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CHAPTER SIX

Revisiting Labor Supply Effects of Sex Ratio, Income, and Wage. Effects of marriage-related Laws.

In Chapter IV testable implications TU1, TU2 and TU3 dealing with income effects on labor supply were presented in the context of a macro model with one type of man and one type of woman. I now reexamine these implications in a micro context, assuming that there are many types of substitutable individuals, and derive further testable implications regarding income effects on labor supply. I also revisit TU4 on wage effects, TU5 on cross-wage effects and implications regarding sex ratio effects analyzed in chapter IV using a macro model. This chapter follows the micro model presented in Chapter III.

INCOME EFFECTS

Revisiting previously stated implications regarding income effects on Time Use (TU). Implication TU1 carries over to the case of multiple types of men and women: it is always necessary to consider individual rather than household income when studying labor supply and other outcomes.

TU2 stated that if gender roles are traditional and all non-wage incomes change by the same proportion, these changes are likely to have different effects on men and women's labor supply. Generalizing the applicability of TU2 to the case of multiple types of men and women is more complex. Some individuals who were well-matched before income changes may no longer be so after income changes, given that they have the option of divorcing and re-matching with spouses who better suit their new circumstances. For example, they may have new levels of WiHo demanded or supplied at new equilibrium WiHo prices. It is still true that employment levels, wages and value of WiHo are all determined simultaneously in interrelated markets for labor and WiHo, but now there are multiple WiHo markets.

The availability of multiple types of men and women implies that when incomes change there is not as much need for adjustment to accommodate spouses as was the case when there was only one type of spouse. To the extent that women are more likely to make adjustments than men this implies fewer gender differences in the effect of income in the micro case than in the macro case.

As for implication TU3 about effects of household income on value of time, in the macro model (Chapter IV) representative men and women were indifferent between being in or out of the labor force and between being in or out of marriage. Still assuming traditional gender roles, in a micro model the diversity in types of men and women may lead some types of individuals into the labor force while others may opt out; some couples may consist of dual earners, and others not. The proportion of men or women in the labor force in a particular h_{ij} market will depend on demand and supply of WiHo in that market, the ensuing price for WiHo and the reservation wage that is a function of WiHo prices (see equations 3.4 defined for type *i* and 3.6 defined for type *j*).

All income effects will depend on where the supply lies in case of income effects on demand (for a spouse's WiHo) or where the demand lies in case of income effects on own WiHo's supply. The flatter the demand, the less a supply shift affects WiHo price, reservation wage and labor supply. The flatter the supply, the less a demand shift affects WiHo price, reservation wage and labor supply. With

multiple markets for WiHo it is much more likely to find diversity in the flatness of demands and supplies, corresponding to diversity in elasticity of demand or supply for different WiHo submarkets.

It was shown in Chapter V that rigidity in the price of WiHo can prevent prices from moving up or down, thus affecting income effects on hours spent in WiHo and labor. Such rigidity may not affect all sub-markets for WiHo equally. If it does not—for example, because social norms imposing such rigidity vary across social classes--when incomes rise reservation wages may rise more in some markets than in others, and income effects on value of time and labor supply will vary accordingly.

New insights about income effects on labor supply. Adapting Grossbard-Shechtman and Shoshana Neuman (1988) let us consider a married woman who receives a monetary transfer from her husband

$k(X) \cdot I$,

where I is a vector of income from sources other than her work that includes spouse's income, and k the proportion of that income that the individual has access to. Transfers from the spouse to the individual may take the form of monetary transfers, access to credit or in-kind transfers with monetary value. Proportion k is a function of factors X.

The following equation states that such transfers are compensations for WiHo. Spouses who benefit from WiHo pay for it out of their income, especially if the WiHo worker does not participate in the labor force.

6.1 $y(X)\, h = k(X)\, I$,

where y is the price of WiHo and h are hours of WiHo supplied by the WiHo worker in the household (the wife in a traditional household).[1] In the context of a traditional household equation 6.1 states that the wife's earnings from supplying WiHo are a proportion k of the household's income, including husband's earnings in the labor market. The price of WiHo is a function of the factors X that influence the equilibrium price in the market in which this WiHo worker participates. Likewise, the proportion k of I that is transferred to the WiHo worker is a function of these factors X.

