor supply.

That women born in growing cohorts experience faster growth in labor force participation follows from models of allocation of time that take account of marriage market conditions, such as Grossbard-Shechtman (1984, 2000) and Chiappori, Fortin and Lacroix (1998). Given that husbands tend to be older than their wives, and that the average difference in age at marriage varies little over time, women born in growing cohorts face unfavorable marriage market conditions: when these women reach marriageable age, the number of women actively participating in marriage markets exceeds the number of (slightly) older men participating in the same markets, i.e. the sex ratio is less than one. This leads to favorable marriage market conditions for men. In contrast, when women born in a shrinking cohort reach marriageable age, the number of older men actively participating in marriage markets exceeds the number of younger women, i.e. the sex ratio of marriageables exceeds one. This leads to favorable marriage market conditions for women.

This paper follows the same methodology as Grossbard-Shechtman and Granger (1998). Data were obtained for five-year age groups every five years. This paper expands that previous work (1) by testing for sex ratio effects not only with models including dummies such as 'growing cohort', but also with models including a cohort's sex ratio measured as a continuous variable; (2) by using not only published data on age-specific labor force participation, but also labor force participation rates calculated directly from the Current Population Surveys, thereby allowing a separation between married and unmarried women; (3) by including data for ten more years and

one more age group (the cohorts included in this study were born between 1921 and 1980, a 60-year range); and (4) by including controls for educational achievement.

The statistical analysis confirms the major finding of Grossbard-Shechtman and Granger (1998): women born in 'growing cohorts' (such as the baby-boom women born right after World War II) experienced faster growth in participation in paid work than women belonging to cohorts of a size similar to that of preceding cohorts, whereas women born in shrinking cohorts (such as the women born after the passage of Roe versus Wade) experienced slower growth in participation in paid work relative to women born during periods of relative stability in the number of births.

This paper also reports a statistically robust negative relationship between rate of change in sex ratio across successive generations and growth in women's labor force participation. Generations of women faced with growing sex ratios have entered the labor force at a slower pace and generations of women faced with shrinking sex ratios have entered the labor force at a faster pace. The effects of changes in sex ratio and growing/shrinking cohort dummies on women's labor force participation are of an important magnitude relatively to the effect of economic variables, such as wages and income, and the effects of time trend, marital status, education, and fertility.

This analysis leads to the prediction that further slowdowns in the rate of growth in women's labor force participation can be expected in the near future. The favorable marriage market available to women belonging to shrinking cohorts are expected to continue to cause relatively slow growth and possible declines in the labor force participation of women in these cohorts. It is also predicted that with the coming of age of the echo generation, women's labor force participation may grow faster again.

First, this paper reviews explanations of labor supply.

2. Explanations of Women's labor supply

Explanations of labor supply can be classified as wage/income (or economic) explanations, cultural/attitudinal explanations, and demographic explanations. Wage/income explanations have been used principally by economists and cultural explanations are more common in the writings of sociologists on women's labor supply.

Wage/Income Explanations. According to Jacob Mincer (1962), higher wages had been a

major reason why women were attracted to join the labor force prior to 1960. Mincer solved a puzzle that had confounded labor economists at the time: time series results showed that women's labor force participation and wages were growing in the same direction, in apparent contradiction to findings of a negative association between wages on women's labor force participation based on cross-sectional data. Mincer resolved this puzzle by separating the effects of male and female wages: what explained women's entry into the labor force in time series were increases in women's wages and what accounted for the negative association between wages and women's labor force participation in cross-sections were the effects of male wages.[3]

While this wage/income explanation has held for earlier periods, its effectiveness in explaining recent trends in labor force participation seems limited. A number of studies have indicated that in recent years women's wages and their labor force participation have not been moving in the same direction. Rosen (1992) pointed out that the labor force participation of women increased greatly during the 1970's, when women's wages were stagnant or declining. Leibowitz and Klerman (1995) have shown that for the entire period 1971-1990, women's full-time real earnings opportunities decreased while the participation of women in the labor force was increasing dramatically.

Whereas Mincer's (1962) early time series suggested that increases in women's labor force participation were associated less with changes in men's wages than with changes in women's wages, the recent study by Leibowitz and Klerman (1995) based on cross-sections from various years of the Current Population Survey found that decreases in men's real earning opportunities and fluctuations in unemployment helped explain a larger portion of the increase in married mothers' employment between 1971 and 1990 than increases in female wages. According to Pencavel (1998), variation in male and female wages account for less than half of the observed changes in women's labor force participation.

Cultural Explanations. Partially encouraged by the decrease in the explanatory power of wage/income variables, scholars—especially those trained in sociology--have turned towards cultural explanations focused on changes in attitudes towards work and family. They have explained positive trends in women's labor force participation as an indication of our culture's increased receptiveness to women's labor force participation. However, as pointed out by Oppenheimer (1994), it is very difficult to establish whether attitudinal changes cause changes in

behavior or vice-versa. Furthermore, this explanation is of limited use in recent years when the unexplained time trend in women's labor force participation has been negative.

Education is another factor that is known to affect women's labor force participation. Previous studies have found that the rise in women's labor force participation was associated with increased levels of education, e.g. Huet (1977), Shapiro and Shaw (1983), Smith and Ward (1984), Mincer (1985), Goldin (1990), and Leibowitz and Klerman (1995). However, even if one could document that women's education and labor force participation vary over time in the same direction this does not necessarily indicate a causal relationship: women expecting to participate more in the labor force are more likely to invest in their own education.

