DEPARTMENT OF ECONOMICS

Working Paper

The Second Paycheck to Keep Up With the Joneses: Relative Income Concerns and Labor Market Decisions of Married Women

by

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Working paper 2005-10

UNIVERSITY OF MASSACHUSETTS AMHERST

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May 2005

ABSTRACT

This paper investigates whether one's effort to keep up with the Joneses has any effect on labor supply behavior. We provide a simple model and empirical evidence that labor supply decisions of married women are influenced by relative as well as absolute income of their husbands. We find, after controlling for husbands' absolute income and other individual characteristics, that married women are more likely to be in labor force when their husbands' relative income is low. Results are robust across various settings and measures of relative income and the size of the effect is economically meaningful. We also show that income inequality of reference group of husbands in age-regional cross sections can be a predictor of their wives' labor supply.

Keywords: Interdependent utility, relative income, social comparisons, inequality, emulation, labor market participation of married women.

JEL classification: H23; D31; D62; J22

Acknowledgments: Thanks to Samuel Bowles for guidance. This paper is based on a chapter of my Ph.D dissertation submitted University of Massachusetts Economics Department.

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1. Introduction

Do relative income concerns affect human behavior? If so, do they count enough to influence labor supply? There is a growing literature with empirical evidence that supports the "relative income" hypothesis, which argues that individuals are adversely affected when they perceive themselves to be economically deprived relative to their peers. Clark and Oswald (1996) for example found that the satisfaction levels reported by British workers (in the British Household Panel Survey) vary inversely with the wage levels of peers. Alesina, Di Tella and MacCulloch (2003) found that individuals have a lower tendency to report themselves happy when inequality of the country (or, in the case of the US, state) is high. Luttmer (2004) and Ferrer-i-Carbonell (2005) show that higher earnings of neighbors are associated with lower levels of self-reported happiness, using individual-level panel data. Given this strong and body of evidence on comparison-based utility functions, it is natural to ask whether the sense of relative deprivation is strong enough to affect economic decisions and therefore to be a predictor of actual economic behavior.

This paper attempts to answer the question by examining the effect of relative income on labor supply behavior. Our model of the choice of work hours, presented in the next section, captures the relative income concern by taking account of the influence of the consumption of the well-to-do on the marginal utility of own consumption for the less-well-off. The main result is that an individual's labor supply is increasing in the degree of the relative deprivation of her family. We then examine this hypothesis by asking whether a wife's labor force participation (LFP) decision depends on her husband's relative income among his peers. We focus on this specific relationship because the husband's relative income among peers provides an exogenous measure of relative income that is not affected by the LFP decision of his wife. Using the March Current Population Survey from 1969 to 1979, we first show that a wife's LFP decision is increasing in the relative deprivation of a husband among his reference group, which is defined using a combination of characteristics including both State and Census Region of

residence, race and age. Our results indicate that, even after controlling for individual characteristics, husband's income, and reference group effects, relative deprivation of the husband is positively associated with LFP of his wife. Its effects are significant, and estimates are robust across a variety of settings. In the later part of this paper, we show that the effect of relative income concerns can also be captured by local income inequality measures. We also show that middle class wives are more sensitive to the relative income concerns than those whose husbands belong to either high- or low-income groups.

There are a few previous papers that have examined the role of relative income in labor supply. Stark and Taylor (1989, 1991) found that relative income plays a significant role in international migration from Mexico to United States. Controlling for absolute income and expected gains from migration, the propensity of households to participate in international migration is directly related to the household's relative income ranking. Neumark and Postlewaite (1998) studied the labor supply decisions of relatives, finding some evidence that women whose sister's husband had a higher income than their own husband were more likely to be employed. Bowles and Park (2003) showed that the greater inequality predicts longer average work hours, using country-level macro data on work hours of manufacturing employees in ten OECD countries.

This paper contributes to the existing literature in several ways. First, we provide a comprehensive test of relative income effect on labor supply using both individual and regional-level measures of relative income and much larger micro-level sample than previous studies. After carefully controlling the possibility of endogeneity between relative income and labor supply, we provide direct evidence that relative income effect is a general phenomenon that can be observed at a much larger scale and over a sustained period of time, which we believe is crucial for the validity of relative income as a predictor of labor supply. Second, this paper provides empirical evidence that relative income effects are asymmetric and mostly up-wards; this means that less well-off individuals' well-being is negatively influenced by the fact that their income is lower