Factors X include factors that possibly affect demand and supply of WiHo in the market in which this couple participates. To capture the diversity of marriage markets, it is better to add subscripts for a particular type of man j and a particular type of woman i, implying

6.1' $y_{ij}(X)h_{ij} = k_{ij}(X_{ij})I_{ij}$

Assuming traditional gender roles and women performing WiHo, the higher price y, the higher k and the higher the proportion of a husband's income transferred to the wife. It is assumed that income is also a function of the characteristics of both members of the couple. Furthermore, a spouse's personal earnings may be influenced by desire for income and productivity, and both may be a function of spouse's characteristics (see Grossbard-Shechtman 1993, Chapters 12-13). More generally, not thinking only in the context of traditional gender roles, it follows that

Testable implication TU15. The higher a WiHo worker's price y, the higher k and the more household income (other than WiHo worker's own income) affects the labor supply of a WiHo worker. *Any factor associated with higher market value of WiHo workers is expected to also be associated with more sizeable negative household income effects on the WiHo workers' labor supply.*

[1] I called this function the *MARRIAGE MARKET CONDITIONED HOUSEHOLD INCOME* effect in Grossbard-Shechtman (2005).

Evidence. We don't have data on WiHo prices. However, there are many comparisons we can make across markets for WiHo and indications that individual WiHo workers belonging to some groups get higher WiHo prices than others. If there is discrimination against black women in WiHo markets (see chapter V) it is expected that the price of their WiHo will be lower than that of white women who are otherwise similar, and controlling for spouse's characteristics. It follows that we can expect more sizeable income effects on white married women's labor supply than on that of black women. One of the studies that documented that husband's income has a more sizeable effect on white wives' labor supply than on that of black wives is Evelyn Lehrer (1992).

Many more predictions regarding differential income effects on WiHo workers' labor supply could possibly be derived. In Grossbard-Shechtman and Keeley (1993) we explored some of the jointness in income effects on labor supply and divorce.

WAGE EFFECTS

Wage elasticity of labor supply and WiHo price. In addition to the wage effects implications TU4 and TU5 derived in Chapter V, the following implication can be derived from a micro-analysis framework that assumes many types of individuals and continues to assume traditional gender roles.

Testable implication TU16: *the larger the positive correlation between WiHo price y and wage w in a group of women, the lower the observed elasticity of labor supply*. Factors that influence WiHo prices, such as racial or ethnic origin, will not only cause shifts in the constant term in labor supply regressions, but will also influence the slope of labor supply curves and wage elasticities. The previous literature has explained such racial or ethnic differences in slope in terms of cultural differences or discrimination in labor markets; it did not recognize that conditions in marriage markets can influence the elasticity of labor supply.

Consider the example of two ethnic or racial groups. Figure 6.1 reproduces Figure 4.1, but now it represents the supply of labor of women from two different groups. Two women, one from each group, initially have identical opportunities in both the labor market (w_0) and the (marriage) market for WiHo (y_0). They have the same true supply, for constant levels of y, denoted by S, but all we observe is the labor supply that is based on correlations between w and y. We also observe two other women, one from each group, who have a higher wage, w_1.

Fig. 6.1 Labor supply elasticity for two groups of women.

The *observed* elasticity of labor supply, based on a cross-section, depends on the correlation between w and y within each group. If w and y are not correlated the *observed* elasticity is also the *true* elasticity. However, if w and y are positively correlated, for instance due to unmeasured ability leading to higher wages and WiHo prices, an increase in wage from w_0 to w_1 implies simultaneously a movement along the supply curve (keeping y constant) and a leftward shift of the supply curve (due to the higher y associated with a higher w, which leads to a substitution effect and an income effect away from work in light of equation 5.1). The observed elasticity--that of the 'envelope supply' linking the relevant points on both true supply curves--will then be lower than the true elasticity. If the correlation between w and y is negative, the opposite will be the case: the observed elasticity will be larger than the true elasticity.

Evidence. Gronau (1981) found that in Israel the labor force participation of Jewish women of Asian-African (AA) origin was more sensitive to changes in wage (actual or potential) than that of European-American (EA) women. He explained AA women's higher observed elasticity of labor supply in terms of this group giving more weight to pecuniary rewards than their EA counterparts. Alternatively, the different elasticities could be interpreted as evidence for implication TU16. There may be less of a positive correlation between y and w for AA women than for EA women due to less

traditional gender roles among the Jews from Europe and America who were more exposed to modern ideas (Stricter adherence to traditional gender roles among Asian-African Jews has been documented, for instance by Yogev and Ayalon (1982)). In contrast, EA women may have more opportunities to balance work in the labor force and family obligations. If relative to similar EA women talented AA women are more likely to solely work at WiHo and not outside the home, there will be a lower correlation between *w* and *y* for AA than for EA Jewish women. That can account for the difference in observed elasticity reported by Gronau. It is possible that a more positive correlation between women's w and y goes together with a lower proportion of all individuals in a particular group being married. AA Jewish men's higher demand for traditional WiHo would entail both more women solely engaging in WiHo and a less positive correlation between *w* and *y* than would be found for EA Jews.