Demographic Explanations. Previous studies have also explained trends in women's labor force participation in terms of demographic variables such as number and age of children, age, marital status, race and cohort. The growth of women's labor force participation over time has been attributed in part to decreases in fertility, e.g. by Mincer (1962), Deville (1977), Eckert (1983), Smith and Ward (1984), Mincer (1985), Goldin (1990), Rosen (1992), and Leibowitz and Klerman (1995). Here too, causality can go either way. Not only is it possible that lower fertility explained increases in women's labor supply, but higher labor force participation may have caused lower fertility. Labor supply and fertility may also be related spuriously due to the effect of other variables on both labor supply and fertility, as mentioned e.g. by Deville (1977) and Lehrer and Nerlove (1986).

It is well-known that married women are more likely to participate in the labor force than unmarried women. Here too, it is possible that to some degree marital status and labor force participation are determined simultaneously (see Johnson and Skinner 1986, Grossbard-Shechtman and Keeley 1993).

The demographic explanation for fluctuations in labor force participation that is the major focus of this paper is an explanation based on fluctuations in sex ratios.

3. Fluctuations in Sex Ratios, Growing Cohorts, and Shrinking Cohorts

It is predicted that the higher a cohort's sex ratio, the less the women born in that cohort are likely to be active in the paid labor force. This prediction follows from three possible arguments all based on the recognition that high sex ratios, i.e. high proportions of men to women in markets for dating and marriage, imply excess demand for women and excess supply of men.

Therefore, women will benefit from more favorable marriage market conditions when sex ratios are high. Conversely, low sex ratios imply unfavorable marriage market conditions for women.

The first argument states that favorable marriage market conditions for women are positively related to the proportion of women who are married (see Henry 1975). Women's labor force participation will be lower the higher the proportion of women who are married and therefore sex ratios and women's labor supply are inversely related (see Guttentag and Secord 1983, Ferber and Berg 1991, and Blau, Ferber and Winkler1998). The second argument recognizes that women entering favorable markets for dating and marriage are more likely to marry high-income men than women participating in marriage markets with lower sex ratios. Married women are likely to work less when their husbands earn more and therefore sex ratios and women's labor supply are inversely related.

The third argument is based on a marriage market analysis. It claims that the bargaining power of women in marriage is a function of the sex ratio in the relevant market for dating and marriage (Grossbard-Shechtman 1984, Grossbard-Shechtman and Neuman 1988, McElroy 1991, Chiappori, Fortin, and Lacroix 1998). Married women with more bargaining power are more likely to get their husbands to support them financially and thereby to avoid paid work. A number of cross-sectional analyses have reported that married women are more likely to supply labor when sex ratios are higher than average. This sex ratio effect was found in a cross-section analysis of individual women living in U.S. cities in 1990 (Grossbard-Shechtman and Matthew Neideffer 1997) and in 1988 (Chiappori, Fortin and Lacroix 1998), and a comparison of city aggregates for the U.S. in 1930 and 1980 (Grossbard-Shechtman 1993).

In principle, econometric studies could test the prediction that sex ratios are inversely related to women's labor force participation and separate between these three arguments by controlling for marital status and husband's income. In practice, this is not so simple since women who are single may anticipate favorable conditions in marriage and behave similarly to married women. The limited power of a marital-status explanation is evident from Pencavel's (1998) study indicating cohort effects on the labor force participation of both married and unmarried women. It is also difficult to get good measurements of income and therefore the last two arguments may be difficult to separate empirically.

Instead of testing for an association between labor supply and sex ratios, one can also test

for an association between labor supply and the root of variations in sex ratios in a time series study: cohort size variations. It is predicted that women born in growing cohorts will participate in the labor force more than predicted otherwise, and that the opposite will be the case with women born in shrinking cohorts. However, the association between growing/shrinking cohort and women's labor supply can also be predicted from a relative income theory in the tradition of Richard Easterlin's (1980). According to Easterlin's theory, growing cohorts such as baby-boomers face income opportunities that are bad relatively to the income opportunities their parents experienced when they were growing up. As a result of the ensuing low incomes of baby-boom men, couples marry less and have fewer children and wives have a higher labor force participation. This explanation can be separated from a marriage market explanation if the sex ratio and growing/shrinking cohort dummies continue to influence labor supply after controls for men's income, marital status, and fertility.

A first look. The cohorts included in this study were born between 1921 and 1980, a 60-year range and were organized by five-year age groups. A simple definition of sex ratio was used: number of men two years older divided by number of women. The use of five-year age groups has the advantage of recognizing that people substitute between various adjacent age groups, although it is granted that the cutting point is arbitrary.[4] As can be seen from Table 1, the sex ratio of five-year birth cohorts born over this 60-year range fluctuated dramatically from a minimum of .87 for the women born right after World War II to a maximum of 1.12 for the women born around the passage of Roe versus Wade, a landmark ruling that led the number of abortions to increase dramatically in the United States. Roe vs. Wade passed in 1973, but many states—including New York and California—legalized abortions right before that (see Donohue and Levitt 1999). Of all the generations of women in Table 1 the Post World War baby boom women thus experienced the least favorable marriage market conditions and the Roe generation the most favorable conditions.

If a causal link ties sex ratios and women's labor supply it follows that the Post World War II generation women should have experienced the fastest growth in labor supply whereas the Roe women should have experienced the slowest growth. Table 1 associates a generation's sex ratio with changes in women's labor force participation at ages when women are most likely to have young children and perhaps some may prefer to work less in the labor force: ages 25-34.

Table 1 reports side by side a five-year age cohort's sex ratio at age 20-24 or 25-29 and changes in labor force participation—relative to the previous cohort--observed when this cohort was 25-29 or 30-34 years old. The data on overall labor force participation are based on publications by the Bureau of Labor Statistics (BLS) and unpublished data provided by the BLS and the data on married labor force participation were extracted from individuals surveyed in the March Population Surveys using files prepared by Unicon Research Corporation (1999).