than that of their reference group, while richer individuals do not get happier from having an income above the average. Third, this paper presents relative income of a husband as a new factor in a married woman's LFP decision. While many studies examined the relationship between husbands' income and labor supply of their wives, to date few studies look at husbands' relative income. In addition, we show that the income comparison effect among sisters observed by Neumark and Postlewaite (1998) can be applied to much more broadly defined reference groups of non-relatives. Lastly, this paper contrasts with a couple of recent studies that investigate the correlation between the inequality in wage distribution and workers' effort from a very different perspective. Lander, Rebitzer and Taylor (1996) have suggested that inequality induces longer work hours because those who work longer attain a higher percentile rank in the wage distribution at the workplace, and the more that the wage distribution is unequal, the greater the wage gains implied by an increase in rank. Bell and Freeman (2001) provide convincing evidence for this effect: In the U.S. and Germany wage inequality within detailed occupation/industry cells is positively correlated with work hours for those working thirty-five hours per week and longer. In these studies, however, income inequality is a reflection of unequal rewards between desirable and undesirable acts that are designed to maximize workers effort and work hours. This paper provides a direct test of relative income effect that can be clearly distinguished from the rat-race model: Wives' labor force participation covarying with her husband's relative income (and regional income inequality) cannot plausibly be capturing the Bell and Freeman (2001) type incentive effects, unless we have a reason to believe that having a wife with a job has positive implication on a husband's promotion.

The rest of the paper is structured as follows: Section 2 discusses the main idea and presents a simple model. Section 3 describes empirical strategy and sample that we used and section 4 estimates the labor market participation equation and presents the results. Section 5 concludes.

2. A Model of Relative Income Concerns

Veblen (1934) held that consumption is motivated by a desire for social standing as well as for the enjoyment of the goods and services *per se*. His key idea was that the best-off members of a community -- "the leisure class" -- establish the standards for the rest. The following model embodies the two propositions underlying Veblen's account, namely that people compare consumption (or wealth) but not leisure, and that they refer upwards, choosing their work and spending activities so as to be more like a higher income group, rather than seeking social distance from lower income groups.[1] Suppose married women differ in some trait that influences (potential) hourly wages and that they choose their hours of work (m) to maximize a utility function. The arguments of the utility function are leisure (which we normalize as $1-m$) and what we term effective consumption, c^*, defined as a function of consumption level of the family (c) minus a constant v (for Veblen) times the consumption level of some higher income family ($\tilde{c}$). How reference groups are formed and dissolved is a complicated issued that we will discuss in detail in the next section. Here, we assume those who live in the same geographical region and who are of similar age form the relevant reference group. In terms of income, the individual's reference group might be the very rich, or it might be an intermediate group. The reference group's rank in the income distribution is taken as exogenous, as is the Veblen constant v. Together, the reference group and v measure the nature and intensity of the relevant social comparisons. Individuals do not save, so $c = \sum_{i=1}^{n} w^i m^i$ where w^i is the wage rate of member i of the family and n is the size of the family (m^i=0 if the individual i is not employed). Effective consumption now becomes an income gap between reference group and the family in question. Assuming that one's

[1] Ferrer-i-Carbonell (2005) provides empirical evidence that income comparisons are mostly up-wards. She finds that poorer individuals' well-being is negatively influenced by the fact that their income is lower than that of their reference group, while richer individuals do not get happier from having an income above the average.

utility from consumption depends on total consumption of the family, for a married woman *i* who is not in the richest group we have

(1) $$u^i = u(c^*, m^i)$$

$$u^i = u[(\sum_{j=1}^{n-1} w^j m^j + w^i m^i - vc^{\sim}), m^i]$$

where u^i is increasing and concave in its first argument and decreasing and convex in the second. Leisure and consumption are complements, so $u_{c^*m}<0$. The effect of increased consumption by members of the reference group thus is both to lower the utility of the individual and to raise the marginal utility of effective consumption. The woman will join labor force if $m^i{}^*$, namely that which equates the marginal rate of substitution between leisure and effective consumption to the wage rate, is positive.[2]

We can now consider the effects of an increase in income gap on labor supply decision of a housewife (whose $m^i{}^*\leq 0$ currently) by raising $c^{\sim}$ relative to income of all other family members ($\sum_{j=1}^{n-1} w^j m^j$). Differentiating the individual's first order condition for the choice of work hours (and using the second order condition) we find that $dm^{i*}/dc^{\sim}$ has the sign of $-(u_{c^*c^*}+u_{c^*m})$, which is positive. The effect of the larger gap between the consumption levels of the individual and the reference group is to raise the marginal utility of consumption relative to the marginal utility of leisure, which may induce the woman to join the labor market. Variations in the Veblen constant have the same sign: $dm^{i*}/dv>0$ reflecting an increase in the intensity of social comparison and perhaps capturing the negative effect of TV watching on saving in Schor (1998). It is readily shown that if, in