Applying the same reasoning to blacks and whites in the U.S.A. this prediction can help us explain a finding reported by Francine Blau and Lawrence Kahn (2007). They estimated labor supply functions for black and white married women in 2000 and found that for black married women own wage elasticities were in the .08-.18 range, in contrast to .36-.41 for white married women. TU16 explains differences in observed wage elasticities of women's labor supply in terms of the correlation between *w* and *y* for women who supply WiHo in each group. The larger the demand for WiHo by men in a particular group, the more women's specialization in WiHo is likely to occur and the less w and y are likely to be positively correlated. Marriage and couple formation have been less prevalent among blacks than among whites in the U.S. White women have better opportunities for specializing in WiHo and getting a high *y* for such work than is the case with black women. This implies that relative to talented black women talented white women are more likely to choose between a high *w* and a high *y*. In contrast, talented black women are more likely to simultaneously obtain both a high *w* and a high *y* than talented white women. Therefore one expects more of a positive correlation between *w* and unobserved *y* in a cross-section of black women than in one of white women. This could explain why the observed wage elasticity for black married women (including effects of wages via unobserved *y*'s and correlations between these *y*'s and wages) is lower than for white married women (with unobserved *y*'s and correlations between these *y*'s and wages that differ from those of black women).

More on cross-wage elasticity

In Chapter IV I derived prediction TU5 based on the assumption that there is one representative man and one representative woman. When there are many types of individuals, wages affect the demand for different types of potential spouses differentially.

TU5 predicted a negative cross-wage elasticity of labor supply due to income and substitution effects of wage on the demand for (potential) spouses' WiHo. That effect depends on the elasticity of those spouses' supplies of WiHo. The less elastic, the larger the effect on the reservation wage and the more labor supply is likely to be affected. This implies that we are more likely to observe negative cross wage effects on the labor supply of individuals when supplies of WiHo are closer to vertical. These are individuals in markets with high reservation wages and low likelihood of participation in the labor force. It is more likely to hold for women's WiHo markets than for men's, given that many more women appear to choose not to participate in the labor force. So I expect that negative cross-wage elasticities are more likely to be observed for women's labor supply than for men's labor supply. If, relative to men, women have higher cross-wage elasticities of labor supply the absolute value of their cross-wage elasticities of WiHo will be smaller than that of men.

Evidence. Bloemen and Stancanelli (2014) found that men's hours of household production were more sensitive to their wife's wage than women's hours of household production were to their husband's wage, which suggests that men are on a flatter portion of their WiHo supply than women.

More on sex ratio effects

Chapter IV based on the macro model presented testable implications TU6 and TU7 stating that sex ratios and women's labor supply will be inversely related whereas the opposite is true for men's labor supply. With many types of men and women the analysis of sex ratio effects is more complex. The representative individual in the macro model is indifferent between being married or not. In contrast, when there are many markets for WiHo sex ratios would ideally have to be calculated in each of these markets. The sex ratio in a particular market will affect not only equilibrium price and quantity in that market but also in all the markets for WiHo that are interrelated to that market due to potential substitution between different types of men and women. In this chapter I only discuss sex ratio effects on women's labor supply by marital status and by education.

Sex ratio and marital status. *Testable implication TU6'*. Within each marital status category sex ratios are expected to matter. In particular: *relative to situations of low sex ratios or balanced marriage markets, high sex ratios are expected to be associated with less labor force participation by married women*. Given the larger variation in labor force participation among married women relative to that among unmarried women, and given that the theory focuses on the effect of sex ratio on price of WiHo, it is expected that sex ratios will have more impact on married women's labor supply than on that of unmarried women who mostly participate in the labor force and work full-time. However, sex ratios may also have an impact on the labor supply of unmarried women, given that they often prepare themselves for supplying WiHo to a spouse or that they may receive some post-marriage income from WiHo after dissolution through divorce or death.