Women born in the late 1940s indeed experienced the fastest increases in labor force participation. The most dramatic increases were observed for Post WW II women who were ages 25-29 between 1970 and 1975 and ages 30-34 between 1975 and 1980. In 1970, women age 25-29 were part of the World War II generation, a generation with a sex ratio of .91. Its labor force participation stood at 45%. Five years later, this age group consisted of women from the Post War baby boom, a cohort with a sex ratio of .87. This group of women participated in the labor force at a rate of 57.3%, an increase of 12.1 % relative to the World War II cohort! This increase principally occurred among married women, and is noticeable when Post WW II women were ages 25-29 and ages 30-34 (when married women of the Post WW II generation experienced an amazing 13.3 % in labor force participation relative to the World War II women when they were that age).

The women of the Roe generation appear to have a sex ratio as favorable as the sex ratio that characterized post World War II women was unfavorable : in each case a shortage of about 12/100 people of the other gender.[5] Whether the missing women of Roe are having an impact as dramatic as that of the missing men of the Post World War generation is hard to tell at the time of this writing. Most Roe generation women are still too young to have experienced dramatic changes in labor supply: the Roe women born between 1971 and 1975 are turning 25-29 in 2000, and the single-year cohort that experienced the largest decrease in births, the people born in 1974 right after the passage of Roe vs. Wade in 1973, are turning 26 in 2000. That is young for the purpose at hand, given that women's labor supply varies most among married women with young children and that on average women in the U.S. marry around age 26 and have their first child around age 30. Most Roe women are thus not old enough to have experienced the benefits of a favorable market for dating and marriage. Therefore, the data in Table 1 can not possibly present an accurate picture of how sex ratios will really affect the labor supply of the Roe generation

women.

Nevertheless, it can be seen from Table 1 that the shrinking generations of women born after 1960 have experienced slower increases in the labor force participation than their predecessors born in growing cohorts. In contrast to earlier cohorts of women, at ages 25-34 these women did not experience any yearly percentage increases in labor force participation larger than 1%. Not only that, but these cohorts have experienced some decreases in the labor force participation of married women. Based on my calculations, extractions from individual CPS records, and extrapolations of changes between 1995 and 1999, I have found that married women ages 30-34 in 2000 and belonging to the Moon generation are experiencing a 2.6% decline in labor force participation relative to their predecessors of the Kennedy generation. We will have to wait 5 years to see what the Roe generation women will do if they are married while in their early thirties. Meanwhile, we can observe the Roe generation women at ages 25-29. While their overall labor force participation rates have not decreased, women of the Roe generation seem to have experienced a slight decrease in labor force participation to the extent that they are married.

Table 1 solely analyzes five-year age groups and actual or extrapolated changes over a five-year period. In fact, a comparison of the latest CPS data from 1998 and 1999 indicates that the married women of the Roe generation are experiencing rapid declines in labor force participation. Between 1998 and 1999 married women ages 25-29 experienced an unusually large decrease in labor force participation: from 73.6% in the labor force in 1998 to 69.9% in 1999 (see Grossbard-Shechtman 2000). This is occurring precisely when the women born in 1974, right after Roe vs. Wade, entered this age group. This cohort of women presumably benefits from a particularly high sex ratio as some of the men born prior to the passage of Roe vs. Wade may be competing for some of the women conceived after the landmark ruling. The high bargaining power of young women in markets for dating and marriage may also explain the imported finding reported by Donohue and Levitt (1999): that young men born around the passage of Roe versus Wade are less inclined to engage in crime. It is not simply that these relatively scarce women are demanding that men work to support them at home, it is also that they are asking for men who make a living in a honest manner.[6]

Table 1 thus shows that without controls for other variables, there is a negative association between increases in women's labor force participation and sex ratios: when sex ratios

are low, women's labor force participation grows faster, and when sex ratios are high women's labor force participation grows at a slower pace and labor force participation among married women even decreases in some instances. Table 2 shows that it is not simply the size of the sex ratio that matters, but also whether the sex ratio grows or shrinks, in turn a function of whether a generation grows or shrinks.

Table 2 presents definitions and means for the variables used in this study, including the two dependent variables: changes in women's labor force participation and married women's labor force participation. It also reports the rate of growth of the sex ratio. Means and standard deviations are presented for the entire sample of 42 five-year age/year groups and for the following subsamples: the PRE GROWING cohorts born in the years 1926-30 and 1931-1936 which replaced earlier cohorts born in 1921-25 and 1926-1931 (cohorts 1 through 4 in Table 1); the GROWING COHORTS of 1936-1940, 1941-1945 and 1946-1950 which respectively replaced women of cohorts 1931-35, 1936-40, and 1941-45 (cohorts 5 through 7 in Table 1); the FIFTIES cohorts born in the years 1951-1955 and 1956-1960, i.e. cohorts 8 and 9 in Table 1; the SHRINKING COHORTS (cohorts 10 to 12) born between 1960 and 1975. For the most recent cohort, the ECHO COHORT born in 1976-80, there is only one observation.

