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

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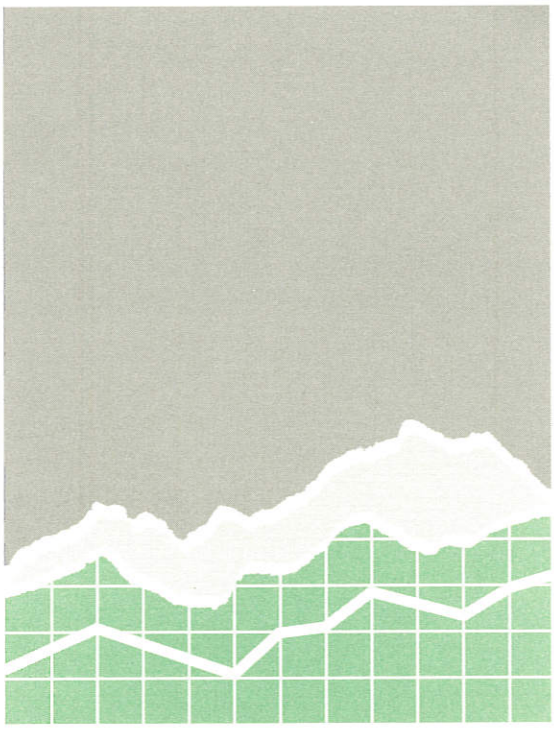

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ABSTRACT

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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I thank C.W.J. Granger for suggesting the statistical model applied in this paper. The help of Thomas Nardone from the Bureau of Labor Statistics, and the research assistance of Louie Cruz, Chris Harris, and Sharon Joseph are gratefully acknowledged. I also benefited from comments by Jacob Mincer and participants at the Journees d'Economie Appliquee held in Laval University, Quebec, June 2000. The financial contributions of San Diego State University and the University of California in San Diego and the dactylographic skills of Michael Bacci are also appreciated.

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

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

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

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

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,

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.

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

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

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

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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 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 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 $p > .01$*

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