Implication TU6 and TU6' have been tested using variation across geographical regions and across birth cohorts. The disadvantage of cross-sectional studies is that they make it difficult to distinguish between two alternative causalities: did sex ratios respond to differences in employment opportunities via migration, or are sex ratios causing differences in employment? Cities with higher sex ratios may have attracted men due to better jobs for men; cities with lower sex ratios may have better jobs for women. Luckily for researchers, this migration-related reverse causality does not apply to cohort comparisons: people don't choose when to be born; they are stuck in their birth cohorts.

Sex ratios vary across cohorts, as has been pointed out at least since Glick *et al.* (1963) and Henry (1975), because (1) on average, women marry men who are generally somewhat older and the age difference does not fluctuate much, and (2) the number of births fluctuates from one birth cohort to the next. For example, in the early 1950s there were more marriageable men than women in many Western countries as a result of declining numbers of births during the Depression that occurred in the late 1920s and early 1930s. Conversely, in the mid-1960s, when the first Post World War II baby-boomers reached marriageable age, baby-boom women in the United States and other countries with similar demographic trends experienced low sex ratios.

Thirty-five years of testing for sex ratio effects on labor supply. Around 1979, when the late sociologist David Heer and I both worked at the Population Research Lab at U.S.C. (the University of Southern California) it dawned on me that there may be a negative association between sex ratios and women's labor supply. David had shown me some dramatic demographic and economic changes that had occurred between 1960 and 1975 right after I had heard a talk on sex ratio fluctuations by cohort. This led to Heer and Grossbard-Shechtman (1981), which includes a market for women's WiHo

(which I then called a market for wives and that is very similar to the market for wife-services in my first publication, Grossbard (1976)). We calculated sex ratios by dividing the number of men ages 19.5 to 26.49 by the number of women ages 17 to 23.99, i.e. using a difference in age at marriage of 2.5 years, which was typical for the period we covered, 1955 to 1975. We compared trends in sex ratio to trends in women's labor force participation and found that in the late sixties and early seventies sex ratios for young women had gone down rapidly, as large numbers of women born after the war found relatively few marriageable men a bit older and born during the war. For example, this sex ratio went down from 1.002 in 1956 to 0.885 in 1965. This means that in 1956 the sex ratio was balanced but 9 years later, in 1965, there were 11 missing men for every 100 women ages 17 to 23.99. We also found that from 1960 to 1975 labor force participation rates of married women ages 20-24 *rose from 31.7 percent to 57.0 percent* , implying that unprecedented growth in young married women's labor force participation was accompanied by dramatic drops in sex ratio.

In the late 1970s it was not possible to run regression analyses of women's labor force participation by marital status and as a function of sex ratios: detailed data on labor force participation by age and marital status only became available on a yearly basis after the introduction of the Current Population Survey in 1965. I had to wait for more cohorts to be old enough to enter labor and marriage markets in order to seriously test whether fluctuations in sex ratio helped explain further changes in women's economic activity. In the meanwhile I at trends beyond the two points in time that Heer and I had examined: 1960 and 1975. In Grossbard-Shechtman (1985) I compared time trends in sex ratio based on Heer and Grossbard-Shechtman with trends in percent of women employed at ages 25-34, as reproduced in Figure 6.2. It can be seen that the plunge in sex ratio corresponds broadly to the time that young women's employment rose. More precisely the upsurge in employment started in 1963, about the time the sex ratio fell below 1.0. The graphs also show that in the late 1970s and early 1980s the sex ratio started to increase and women's employment surge stopped.

[Figure 6.2 here]

The rapid rise in employment between 1965 and 1975 can't possibly be explained in terms of higher wages. On the contrary, it occurred "despite a significant slowing of the growth in real wages and dramatic acceleration of the rate of inflation. In fact, between 1973 and 1975, real wages fell in two successive years, yet women's labor force participation continued to grow" (Niemi and Lloyd 1980).

In line with TU6 I had predicted that with rising sex ratios for cohorts born in later baby-boom years and during the baby-bust there would be a slow-down in the entry of women into the labor force. By the 1990s enough data had accumulated to do a more rigorous study of time series. Clive Granger, who later obtained the 2003 Nobel prize in economics for his work on time series, advised me on the econometrics. Based on data for 1965-1990 and controlling for other factors that changed over time Grossbard-Shechtman and Granger (1998) showed that women born in cohorts with lower sex ratios experienced more rapid growth in labor supply. We discovered that women born in the late 1930s (after the New Deal and before feminism became popular) also experienced large increases in participation in the labor force. Sex ratio analysis helps explain that: those born during the New Deal were also a 'baby-boom' generation, although at a smaller scale than was the case with the post-World-War II baby-boom.