It can be seen that these groups differ in the direction of change in sex ratios, indicating that they are indeed growing or shrinking cohorts. The sex ratio grew most of this time, in accordance with the overall trend of declining births, except for the unusual case of the growing cohorts born between 1936 and 1950, and of the echo generation born to the baby-boomers. [10] It can also be seen that all the cohort groups experienced increases in women's labor force participation that were smaller than the average for all cohorts, except for the cohorts labeled 'growing cohorts' and the echo cohort. A quick look at Table 2 also suggests that explanations for this phenomenon based on factors other than marriage market considerations may have limited power: the generations that experienced the fastest growth in labor force participation are not distinguishable in terms of rate of growth in marriage rates, trends in male and female wages, total fertility, childlessness rates, or education. In particular, variations in the proportion of women who are married can not possibly account for much of the change in women's labor force participation. This is not only true because we see that married women's labor force participation varied at least as much with sex ratio factors as did overall labor force participation of women,

but also because changes in the percent of women who are married in a given age group have not varied much by birth cohort. Women born earlier in the century experienced very slow growth in marriage rates. For all subsequent cohorts the proportion of women who are married has been decreasing and the rate at which this proportion decreased was accelerating.

But these are simply impressions. I now turn to a test for partial effects of sex ratios and shrinking/growing cohort dummies on growth in women's labor force participation.

4. Empirical Study: Methods

Model. The principal measure of labor supply studied in this paper is labor force participation. Let p be the likelihood that an individual participates in the labor force. Individual women (or men) decide on participation in the labor force based on a comparison between their value of time outside the labor force, and the wage they can obtain in the labor force. A rational woman will participate in the labor force if $w_f > w^*$, (1)

where w_f is the woman's wage and w^* is her value of time outside the labor force, her reservation wage.

When modeling a reservation wage equation, most economists posit that reservation wage is a function of household income, fertility, and any other characteristics affecting household productivity. In addition, following Grossbard-Shechtman and Neuman (1988) marriage market factors—in this case sex ratio measures--are included as a variable explaining reservation wage The reservation wage equation is

$$w^* = \beta_o + \beta_{w_m} w_m + \beta_F F + \beta_{SR} SR + \beta_M M + \varphi X + \varepsilon \qquad (2)$$

where w_m is male wages, F is fertility, SR is sex ratio, M is married status, and X is a vector of other variables influencing w^*.[6] It is predicted that β_{w_m} and β_f are positive and that the coefficient of sex ratio is negative. Equation 2 considers the partial effect of sex ratio, separating it from the effects of income, fertility, etc. Sex ratios may also have indirect effects on value of time *via* effects on marriage probability, fertility, husband's wage (women in favorable marriage markets are likely to marry husbands with higher wages) and other characteristics of the husband. By including these other variables in the model, we may weaken the association between sex ratio and reservation wage. Also, the association between sex ratio and labor force participation may

not be linear, and birth cohort may matter for other reasons as well, so we also estimate regressions including cohort dummies rather than a continuous sex ratio variable based on cohort.

The likelihood of labor force participation (labor force participation) is a function of w (own wage), of the variables influencing reservation wage found on the right-hand side of Equation 2, and of variables related to both wage and reservation wage, such as education. Variables will affect labor force participation in the direction opposite to that of their effect on reservation wage.

Data. This model is applicable to individual observations or to grouped observations. Our observations were aggregated by five-year age groups and obtained every five years starting with 1965. Most of the data were obtained from published sources, the data on labor force participation for all women in a particular age/year group obtained from the Bureau of Labor Statistics. The sources for all the variables are mentioned in the notes to Tables 1 and 2.

As explained above, each birth cohort with a particular sex ratio measured using a fixed age difference between men and women (two years, the average age difference at first marriage.) More specifically, sex ratios were defined as the total numbers of men two years older divided by the total number of women two years younger. It was assumed that the marriage market conditions which influence labor force participation over a life-time are those women face when they are in their twenties and most likely to enter a first marriage. Given that our data are five-year cohorts and that sex ratios were calculated with census data, we could not calculate sex ratios at the same age for all five-year cohorts. For all five-year year/age observations (ranging between ages 20 and 49) the sex ratio was defined for the time at which women were in their twenties. Depending on the age/year group, women were either 20-24 or 25-29 and men were either 22-26 or 27-31.

An aggregated labor force participation function P was defined for time t and age group i:

$$P_{ti} = c_0 + c_1 \log w_{fti} + c_2 \log w_{mti} + c_3 \log F_{ti} + c_4 \log SR_{ti} + c_5 \log M_{ti} + c_6 \log E_{ti} + c_7 t + c_8 t^2 + e_t, \quad (3)$$

where E is education. The continuous variables wages and fertility are presented in logarithmic form and a trend factor t and its square were added.[9] The time trend controls for period-varying factors other than the ones included in the model. For instance the time trend could capture the effect of exogeneous attitudinal change or government policies such as Affirmative Action.

Equation 3 is differentiated with respect to time in order to reduce the effect of some of the unmeasured factors that influence residual correlations. This leads to the following equation

$$\frac{\partial P_{ti}}{\partial t} = \tau_0 + \tau_1 \frac{\dot{w}_{fti}}{w_{fti}} + \tau_2 \frac{\dot{w}_{mit}}{w_{mti}} + \tau_3 \frac{\dot{F}_{ti}}{F_{ti}} + \tau_4 \frac{\dot{SR}_{ti}}{SR_{ti}} + \tau_5 \frac{\dot{M}_{ti}}{M_{ti}} + \tau_6 \frac{\dot{E}}{E} + \tau_7 t + u_{tl} \qquad (4)$$

where $\dot{w}_f / w_f$ etc. are rates of growth. Given that many of the variables are not truly exogenous to women's labor force participation decisions—as is the case with wages and fertility--reduced forms excluding some of these variables were also estimated. Most of the models also include lagged values of the dependent variable. We approximate the dependent variable in equation 4 by the change in women's rate of labor force participation over a five-year period.