[2] If the utility function is Cobb-Douglas in leisure and effective consumption (with *a* the coefficient of c* and (1- *a*) the coefficient of (1-*m*)) then the choice of hours is such that $m^i{}^*/(1-m^i{}^*) = a/(1-a) + (\sum_{j=1}^{n-1} w^j m^j - vc^{\sim})/w^i(1-m^i)$ with the increased hours indicated by the second term on the right hand side representing the Veblen effect.

contrast to this model, the reference group were the poor (others seeking to distance themselves from the reference group) then an increase in inequality would induce a *reduction* in work hours, giving us an unambiguous and empirically testable hypothesis distinct from seeking distance from the poor, or social comparisons generally.

3. Empirical Strategy

To test the hypothesis, we need to find an exogenous measure of relative income c* that is not affected by m^i*. Otherwise, due to the feedback effect of m^i* changes on the income gap, we will get a biased measure of relative income effect on labor supply. The concern about the endogenous relative income is addressed in two ways. First, we examine the correlation between a husband's relative income among his peers and LFP of his wife. Suppose relative income of a husband has fallen compared to his reference group without any changes in his absolute income. Assuming that husband's reference group is closely tied to the reference group of his family, the model presented in the previous section predicts an increase in labor supply by his wife ($dm^{i*}/d\tilde{c}>0$). And yet, the feedback effect of the wife's LFP decision on relative income of the husband will be limited because the relative income depends on the wage rate and work hours of the husband and other men, not of his wife. Second, to eliminate cases in which a husband quits his job or become a part-time worker after his wife joined the labor force, we limit the sample to wives of full-time, full-year workers.[3]

We also need to consider the possibility of group-level correlation caused by substitution of male workers by female workers. Topel (1992) suggests that growing supply of skilled women might contribute to the rising inequality among male workers by substituting for less skilled male workers and reducing their wages. However, Juhn and Kim (1999) show

[3] Though it is possible to reduce work hours without becoming a part-time worker, many full time workers face "trap-door floors", that they may be denied the opportunity to reduce their hours and instead face a choice between full-time employment and quitting the job. (Drago, Black and Wooden, 2004) Stewart and Swaffield (1997) also show that workers may not choose their hours of work freely by showing that more than a third of British men work longer than they would wish at the prevailing wage.

that women had not made a greater contribution to labor in the higher-skill categories until 1980s[4]. Therefore, by limiting the sample to 1970s, we minimize the possibility of an endogenous connection between income inequality of men and LFP of married women.

Limiting sample to 1970s has two additional advantages. First, since the cultural presumption that men were supposed to be the breadwinner for a family was still strong at that time, it is even less likely that LFP of a wife would affect a husband's job and relative income. Second, it was a period when employment of married women increased very rapidly and married women with a job became a majority.

Table 1. Overtime Changes in Women's Labor Market Participation in 1970's

Age Group	1969	1979	Change (1969 - 1979)
16-24	46.06	60.02	13.96
25-34	36.90	56.96	20.06
35-44	45.37	60.19	14.82
45-54	48.03	54.55	6.52
55-64	35.31	37.18	1.87
All	47.64	58.79	11.15

As shown in Table 1, between 1969 and 1979 labor market entry of prime age married women (aged 25 to 44) increased by 20% and 14.8% respectively. It is therefore interesting to see whether this rapid increase can be explained by the relative income effect.

To capture the changes in the 1970's, we use 11 years of Current Population Survey March data from 1969 to 1979. The March supplement has several clear advantages. It is a large and nationally representative sample, the quality of income data exceeds that of most other surveys, and it provides geographic identifiers at the level of the Census

[4] According to Juhn and Kim (1999), demand shift, not supply of educated women, is the main reason for the rising inequality among men in 1980s. They show that evidence that college-graduate women may be substitutes for high school drop out or graduate men in the 1980s is weak at best. Moreover, they show that when demand shift measures are allowed to play a larger role and entered as a separate regressor, the substitution between these two groups disappears.

division and state. This allows us to construct measures of income inequality at multiple geographic levels (Census geographic division and States). We limit the sample to white women because minorities are severely under-represented in 1970s CPS and cross-reference between races is likely to have been weaker in the 1970s when racial segregation was still prevalent. As noted above, women with a part-time working husband are excluded from the sample to minimize the possibility of reverse causality and the resulting sample of white, working aged men (including not married)[5] contains 414,439 individual observations and the married women sample contains 101,303 observations across the 11 years of the survey.