By the mid-2000s it was possible to analyze employment data for the period 1965-2005, thereby capturing major fluctuations in sex ratio due to the sequence of baby-bust, baby-boom, baby-bust that followed the baby-boom, and echo of the Post World War II baby boom. In Grossbard and Amuedo-Dorantes (2007) we calculated sex ratios from Census data for 5-year age groups assuming that the male/female age difference at marriage is, on average, equal to 2 years. This assumption fits the data on age difference at first marriage in the U.S. well for most of the period we covered (towards the

end the difference shrunk to 1.5 years). For each cohort Census data were used to compute sex ratios at the time the women were ages 20–24 or 25–29 and we used the number of men two years older.[2] Sex ratios defined for women born between 1926 and 1980 and men born between 1924 and 1978 for the entire country and by U.S. regions are shown in Table 6.1. Each 5-year cohort was given a name related to historical events that occurred around their year of birth.

[Table 6.1 about here]

For the U.S. as a whole (bold numbers), it can be seen that this sex ratio reached its minimum of .87 for the women born at the onset of the baby-boom, in the years 1946–1950 right after World War II, and the men born in 1944–1948, which includes the end of World War II and the beginning of the baby-boom. The maximum value of the sex ratio, 1.07, corresponds to the women born in 1971–1975 and the men born in 1969–1973. These women were born right around the passage of Roe versus Wade, a landmark ruling that led the number of abortions to increase in the United States.[3] The sex ratio for women born in 1966–1970 and men born in 1964–1968, the Moon generation, was also high at 1.06.

Table 6.1 also reports changes in labor force participation rates for married women belonging to different age groups, these changes being calculated by comparing the labor force participation for year t (the year at which a birth cohort was observed in a certain age group) and year $t - 5$. The table indicates a negative correlation between sex ratio and changes in married women's labor force participation. For example, look at the women of the Post-World War II babyboom, who have the lowest sex ratio. At almost every age this cohort experienced faster growth in labor force participation than any other 5-year cohort of women. In contrast, married women of the Moon generation, characterized by some of the highest sex ratios, experienced a drop in labor force participation of 2.14 percentage points when they entered the 30 to 34 age group (replacing women born in the Kennedy generation).

Catalina Amuedo-Dorantes and I estimated regressions of women's labor force participation for the U.S. as a whole and separately for four major US regions. We looked at married women and all women in different age groups separately. We found that cohorts of women with lower sex ratios (women born at onset of baby-booms) have experienced above-average labor force participation whereas cohorts of women with higher sex ratios (born at the beginning of baby-busts) have experienced below-average labor force participation. This held for all women and for married women in particular, and results were robust to a number of specifications. As for why the increase in women's labor force participation in the U.S. stopped well before that participation reached levels observed in some other Western countries, that can in part be explained by the relatively high sex ratios observed for young women born in the early 1970s, when fertility dropped dramatically as a result of Roe vs. Wade (Grossbard and Amuedo-Dorantes 2007).

Could there be alternative explanations for these variations in aggregate labor supply over time? Amuedo-Dorantes and I showed that sex ratio effects on women's LFP were robust to the inclusion of women's wages, education, and presence of young children in the regression models. The inclusion of these endogenous variables weakens the sex ratio effects. Nevertheless, they remain important. For instance, the effect on LFP of an increase in sex ratio of .10 is comparable to that of an increase in education of a little more than 2 years. Some idiosyncratic factors could possible help explain periodic change. The surge of the feminist movement also helps explain the large increase in

[2] For alternative methods for calculating sex ratios see e.g. Goldman et al. (1984) and Porter (forthcoming).

[3] Links between abortion law changes and changes in fertility in the 1970s have been discussed e.g. by John Donohue and Steven Levitt (2001) and Joshua Angrist and William Evans (1999).

labor supply experienced by the first Post WWII baby-boomers, the generation who bought the first issues of Ms Magazine and who filled the first Women Studies classes. However, why did big increases in women's labor supply last for 15 years and not 25 years? Some may say, it was a backlash against feminism. But then why did it occur at that particular time? Furthermore, Heer and I argued that the feminist movement was not an exogeneous factor and extremely low sex ratios also help explain the onset of the feminist movement (Heer and Grossbard-Shechtman (1981).