5. Results from the Multivariate Analysis.

Tables 3 and 4 report some of the models that were estimated. Table 3 reports models estimating the participation of all women in the labor force, and is based on data published by the BLS. Table 4 estimates the participation of married women in the labor force and is based on data extracted from the CPS. When all age/year groups are included, the sample size is 42.

Labor Force Participation of Women--Married and Unmarried. It can be seen from Table 3A (model 1) than when only four variables are included--a time trend, a lag term, male wages and childlessness--the adjusted R-square of the regression is .63. The time trend and the childlessness factors are the only significant variables.[8] It can be seen from model 2 that by adding the sex ratio term to model 1, the explanatory power increases. As predicted, the continuous sex ratio term is strongly negative. Model 3 indicates that the association between women's labor force participation and sex ratio is non-linear. After a certain point, further increases in sex ratio do not draw more women into the labor force.[9] Model 4 is a reduced form model excluding childlessness. It can be seen that the sex ratio continues to matter in this model as well.

The table also reports a number of models that examine the association between changes in women's labor force participation and the absolute level of the sex ratio. Model 5 suggests a weak positive association between a sex ratio lower than 95 and women's labor force participation. However, if the sex ratio is higher than 105, this does not seem to discourage overall participation of women in the labor force. It can be seen from Model 6 that if the growth rate in fertility is also included in this regression, a sex ratio lower than 95 has a significantly

negative effect on women's labor force participation.

It was mentioned earlier that the negative association between sex ratios and women's labor force participation can possibly be due to the effect of marriage rates: when sex ratios are lower fewer women marry and therefore more women are in the labor force. Model 7 presents a model similar to Model 2 that also contains the growth rate in percent women who are married. That variable does not seem to matter. Other models not reported here were estimated, including education, female wages and GNP among the explanatory variables. These variables were not significant in regressions of women's labor force participation.

In an earlier paper it was shown that growth in percent married was positively associated with change in women's labor force participation. Apparently, this changed between 1995 and 2000, as is apparent from Model 8 restricted to the period 1970-1995 (Table 3B). The fertility rate was also strongly negative using that sample. The coefficient of growth rate in sex ratio was even larger (in absolute value) than it is in models covering the entire period. Finally, model 9 presents results for the earlier period after the continuous sex ratio variable is replaced with two sex ratio dummies. Women from low sex ratio generations participated significantly less in the labor force in the years 1970-1995, even after control for percent married. This indicates that an explanation for the observed association between sex ratio and women's labor force participation has to follow a channel other than effects of sex ratio on marriage rates, the explanation offered by Ferber and Berg (1991).

Labor Force Participation of Married Women. The same conclusion also follows from Table 4, which presents regressions of married women's labor force participation. These data were extracted from individual Current Population Survey (CPS) records for the years 1965-1999. Given that the dependent variable is a change in participation, the sample covers the years 1970-2000, where values for 2000 were extrapolated from the latest data available. As data for years preceding 1965 were not accessible, estimating models with a lag of the dependent variable implies limiting the sample to the years 1975-2000 and losing some of the most important years from the point of view of changes in women's labor force participation in the United States. Consequently, models were estimated twice: once with a lag and once without.

The first five models in Table 4A do not include a lag of married women's labor force participation. Model 1 shows that without sex ratio variables the adjusted R-square is .68. The

equivalent model with a lag, Model 6 in Table 4B, indicates an adjusted R-square of .74. Models 2 and 7 add the rate of growth in sex ratio to these baseline models. It can be seen that whether lags are included or not, this sex ratio variable has a negative coefficient and is statistically significant.

Models 3 and 8 indicate that again, this association between growth in sex ratio and change in married women's labor force participation is not linear, and is found more when sex ratios increase or decrease by small percentages. The last models in each set of models have replaced the sex ratio variable with two dummies for unusually high or unusually low sex ratios. It can be seen that in most of the specifications reported in Models 4,5,9, and 10, there was a negative effect of high sex ratio as well as a positive effect of low sex ratio. A comparison of Models 9 and 10 explains why the quadratic term mattered in Model 8: a sex ratio less than 95 men per 100 women has more effect on married women's labor force participation than a sex ratio of less than 90 men per 100 women (the case of the women born between 1946 and 1950, i.e. the Post WW II generation of women).

Table 5 thus confirms that it is married women's labor force participation that varies the most with sex ratios, and this seems to be occurring more so in recent years, as the women from generations experiencing shortages of women have entered markets for dating and jobs. Apparently, these baby-bust women are not staying home unless they have a good situation at home and a good reason to stay away from the labor force. A more technical reason for the stronger effects of sex ratio on married women's labor force participation than on overall women's LFP is that most unmarried women are in the labor force all along. Therefore, growth in women's labor force participation can occur mostly among married women.

What about the effect of other variables? The negative time trend can possibly reflect the natural limit to increases in women's labor force participation. This negative time trend is also observed in Table 4 reporting results for married women. In the U.S. in the last decade, the labor force participation of married women ages hovers around 70%, rarely getting much higher than that. Why would the natural limit be so low?

The reported models also included the rate of growth in male wage. Other models were estimated including the rate of growth in female wages, but that variable never added to a regression's explanatory power. This is not surprising, given that women's wages are endogeneous

and a function of changes in the supply of labor. Furthermore, changes in female wages are strongly correlated with changes in male wages. Many of our models indicate that male wage had a strongly negative effect on women's labor force participation, evidence of an income effect.[10] This indicates that Easterlin's explanation of cohort effects on women's labor force participation is of limited use here. Another reason that cohort size may matter according to Easterlin is cohort size's effect on fertility. Again, the results reported here indicate that sex ratios matter independently of fertility effects.