3. 1 Reference Group:

Difficulty in this type of research has always been that it is hard to know how individuals define their reference group. The social psychology literature suggests that members of one's reference group are typically selected on the basis of either similarity or geographic proximity (Singer, 1981). While there is no perfect formula for determining reference groups, various studies report that individuals define reference groups along demographic lines such as sex, education, and race (Merton and Kitt, 1950; Singer, 1981; Bylsma and Major, 1994). In this paper, we define reference groups as those who are geographically close and of the same race and of similar age. For the geographical closeness, we use both census geographical regions and States as criteria. One problem with using States is that until 1979 not all States are identified in CPS. As a result, the twenty-one States and Census Bureau Geodivision groups of States that are consistently identifiable are used instead.

For the age similarity, we divided the data set into five-year age groups (20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64) and calculated the within-age group

[5] Single men are included since we could not think of any reason why married men should exclude unmarried men from their reference group. Also, inclusion of unmarried men makes the measures of earning inequality more reliable by increasing the size of primary sampling unit.

inequality of men living in the same area. The purpose of controlling age is twofold. First, we believe that reference between men of similar age may be stronger than it would be between men of different ages. Second, and more importantly, controlling age allows us to eliminate a potential link between future income and measures of income inequality. Without age control, measures of income inequality pick up the income difference between men of different age groups living in the region and may reflect the difference between the present and future income level.[6] Given that husbands' future income may have a stronger negative income effect on their wives' employment than the current income (Shaw 1992), it is necessary to control age to minimize the correlation between income inequality measures and future income level.

As a result, a 33 year-old man who lived in California during the sample years, for example, is assigned to a cell made of men aged between 30 and 34 and living in California (or Pacific region in case of Census Geodivision analysis), and we calculate his relative income in the group using two different measures of relative deprivation. In addition, three (weighted) measures of income inequality among the cell members are calculated.[7] Average cell size per year is 152.67 observations for State/age group cells and 339.71 observations for region/age group cells.

3. 2 Measures of Relative Income

Based on the seminal definition of relative deprivation of Runciman (1966), Stark and Taylor (1989) define relative deprivation index as follows:

$$RD_i = [E(y|y>y_i) - y_i]\cdot prob(y>y_i) \quad (2)$$

[6] Indeed, the key operating assumption linking labor supply to inequality in Bell and Freeman (2000) is the notion that pay inequality provides an indicator or measure of the future income stream influenced by current work hours.

[7] This way of calculating a local level inequality is commonly used in many other studies (Ferrer-i-Carbonell, 2004, Eibner and Evans, 2004) including Bell and Freeman (2001), in which they used detailed occupation/industry cells to measure the wage inequality in the cells.

which is the product of the mean excess income of those with higher income than y_i and the proportion of individuals in the group with higher income than *i*'s income. (For a proof and analysis of the more general form, see Stark and Taylor 1989) If all rankings are left intact, any increase in the income of a household richer than household *i* will increase the relative deprivation of household *i*, whereas any ranking gain by household *i* will reduce the relative deprivation of household *i*.

One concern with this measure is that it is sensitive to changes in absolute income. As Eibner and Evans (2004) pointed out, if everyone's income doubles, for example, RD_i will double as well. This may pose a problem since we look at relative deprivation over a ten-year span, even though incomes were adjusted for inflation and average income has not increased over the period. To suppress the effect of absolute income changes, we construct a measure of relative deprivation by substituting log income instead of nominal income that are used in equation (2).

A second measure of relative income is the individual's z-score from Eibner and Evans (2004), which measures the number of standard deviations the individual's own income is above (or below) the reference group mean.

$$\text{z-score} = \frac{(y_i - \mu_r)}{\sigma_r}$$

where μ_r and σ_r are the reference group mean and standard deviation. While this measure also captures relative income, it is different from the relative deprivation index in that it is sensitive to changes in the income of those whose income is lower than *i*'s income. Further, while relative deprivation decreases as one's relative income increases, z-score will increase. Therefore, we should expect negative coefficient z-scores. Table 2 reports summary statistics of relative income variables of Census region cells and State level cells and other explanatory variables by year, and those of a merged sample.