Sex ratio effects have also been tested at the *city level*. Grossbard-Shechtman (1993, chapter 6) used US cities in 1930; Grossbard-Shechtman and Neideffer (1997) and Chiappori, Fortin and Lacroix (2002) used US cities in 1990. These studies all found that where sex ratios are higher women are less likely to work in the labor force. Chiappori et al. (2002) also found that where sex ratios are higher men are more likely to work in the labor force, which can be used as evidence for TU7 (see Chapter IV). However, such cross-sectional results could be the result of reverse causality: women's migration to cities with more job opportunities for women and men's migration to where men have more good jobs could account for the results.

Sex ratio and education.

Sex ratio and education. Societies tend to have separate marriage markets for people differing in education level. A priori it is not so clear where sex ratios are expected to have more impact, among the more educated or the less educated.

Implication TU6 is more likely to hold for couples (1) in which one spouse engages in more WiHo than the other; and (2) for which it can be assumed that the other spouse pays for that WiHo. In terms of equation 6.2, the k capturing how much the spouse pays for WiHo is likely to be larger when the amount of WiHo, h, is larger. It is also expected to be larger if the price of WiHo is higher. Where there are positive intra-household transfers compensating for WiHo, sex ratio variations are more likely to influence WiHo price and therefore labor supply than in cases where there is no WiHo or there is little payment for WiHo.

We don't have data on time supplied to WiHo or on whether the spouse transfers income within the household to pay for WiHo. However, hours of WiHo can be approximated with hours devoted to chores: in couples it can be assumed that at least some of these chores benefited the spouse. We can also make assumptions as to who is more likely to get a positive price y for their WiHo depending on individual characteristics of self and spouse (see Chapter V). Education tends to be negatively correlated with time doing chores (Grossbard, Gimenez-Nadal and Molina 2010), so it can be inferred that, compared to women without college education, college-educated women are less likely to work in WiHo for the benefit of their husbands. However, educated women who work in WiHo are likely to get paid a higher y for it if education makes them more productive. So it is not clear in advance whether sex ratios will have more impact on women with or without education.

Evidence. In Grossbard and Amuedo-Dorantes (2007) we found that in the West and the Northeast effects of cohort-based sex ratios on the labor supply of married women were more sizeable for women with less education than for college-educated women. This result was obtained by including interactions of sex ratio and years of schooling, but sex ratios were not calculated separately by education category. For the Midwest, however, we got the opposite result: sex ratio effects on labor supply were more sizeable for educated married women than for their less educated counterparts. Likewise, Emery and Ferrer (2009) found negative sex ratio effects for college-educated women in Canada over the period 1971-91. This suggests that the premium for educated married women in the Midwest and Canada is higher than in other regions in the U.S.: in Canada and the American Midwest yh seems to be higher for college-educated women than for women with less education. Therefore low sex ratios can be more damaging to their earnings from WiHo and

high sex ratios can be more beneficial than for their less educated counterparts. This is intriguing and suggests that some underlying factors that are common to the American Midwest and Canada—but not found in the West and the Northeast of the U.S.A.—are associated with higher prices for women's WiHo. Could it be that farmers appreciate their wives more than city dwellers, and even more so if they are educated?

While Grossbard and Amuedo-Dorantes used sex ratios for all education groups (assuming that educated and less educated people are good substitutes and participate in the same WiHo markets) Negrusa & Oreffice (2010) constructed "quality" sex ratios by education groups. They used variation across metropolitan areas and investigated the impact of these sex ratios on the labor supply of married women and men. They found negative sex ratio effects for wives and positive effects for husbands. Effects for more educated individuals were more sizeable; they found insignificant effects for high school graduates. This also suggests that the value of educated women's WiHo, *yh*, is higher than that of the WiHo of less educated women. The finding of Negrusa and Oreffice for men can be explained in terms of this model as well. When sex ratios are higher and women's WiHo is more expensive, men need to work harder in the labor force to afford the higher *yh* payments. They need a higher income *I* (see equation 6.2). They may also have a higher *k* in the sense that they transfer a larger portion of their income to their wife.

Labor supply and laws and institutions governing couple formation

The form in which a couple lives together may reveal important information and may be worthy of further investigation when studying labor supply. Are they married? Do they live together without marriage? We can infer whether *y*, the price of WiHo, is relatively high or low by using information on choice of type of relationship where such choice is available and the outcome is observed.