In the past, sex ratio effects on women's labor force participation have been discounted by scholars who believe that the factor that really matters is educational achievement (see Strober 1995). Many specifications were tried, but education never seemed to make much of a difference in this empirical study of women's labor force behavior, at least not in the manner that it was measured here: in terms of changes in percent of women who graduated from college.

6. Conclusions

The sex ratio effects on women's labor force participation that were reported here appear to be mostly the result of sex ratio effects on the labor force participation of married women. It is possible that marriage market imbalances favoring men--of the kind experienced by baby-boom women--reduce the average husband's willingness to be financially responsible for his wife and increase the average wife's need for financial independence. Conversely, younger cohorts of women who are experiencing favorable marriage market conditions appear to be less inclined to join the labor force. The magnitudes involved are not trivial.

Model 1 indicates that a 10% increase in the rate of growth of the sex ratio causes the labor force participation rate of married women to drop 1.5 % according to Table 4. This implies that a 10% increase in the sex ratio such as a change from .90 to .99 could lead to a decrease in labor force participation of 1.5 percentage points, let us say from 75% of women in the labor force to 73.5 % of women in the labor force. This effect is not trivial. The 1946-50 birth cohort (the Post WW II generation) experienced a rate of decrease in sex ratio of 4% over 5 years. The model implies that the direct impact of such decrease in sex ratio accounts for an increase of .75 % in labor force participation. The women born in 1971-75 (the Roe generation) experienced an increase in sex ratio at a rate of 6 % over 5 years. This implies a decrease of .9 % in the labor force participation of the married women of that generation. In addition, there may be indirect

effects via the lagged impact on labor force participation five years later or via other variables.

This analysis highlights the importance of marriage market imbalances in explaining women's labor force participation. It also shows the limitations of two alternative sets of explanations for changes in women's labor force participation that are usually relied upon when explaining labor supply: cultural/attitudinal explanations and wage/income explanations. It can be seen from the models reported here that rate of change in sex ratio mattered more than rate of change in men's wages when it comes to explaining women's labor supply. Economic variables may have explained past trends in women's labor force participation well. But when the period 1965-2000 is analyzed and cohort-related factors are taken into account, one of the major economic variables--women's wage--appears to have no effect on women's labor force participation. At the same time, our findings indicate large negative coefficients of male wages: as men's wages have declined, women's labor force participation has increased. [11] Male wage effects on female labor force participation seem to have become more important in recent years.

These findings carry implications for economic forecasting and public policy. The equations we estimated can be used to predict future rates of participation of women in the labor force. Based on estimates reported in Grossbard-Shechtman and Granger (1997) it was predicted that between 1995 and 2000 the participation in the labor force of women age 25-29 would decrease by 2%. In fact, the women who are in this age group today, the Roe generation women, have experienced a decrease in labor force participation. Extrapolating from 1999 data, I estimate this decrease to be -.25 %. Recent increases in men's wages may also have contributed to the small decrease that was observed. The models predict that as long as women benefiting from strong marriage markets are filling the age groups associated with family formaton, more reductions in labor force participation of women are likely to occur.

A possible drop in women's labor force participation could create economic problems. It may cause higher wages, especially for educated women who may experience the largest increases in reservation wage. In turn, higher wages are inflationary. However, this analysis does not take account of changes in public assistance policies. The discontinuation of welfare programs such as AFDC has brought women into the labor force, and is expected to do so more in the future, as temporary benefits to welfare mothers expire. The demographic trends causing the predicted decrease in cohort size and labor force participation rates for young women can facilitate the

conversion of welfare recipients into labor force participants, especially since many of the current welfare recipients belong precisely to the birth cohorts of women experiencing favorable marriage market conditions.

These results demonstrate the importance of a variable overlooked by most studies of women's labor force participation: the sex ratio, i.e. the ratio of men to women in marriage markets. Sex ratios vary over time due to the mutual tendency of younger women and older men to marry each other. Cohorts of women who experienced the fastest growth in sex ratio experienced the smallest increase in labor force participation. In contrast, growing cohorts that experienced declining sex ratios, experienced the fastest growth in women's labor force participation.

There is much room for further work. Measures of all the variables that were used could be improved, including measures of sex ratios and labor supply. Other measures of labor supply could be examined. More sophisticated methods of estimation could be applied. More research is needed for the U.S. and other countries. It is hoped that future work will engage in much needed research in this area.

It is also hoped that this paper will help people realize that marriage markets matter, and not only when one is interested in marriage. This confirms other research on marriage markets and labor markets, some of which is reported in Grossbard-Shechtman and Neuman (not dated).

Notes

1. An exception to this continuous rise occurred during the years immediately following World War II. This experience is common to many Western countries (Mincer 1985) including Canada (Ciuriak and Sims 1980) and France (Deville 1977, Huet 1977, Riboud, 1985).

[2] See Grossbard-Shechtman and Granger (1997) for a detailed explanation as to why the five-year cohorts born in the fifties were not growing cohorts.

[3] The age differential between men and women is likely to respond to marriage squeezes (see Bergstrom and Lam, 1989) and to vary with other factors, such as the existence of polygamy (Grossbard-Shechtman, 1993). Men's average age at marriage always exceeds women's, but the differential varies across countries. In the U the average age differential has stood at around two years in the last decades, indicating little response to variations in marriage squeeze.

[4] Mincer's theory opened many eyes to the importance of individual opportunities and incomes of husbands and wives and became one of the main building blocks of the New Home Economics

(see Grossbard-Shechtman 2000).

[5] It is hoped that future work will introduce more sophisticated calculations of sex ratio, such as the ones developed by Goldman et al. (1984) and Wood (1995).