3.3 Regression Equation

In the logit regression model, the dependent variable takes on the value of 1 if person *i* is in a labor market at the time of survey and 0 otherwise. A logit criterion equation for women's LFP is

$$\text{LFP}^{it} = \beta_0 + \beta_1 q_j{}^t + \beta_2 x_j{}^{it} + \lambda_j + T^t + G_j + u^{it}$$

where a married woman *i* is either seeking or has a job if $\text{LFP}^{it} > 0$. $q_j{}^t$ is the relative deprivation index or other measure of inequality for region/age group cell *j* at time *t*; x^{it} is a vector of other possible individual level explanatory variables with β_2 its vector of estimated coefficients; λ_j is a regional fixed effect; G_j is husband's age-group fixed effect; T^t is time fixed effect; u^{it} is an error term. The explanatory variables x^{it} include a list of human capital variables typically found in studies of women's labor supply. These include husband information (husband's income, age and education in years), wife information (wife's age, age squared and age cubed, education in years, educational dummy variables), and family characteristics (number of children under 1, 3 and 18 years old, size of the family). Also, state-level unemployment rate is added to capture the labor market situation of the region. As we can see from Table 2, demographic variables clearly show the changes in family structure (falling fertility rate, decreasing family size) and women's human capital (a rise in schooling level) that are widely cited to have contributed to the growth in women's labor supply. Lastly, a quadratic initial relative deprivation term is included in the regression equation. Although our theory predicts that the relative income variable in the LFP decision function will have a positive effect on LFP propensities, at incomes near or below subsistence level, relative income considerations may not matter as much as concerns for mere survival. These considerations may erode the measured positive impact of relative deprivation at the low-

income level. A quadratic initial relative deprivation term may be able to capture this potential nonlinearity.

4. Estimated Results

4.1 Basic Results

Table 3 reports the estimated effects of relative deprivation index and z-score from logit models of women's labor market participation. Marginal effects (instead of logit coefficients) are reported and the standard errors are based on robust variance estimates that control for the clustering of observations within a reference group.

After controlling for individual attributes and local labor market condition, coefficients of both measures of relative income have the expected sign and are statistically significant. The coefficients are largest in the Census Region/age-group model, where one standard deviation increase of the relative deprivation index from index = 0 will increase the chance of a wife's LFP by 4.58%, compared to 3.1% in the State/age-group cell. In case of z-scores, the coefficient is negative as expected and one standard deviation increase from mean income (z=0) for a husband appears to decrease the probability for his wife to join labor force by about 4.4%(State/age cell) or 5.1%(Census Region/age cell). Considering that one standard deviation increase in the unemployment rate in the region reduces women's labor market participation by about 1.07% in the same regression, these are sizeable results. It is also true, however, that one standard deviation movement in relative deprivation is a large change. For the RD index, one standard deviation increase is slightly bigger than the average difference in RD index between 25-29 age-group (0.340) and 55-59 age-group (0.767).

The significant effect on square terms of both the relative-deprivation and z-score shows that correlation between income inequality and women's LFP becomes weaker as husband's income decrease. For example, one standard deviation increase of RD index

from its mean value is calculated to have only negligible (0.4% decrease) effect on women's LFP. We can think of two possible explanations for this nonlinearity: First, it may simply mean that relative income concern is not an important factor in women's LFP decision, which is consistent with what Alesina, Di Tella and MacCulloch (2003) found in their happiness research, namely that the group whose happiness seems to be most adversely affected by inequality is the rich (those who belong to the top two income quartile) while the poor (those who belong to the bottom two income quartile) seem unaffected by inequality. However, the weaker correlation may reflect poor job prospect (and lower expected wage) for low income wives, namely that, due to matching effect, lower income of a husband may be a proxy for lower market wage and lower changes of finding a job for his wife. The fact that husband's absolute income also has non-linear relationship with his wife's LFP suggests the presence of matching effect.
Lastly, this result also indicates that our result is not driven by substitution of male workers by more skilled female workers, as the correlation between LFP of women and relative deprivation should be stronger among low-income male workers if the substitution effect were driving our results.

4.2 Alternative Explanations

The fact that women's LFP is correlated with their husbands' relative income may have some other explanations. At the very least, we want to control for other factors that influence women's LFP to verify that they are not responsible for our findings.
One alternative explanation is that the results are driven by unobserved local characteristics that are correlated with both LFP of women and relative income of her husband. For example, one would expect high-income area to have positive amenities such as better schools and less crime. Due to positive amenities and high income level, cost of living may be higher in that region than other areas and it may put more married women in the area into labor force. If average income and measured income inequalities are positively correlated, cost of living may be a contributing factor to our results.

Similarly, one may expect that living in a metropolitan area might play a role since women living in city may get more job opportunities and income differences in metropolitan area may be higher than other non-MSA area.