Furthermore, laws and regulations that affect couple formation by providing benefits and costs associated with marriage and its alternatives will also influence price of WiHo and therefore reservation wage and labor supply.

Labor supply, marriage and cohabitation. Whether a couple cohabits without marriage or is married may indicate variation in price of WiHo. In the case of a couple with a full-time or part-time WiHo worker the fact that the couple is formally married may indicate that the spouse doing most WiHo (the WiHo worker) is being paid a higher WiHo price *y* than their counterpart who cohabits outside marriage. Where women are the WiHo workers they often prefer the commitment involved in marriage and may prefer to have part of their compensation taking this form (see Grossbard-Shechtman 1982). Linking observed marital status to WiHo price helps explain DaVanzo's (1972) finding that in Chile women cohabiting without a formal marriage are more likely to participate in the labor force than women married formally. A formal marriage may indicate a higher *y* and therefore less of a need for women in traditional relationships to participate in the labor force. Since DaVanzo analyzed labor supply, marriage type and wages simultaneously, an alternative explanation--that working women prefer cohabitation--is not so likely.

Labor supply and divorce laws. To the extent that some divorce laws give less protection to WiHo workers in case of divorce than other divorce this implies that the total package of compensation for WiHo is lower (the price of WiHo may include payments after separation if there is separation or divorce). A lower price of WiHo implies a lower reservation wage and more labor supply. It is therefore expected that labor supply of women will be higher in legal regimes that offer less protection to WiHo workers (assuming traditional gender roles). The replacement of fault- and consent-based divorce laws with no-fault and unilateral divorce can be considered as forms of lowering the effective price for WiHo. These laws, introduced to most of the United States between 1970 and 1980, may have contributed to the rapid growth in women's labor force participation during the years 1970 to 1985. However, that rapid growth started around 1965, before the divorce

laws started changing. Gray (1998) has shown that the effect of unilateral divorce laws interacted with the effect of laws specifying division of property in case of divorce. In states where community property prevails no-fault divorce laws led to higher labor force participation of women and less household production, but in states without community property no-fault divorce was associated with lower labor force participation and more household production. This is consistent with a larger drop in the price of women's WiHo associated with introduction of no-fault divorce in states with community property than in states without community property regulating division of assets in case of divorce.

Labor supply and polygamy. It is also expected that laws allowing polygamy will affect price of WiHo and reservation wage. When men are allowed to marry more than one wife, but women are only allowed to marry one man and assuming traditional gender roles, there will be a large demand for women's WiHo relative to the supply. This implies higher prices for WiHo and higher reservation wages, thus leading to a lower labor supply of women.

Labor supply and Common Law Marriage (CLM). Some states in the U.S. offer common law marriage and some don't. Common law marriage is a more accessible form of marriage with lower entry costs. The availability of CLM in a state could possibly affect both the demand and the supply of WiHo. The impact CLM on the labor supply of men and women was analyzed in Grossbard and Vernon (2014). An adaptation of that article is presented in the next chapter. Our interpretation of CLM is that it acts as some form of minimum price of WiHo. We found ample empirical evidence to support our testable implications.

Table 6.1
Generations of Women, Sex Ratios, and Changes in Married Women's Labor Force Participation for Four Regions in the United States