[6] It should be noted, however, that the 1990 Census is the latest one available and that the sex ratio for the Roe generation reflects conditions in markets for dating and marriage less adequately than sex ratio measures for older generations. For the Roe generation I calculated the number of men ages 17-21 to the number of women ages 15-19.

[7] It is also possible that the passage of the welfare reform in 1996 has increased incentives for a traditional division of labor in marriage.

[8] The childlessness of women ages 45-49 was assumed to be the same as that of women ages 40-44 in every single year. When women ages 45-49 were dropped from the sample, results were very similar.

9. Grossbard-Shechtman and Granger (1997) also found such non-linearities for the period 1970-1995. They also tested for non-linearities in age and time, but did not find any.

10. We also experimented with GNP as a variable. We found a strong correlation between the rate of growth in men's wages and in GNP and dropped one of these variables from the model.

11. It is not clear what is cause and effect. Are women encouraged to enter the labor force when their husband's earn less, or are increases in women's labor force participation causing men's wages to drop?

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Table 1. Generations of Women, Sex Ratios, and Changes in Labor Supply (United States)

Generation	Year of Birth	Generation Name	Sex Ratio[1]	Change in LFP[2] 25-29	Change married LFP, 25-29[3]	Change married LFP, 30-34[3]
1	1916-1920	World War I	.949	n.a.	n.a.	n.a.
2	1921-1925	Early 20	.927	n.a.	n.a.	n.a
3	1926-1930	Pre-Depression	.98	n.a.	n.a.	n.a
4	1931-1935	Depression	1.00	n.a.	n.a.	n.a.
5	1936-1940	New Deal	.943	3.3	n.a.	9.0
6	1941-1945	World War II	.907	6.3	4.5	5.7
7	1946-1950	Post WW II	.874	12.1	11.9	13.3
8	1951-1955	Korean War	.948	9.4	9.0	6.4
9	1956-1960	Sputnik	.971	4.7	6.3	4.0
10	1961-1965	Kennedy	1.027	2.4	3.9	3.0
11	1966-1970	Moon	1.06	1.1	5.0	-2.6
12	1971-1975	Roe	1.12	2.5	-.25	n.a.
13	1976-1980	First Echo	1.02	n.a.	n.a	n.a.

[1] Ratio of men age 22 to 26 to women age 20 to 24 or men age 27 to 31 to women age 25 to 29 calculated based on Census data from 1940 to 1990. The age group depends on the Census year. Sex ratios for last two generations were calculated based on the 1990 Census using younger age groups.

[2] Labor force participation (LFP) rate, including part-time and intermittent employment. Data provided by Bureau of Labor Statistics (data for 2000 extrapolated from 1999).

[3] Calculated from Current Population Survey years 1965-2000 (data for 2000 extrapolated from 1999).

Table 2. Definition and Means (Standard Deviations in Parentheses) for Five-Year Age Groups, 1970-2000, by Cohort Group

	DEFINITION	ALL COHORTS		EARLY COHORTS		GROWING COHORTS		50'S		SHRINKING COHORTS		ECHO COHORT
Cohort	See Table 1	**1-13**		**1-4**		**5-7**		**8-9**		**10-12**		**13**
FLFP [1]	Change in rate of women's labor force participation (LFP) over 5-year period	4.5	(3.3)	4.03	(1.88)	7.4	(2.6)	3.8	(2.9)	1.11	(1.42)	3.6
MFP	Change in rate of LFP of married women	5.1	(3.9)	6.46	(3.3)	7.8	(3.1)	4.5	(3.1)	.94	(2.42)	1.9
Married [2]	Rate of growth in percent of women who are married	-.048	(.05)	.008	(.06)	-.04	(.03)	-.06	(.05)	-.07	(.05)	-.14
Male Wage [3]	Rate of growth in real male wage during 5-year period by age	.01	(.08)	.105	(.07)	.02	(.07)	-.04	(.05)	-.03	(.07)	.11
Female Wage [3]	Rate of growth in real female wage during 5-year period by age	.04	(.07)	.08	(.08)	.07	(.06)	0	(.05)	0	(.05)	.09
Total Fertility [4]	Rate of growth of total fertility by age	-.02	(.25)	-.37	(.04)	.02	(.35)	.13	(.23)	.03	(.08)	.01
Childless [2]	Rate of growth in percent of childless women by age	.08	(.21)	-.17	(.06)	.21	(.25)	.12	(.12)	0	(.06)	-.11
Education [5]	Rate of growth in percent of women with a college degree by age	.18	(.12)`	.15	(.11)	.26	(.11)	.14	(.11)	.13	(.08)	-.08
Sex Ratio [6]	Rate of growth in ratio of number of men two years older over number of women (see Table 1)	.01	(.05)	.025	(.03)	-.043	(.01)	.06	(.03)	.05	(.01)	-.09
	Number of age/year observations.	42		6		15		11		9		1
	Years for which changes in FLFP were observed.	1970-2000		1970-1980		1970-1995		1970-2000		1985-2000		2000

Sources: 1. Unpublished data based on Current Population Surveys. Nationally aggregated statistics were provided by the Bureau of Labor Statistics; 2.Statistical Abstract of the United States. Not available for ages 45-49; ; 3 Bureau of Labor Statistics: Employment and Earnings; 4.Statistical Abstracts; data for 1993 from Health, United States. Data for 2000 Extrapolated; 5.Current Population Reports, Population Characteristics, P20, n158, n207, n295, n415, n462, n476. Data for 2000 extrapolated from 1998 data; 6 U.S. Bureau of the Census 1943, 1953, 1963, 1973, 1983, 1993.