However, simple correlation between measures of income inequality and mean income is weak (correlation coefficient between mean income of a cell and the relative deprivation index = 0.258 and z-score = -0.1003) and within age-group correlation is even smaller (ranging from 0.017 to 0.093 depending on age-group in case of RD Index). Also, within age-group correlation between mean income and women's LFP is very weak and mostly negative (ranging from -0.12 to 0.024 depending on age-group). Lastly, when we include dummy variables for each reference group at each point in time to control reference group effect, the coefficients on relative income measures actually increase slightly and remain statistically significant (column I of Table 4), discounting the possibility that our results are driven by cross-regional correlation between mean and relative income or any kind of inter-reference group correlation.

In case of MSA, women's LFP rate in non-MSA area is actually higher (average=0.509) than Central City area (average=0.459) and income inequality is also slightly higher in non-MSA area (0.6387 in Central City, 0.7058 in non-SMSA) but differences are not statistically significant. The second column of Table 5 estimates the reference group fixed effect regression with dummy variables for MSA status. The coefficients on relative income measures remain significant and similar in magnitude, which indicates that our results are not driven by MSA status.[8]

Another possibility is that our results may be driven by husband's job characteristics that may affect both his relative income and LFP decision of his wife. The last set of regressions includes dummy variables for husband's two-digit occupation and industry codes to control husbands' job/industry characteristics. All the signs of coefficients on

[8] For further test, we dividied sample according to MSA status and ran separate regressions for each sub-sample. The result (not shown) showed that relative income effect is stronger in 'balance of SMSA' and 'Non-SMSA' area than central cities.

relative income remain the same and similar in magnitude, which discounts the possibility that husbands' job characteristics are driving our results.

Table 4.

	I	II	III
Relative Deprivation Index			
Census Region Index	0.171**	0.165**	0.148**
	(7.18)	(6.89)	(7.02)
Census Region Index_Squared	-0.112**	-0.111**	-0.097**
	(-14.02)	(-13.78)	(-12.43)
State Index	0.135**	0.130**	0.122**
	(5.70)	(5.45)	(6.61)
State Index_Squared	-0.095**	-0.094**	-0.083**
	(-11.95)	(-11.71)	(-11.25)
Z-Score			
Census Region Z-Score	-0.169**	-0.169**	-0.143**
	(-13.04)	(-13.13)	(-11.39)
Census Region Z-Score squared/10	0.014**	0.014**	0.012**
	(9.08)	(9.12)	(8.50)
State Z-Score	-0.170**	-0.170**	-0.129**
	(-13.01)	(-13.01)	(-11.04)
State Z-Score squared/10	0.013**	0.013**	0.011**
	(8.87)	(8.87)	(8.20)

t-statistics in parentheses. Standard errors are adjusted for clustering.
* significant at 5%; ** significant at 1%

4.3 Income Inequality as a Predictor

A number of studies have reported that local-level income measures (such as mean income and income inequality) have sizable effects on self-reported happiness. Moreover, Bell and Freeman (2001) and Bowles and Park (2004) have demonstrated a strong statistical correlation between income inequality and labor supply using group level income inequality measures. In this section, we examine whether a positive correlation between income inequality and labor supply can also be found between husbands and wives.

We employ three measures of income inequality.[9] Firstly, based on Veblen's idea that the Joneses, with whom one had to keep up, were not the usual neighbors but the rich ones,[10] we chose the ratio of the highest income in 90th percentile (that dividing the 90th from the 91st percentile) to the highest income in the 50th percentile, as the key measure of income inequality. The ratio (P90/P50) averages 1.814 across states over the time period, and ranges from 1.405 to 2.678. We also measure the coefficient of variation (CV), which is designed to capture the effect of overall changes in income inequality. The third measure of income inequality is the ratio of the 50^{th} percentile and 10^{th} percentile of income (P50/P10). It is included to see whether a 'falling bottom' has any influence on women's employment.[11] If our analysis is correct, the coefficients of P90/P50 and CV will be positive.

The coefficient of regional income inequality regressions reported in Table 5 and 6 show similar pattern with relative income regression though weaker. The coefficients of CV and P90/50 are both positive and the coefficient of CV is statistically significant at 5%, though that of P90/P50 is significant at 10% level in Census Level Sample and not significant in State Sample. The coefficient of the P50/P10 index is statistically significant and negative, which is also consistent with the individual-level results. However, magnitudes of these inequality variables are weaker than that of individual-level relative income measures. A standard deviation change in the P90/P50 ratio and the CV is associated with only 0.4 to 0.5 percentage point increase in women's LFP, respectively (based on Census region sample regression).

[9] To construct each measure, we used the total income of the last year variable and weighted each observation by the weights provided in the CPS.