Year of Birth	Generation Name	U.S. Region	Sex Ratio[1]	Δ LFP[2] ages 20-24	ΔLFP ages 25-29	ΔLFP ages 30-34	ΔLFP ages 35-39	ΔLFP ages 40-44
1926-1930	Pre-Depression	**U.S.**	**0.98**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**4.96**
		NE	0.95	n.a.	n.a.	n.a.	n.a.	2.68
		Midwest	1.06	n.a.	n.a.	n.a.	n.a.	10.05
		South	0.96	n.a.	n.a.	n.a.	n.a.	3.07
		West	0.99	n.a.	n.a.	n.a.	n.a.	3.31
1931-1935	Depression	**U.S.**	**1.00**	**n.a.**	**n.a.**	**n.a.**	**6.69**	**5.65**
		NE	0.96	n.a.	n.a.	n.a.	4.80	3.87
		Midwest	1.06	n.a.	n.a.	n.a.	8.87	5.63
		South	1.01	n.a.	n.a.	n.a.	7.56	6.94
		West	1.01	n.a.	n.a.	n.a.	3.87	5.05
1936-1940	New Deal	**U.S.**	**0.95**	**n.a.**	**n.a.**	**6.84**	**5.09**	**9.23**
		NE	0.95	n.a.	n.a.	6.02	2.18	12.61
		Midwest	1.02	n.a.	n.a.	5.85	6.03	9.75
		South	0.92	n.a.	n.a.	8.89	3.12	6.25
		West	0.91	n.a.	n.a.	6.22	9.75	10.35
1941-1945	World War II	**U.S.**	**0.91**	**n.a.**	**5.97**	**5.44**	**10.83**	**4.12**
		NE	0.90	n.a.	7.23	5.25	12.88	1.77
		Midwest	0.93	n.a.	6.69	6.28	12.33	3.96
		South	0.88	n.a.	1.74	3.34	9.34	4.52
		West	0.92	n.a.	9.86	7.17	9.47	5.68
1946-1950	Post WW II	**U.S.**	**0.87**	**11.28**	**11.84**	**13.51**	**6.61**	**7.05**
		NE	0.89	10.07	11.05	15.26	8.61	11.11
		Midwest	0.93	8.43	14.19	17.32	6.53	5.71
		South	0.84	12.21	10.98	10.32	6.39	7.48
		West	0.85	14.98	9.71	11.61	5.36	3.92

1951-1955	Korean War	**U.S.**	**0.95**	**10.47**	**8.25**	**6.06**	**5.28**	**2.85**
		NE	0.94	12.22	13.59	8.18	6.52	-0.11
		Midwest	0.99	14.28	8.80	5.55	4.82	6.84
		South	0.93	9.22	6.70	6.45	3.86	0.13
		West	0.94	5.12	6.18	4.28	6.30	5.81
1956-1960	Sputnik	**U.S.**	**0.97**	**2.12**	**7.40**	**3.82**	**1.40**	**1.23**
		NE	0.97	2.68	5.44	2.46	0.86	2.98
		Midwest	1.04	2.08	6.00	4.23	2.83	0.27
		South	0.93	1.19	7.26	5.59	2.47	3.29
		West	0.96	5.19	9.84	2.81	-0.78	-2.22

Table 1 – Continued

Year of Birth	**Generation Name**	**U.S. Region**	**Sex Ratio**	ΔLFP ages 20-24	ΔLFP ages 25-29	ΔLFP ages 30-34	**ΔLFP ages 35-39**	**ΔLFP ages 40-44**
1961-1965	Kennedy	**U.S.**	**1.03**	**4.60**	**3.49**	**3.62**	**-1.84**	**n.a.**
		NE	1.01	6.65	2.54	4.54	-0.77	n.a.
		Midwest	1.09	10.02	6.18	5.03	-2.67	n.a.
		South	1.01	1.79	6.90	2.98	-0.58	n.a.
		West	1.01	1.55	-2.31	2.19	-2.97	n.a.
1966-1970	Moon	**U.S.**	**1.06**	**-0.23**	**-0.14**	**-2.14**	**n.a.**	**n.a.**
		NE	1.05	-3.66	2.59	-0.80	n.a.	n.a.
		Midwest	1.16	-1.66	4.28	-2.00	n.a.	n.a.
		South	1.03	1.65	-5.06	-1.22	n.a.	n.a.
		West	1.02	1.49	-0.38	-4.45	n.a.	n.a.
1971-1975	Roe	**U.S.**	**1.07**	**-0.23**	**0.76**	**n.a.**	**n.a.**	**n.a.**
		NE	1.05	-0.06	1.62	n.a.	n.a.	n.a.
		Midwest	1.11	1.43	-0.11	n.a.	n.a.	n.a.
		South	1.06	1.63	4.06	n.a.	n.a.	n.a.
		West	1.06	-2.27	-1.24	n.a.	n.a.	n.a.

1976-1980	First Echo	**U.S.**	**1.01**	**0.15**	**n.a.**	**n.a.**	**n.a.**	**n.a.**
		NE	1.01	-0.61	n.a.	n.a.	n.a.	n.a.
		Midwest	1.08	-1.95	n.a.	n.a.	n.a.	n.a.
		South	0.97	-1.50	n.a.	n.a.	n.a.	n.a.
		West	0.98	-1.47	n.a.	n.a.	n.a.	n.a.

Notes: [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 2000. 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]Calculated from CPS years 1965-2000.

This table was first published in Grossbard and Amuedo-Dorantes (2007).