Table 3A. Regression of Changes in Women's Labor Force Participation
U.S. Women 20-49, 1965-2000 ($N = 42$)

Explanatory Variables	Models						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sex Ratio	–	-21.65** (3.65)	-27.10** (4.43)	-33.31** (4.93)	–	–	-22.00** (3.64)
Sex Ratio Less Than 95	–	–	–	–	1.39 (1.65)	1.85* (2.10)	–
Sex Ratio More Than 105	–	–	–	–	-.54 (.49)	-.91 (.83)	–
Time	-.19** (5.14)	-.17** (5.07)	-.18** (5.71)	-.17** (4.67)	-.17** (4.52)	-.10 (1.54)	-.13** (2.56)
Lagged Participation	.17 (1.33)	.21* (1.93)	.16 (1.45)	.12** (2.54)	.07 (.51)	.09 (.66)	.25* (2.09)
Male Wage	-.77 (.16)	-4.68 (1.05)	-6.51 (1.52)	-9.70* (2.01)	-3.04 (.60)	-4.30 (.85)	-4.63 (.93)
Total Fertility	–	–	–	–	–	-3.58 (1.53)	-1.90 (.88)
Childless	6.96** (4.18)	5.28** (3.43)	5.21** (3.57)	–	5.45** (2.91)	6.28** (3.28)	5.91** (3.40)
Married[1]	–	–	–	–	–	–	-1.01 (.16)
Sex Ratio Squared	–	–	287.33* (2.27)	–	–	–	–
Constant	19.39	17.55	18.38	17.28	17.88	10.94	14.30
Adjusted *R*-squared	.63	.72	.75	.67	.64	.66	.72

*Notes: t-statistics in parentheses; * significant at p > .05; ** significant at p> .01*

1. *Growth rates*
2. *Data prior to 1965 were not available. These regressions only cover the period 1975-2000*

Table 3B. Regression of Changes in Women's Labor Force Participation, Excluding 2000 U.S. Women 20-49, 1965-1999 ($N = 36$)

Explanatory Variables	Models	
	(8)	(9)
Sex Ratio	-27.03** (5.57)	–
Sex Ratio Less Than 95	–	1.90* (2.56)
Sex Ratio More Than 105	–	-.73 (.58)
Time	-.27** (5.78)	-.26** (3.91)
Lagged Participation	.40** (4.60)	.18 (1.43)
Male Wage	-29.68** (5.76)	-25.22** (3.75)
Total Fertility	-4.79* (2.71)	-4.16 (1.78)
Childless	5.09** (4.05)	5.52** (3.25)
Married[1]	17.45** (5.21)	14.91* (2.05)
Constant	25.61	24.57
Adjusted *R*-squared	.86	.76

*Notes: t-statistics in parentheses; * significant at p > .05; ** significant at p > .01*

1. *Growth rates*
2. *Data prior to 1965 were not available. These regressions only cover the period 1975-2000*

Table 4A. Regressions of Change in the Labor Force Participation of Married Women U.S., 1965-2000, Women Age 20-49 $N = 42$

Explanatory Variable	Models				
	(1)	(2)	(3)	(4)	(5)
Sex Ratio	-	-15.0* (2.10)	-21.55** (2.88)	-	-
Sex Ratio Less Than 90	-		-	-	2.23* (2.13)
Sex Ratio Less Than 95	-		-	1.57 (1.91)	-
Sex Ratio More Than 105	-	-	-	-1.91 (1.72)	-2.35* (2.19)
Time	-.305** (8.27)	-.29** (8.14)	-.300** (8.71)	-.25** (6.62)	-.27** (7.20)
Lagged Participation	-	.37** (4.10)	-	-	-
Male Wages	-8.90 (1.80)	-12.14* (2.44)	-13.20* (2.76)	-9.49* (2.07)	-9.04* (2.00)
Childless	6.53* (3.77)	5.52* (3.19)	5.10** (3.07)	3.91 (.049)	3.83* (2.05)
Sex Ratio Square	-	-	324.06* (2.15)	-	-
Constant	30.62	29.81	29.76	25.95	27.45
Adjusted R^2	.68	.71	.74	.73	.74

*Notes: t-statistics in parentheses; * significant at $p > .05$; ** significant at $p > .01$*

Table 4B. Regressions of Change in the Labor Force Participation of Married Women/ Models Including Lags
U.S., 1970-2000, Women Age 20-49 $N = 36$

Explanatory Variable	**Models**				
	(6)	(7)	(8)	(9)	(10)
Sex Ratio	-	-14.79** (2.12)	-23.15** (3.66)	-	-
Sex Ratio Less Than 90	-		-	-	1.20 (1.14)
Sex Ratio Less Than 95	-		-	2.45** (3.50)	-
Sex Ratio More Than 105	-	-	-	-2.08** (2.43)	-2.52** (2.55)
Time	-.35** (7.32)	-.31** (6.41)	-.33** (8.09)	-.31** (8.00)	-.31** (6.89)
Lagged Participation	-.20 (1.69)	.12 (1.00)	-.20* (-1.96)	-.37* (3.69)	-.24* (2.09)
Male Wages	-6.55 (1.29)	-10.31** (2.01)	-12.35* (2.83)	-9.30** (2.30)	-7.91 (1.68)
Childless	9.31** (5.38)	8.33** (4.88)	8.16** (5.67)	5.65* (3.52)	7.23** (3.71)
Constant	35.14	31.67	33.13	32.06	32.63
Adjusted R^2	.74	.77	.84	.84	.79

*Notes: t-statistics in parentheses; * significant at $p > .05$; ** significant at $p > .01$*

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