[10] "…[The] standard of expenditure which commonly guides our effort is not the average, ordinary expenditure already achieved; it is an ideal of consumption that lies just beyond our reach, or to reach which requires some strain….It is for this class [the wealthy leisure class] to determine, in general outline, what scheme of life the community shall accept as decent or honorific; and it is their office by precept and example to set forth this scheme of social salvation in its highest, ideal form." (Veblen, p.103-4)

[11] Bosch (1999) suggests that falling wages of low skilled male workers may have induced longer work hours and growth of married women's labor-force participation.

Similarity between individual-level and local-level results can also be found when we divide the sample into three different income groups – upper (husband's income>P90), middle (P50<husband's income<P90) and low (husband's income<P50) - and then compare the coefficient of income inequality measures in each samples. Individual-level results suggest that the tie between LFP of married women and income inequality among men might be stronger among those whose make more than median income. As we can see from Table 6, middle-income group results show stronger marginal effects for both the P90/P50 ratio and CV than the results from merged sample. Coefficients of both measures show significant increase from Table 5 and marginal effects also have significantly increased to 0.93% change per one standard deviation increase of P90/P50 ratio. Second, results from other income groups also support the hypothesis.

Table 5. Effects of Men's Income Inequality on Women's Labor Supply

	Census Geodivision	State
P90/P50 of Men's Income	0.0272†	0.0194
	(1.71)	(1.62)
CV of Men's Income	0.0729*	0.0735**
	(2.07)	(2.96)
P50/P10 of Men's Income	-0.0089*	-0.0044†
	(2.35)	(1.78)
Observations	101303	101303

t-statistics in parentheses. Standard errors are adjusted for clustering. In addition to individual variables, all the regressions include regional, year and husband's age-group dummy variables.
† significant at 10% * significant at 5%; ** significant at 1%

As we can see from column 5 and 6 of Table 6, wives of both high and low-income husbands are not affected by P90/P50 ratio at all. The marginal effects of the CV and all other P90/P50 ratio are reduced substantially and become insignificant in these samples, which suggests that wives of medium income earners are the driving force of relative income effect. Lastly, it is interesting to see that the P50/P10 percentile ratio is insignificant to women with high- and low-income husbands and has a negative effect on mid-income husbands. As noted in the previous section, this outcome may suggest that

wives of low-income husbands may be more affected by necessity and other variables than relative income concerns.[12]

5. Conclusion

Researchers in the social science are increasingly concerned about the effect of relative income and income inequality on people's happiness and well-being. Yet studies of these relationships are difficult to conduct and not always convincing because of some skepticism toward self-reported measures of well-being. (see Bertrand and Mullainathan, 2001 for example) In this paper, we provide evidence on how relative income and income inequality affect *actual behavior* of people and show that the results are consistent with studies on well-being. We find that there is a positive and statistically significant link between relative income of a man and the probability for his wife to be in labor market. We investigate the concern that this finding could be driven by omitted variables but could not find any evidence. We find similar link using income inequality measures, namely that a married woman is more likely to be in labor market as regional income inequality increases. In both cases, correlation between relative income measures and women's LFP becomes weaker as husband's income falls below average, which may suggest that middle class wives are more sensitive to relative income effects than those who are poor.

Lastly, our results suggest that relative income effects on labor supply are asymmetrical: if the reference group were the poor and the well-off seek to distance themselves from the reference group then an increase in relative income (and regional inequality) would induce a *reduction* in work hours. Many researchers have argued (Dusenberry, 1949, Irelend, 2001, Bowles and Park, 2004) that if the asymmetry holds, then it may offer real support for progressive taxation. While our results pose an interesting complication because more married women entering labor market is not necessarily a bad thing, we

[12] This result is consistent with Stark and Taylor (1989) who show that the effect of relative deprivation variable on migration is not linear.

provide support for the potential policy relevance of empirical information on the relative income effect.

Table 2. Summary Statistics

	ALL	1969	1979	1969-1979
Labor Force Participation	0.479	0.401	0.583	0.182
	(0.500)	(0.490)	(0.493)	
Census Region				
RD Index	0.576	0.539	0.561	0.022
	(0.441)			
Z-Score	0.172	0.127	0.172	0.045
	(0.926)	(0.905)	(0.916)	
P90/P50	1.814	1.770	1.846	0.076
	(0.184)	(0.179)	(0.177)	
P50/P10	2.581	2.231	2.836	0.605
	(0.942)	(0.689)	(0.539)	
Coeff. Of Variance	0.605	0.598	0.601	0.0031
	(0.077)	(0.086)	(0.059)	
State				
RD Index	0.569	0.533	0.554	0.021
	(0.445)			
Z-Score	0.175	0.132	0.172	0.040
	(0.926)	(0.908)	(0.916)	
P90/P50	1.723	1.668	1.752	0.084
	(0.177)	(0.178)	(0.177)	
P50/P10	2.401	2.093	2.618	0.525
	(0.656)	(0.510)	(0.675)	
Coeff. Of Variance	0.531	0.514	0.528	0.013
	(0.074)	(0.086)	(0.054)	
Log(Income of Husband)	10.004	9.977	9.944	-0.033
	(0.612)	(0.583)	(0.667)	
Unemployment Rate	0.057	0.032	0.053	0.022
	(0.019)	(0.009)	(0.010)	
# Child under 1	0.076	0.080	0.080	0.000
	(0.269)	(0.275)	(0.274)	
# Child under 3	0.260	0.274	0.258	-0.016
	(0.500)	(0.520)	(0.494)	
# Children under 18	2.086	2.317	1.824	-0.494
	(1.414)	(1.525)	(1.270)	
# Persons in the Family	4.304	4.521	4.046	-0.475
	(1.506)	(1.596)	(1.362)	
Age	33.886	34.326	33.536	-0.790
	(5.770)	(5.876)	(5.597)	
Education	12.314	11.908	12.671	0.763
	(2.470)	(2.419)	(2.576)	
High School Graduate	0.780	0.718	0.831	0.113
	(0.414)	(0.450)	(0.375)	
College Graduate	0.136	0.100	0.171	0.071
	(0.342)	(0.300)	(0.377)	

Table 3. Effects of Men's Income Inequality on Women's Labor Supply

	Relative Deprivation		Z-Score	
	Census	State	Census	State
Index	0.168**	0.140**		
	(8.08)	(7.56)		
Index_Squared	-0.112**	-0.096**		
	(14.51)	(12.94)		
Z-Score			-0.130**	-0.099**
			(-11.15)	(-8.98)
Z-Score squared/10			0.0106**	0.0079**
			(8.76)	(6.42)
Ln(Income of Husband)	0.2304**	0.2828**	0.1960*	0.2973*
	(4.59)	(4.23)	(2.36)	(2.45)
Ln(Husband's Income) Squared	-0.0230**	-0.0258**	-0.0108*	-0.0182*
	(8.64)	(7.56)	(-2.24)	(-2.71)
Age of Husband/100	0.0022†	0.0021	0.0020	0.0019
	(1.73)	(1.62)	(1.56)	(1.46)
Education of Husband/10	-0.0052**	-0.0051**	-0.0055**	-0.0054**
	(6.48)	(6.42)	(-6.86)	(-6.72)
# Child under 1	-0.0921**	-0.0922**	-0.0910**	-0.0913**
	(10.54)	(10.56)	(-10.44)	(-10.48)
# Child under 3	-0.2151**	-0.2153**	-0.2149**	-0.2151**
	(42.82)	(42.89)	(-42.85)	(-42.91)
# Children under 18	-0.0844**	-0.0846**	-0.0842**	-0.0845**
	(22.39)	(22.42)	(-22.34)	(-22.42)
# Persons in the Family	0.0317**	0.0320**	0.0313**	0.0317**
	(9.02)	(9.09)	(8.90)	(9.00)
Age	-0.2445**	-0.2462**	-0.2395**	-0.2420**
	(5.59)	(5.62)	(-5.48)	(-5.53)
Age Squared/10	0.0767**	0.0772**	0.0753**	0.0760**
	(5.97)	(6.01)	(5.87)	(5.92)
Age Cubed/1000	-0.0784**	-0.0788**	-0.0771**	-0.0777**
	(6.33)	(6.36)	(-6.23)	(-6.27)
Education	0.0293**	0.0294**	0.0298**	0.0299**
	(18.60)	(18.71)	(18.95)	(19.03)
Unemployment Rate (State)	-0.6707*	-0.6479*	0.7939**	0.0292**
	(2.48)	(2.40)	(4.59)	(4.72)
Observations	101303	101303	101303	101303
Pseudo R-squared	0.103	0.103	0.103	0.103

t-statistics in parentheses. * significant at 5%; ** significant at 1%
Robust Standard Errors are used to calculate *t-statistics*.
Regressions include dummy for Census Region or State, husband's age group, each year and for high school and college graduates.

Table 6. Differences in Reaction to Income Inequality by Class

	Upper Income Group[1]		Mid Income Group[2]		Low Income Group[3]	
	Census	State	Census	State	Census	State
P90/P50 of Men's Wage	-0.0125	-0.0072	0.0510*	0.0375*	-0.0125	-0.0072
	(-0.35)	(-0.25)	(2.34)	(2.25)	(-0.35)	(-0.25)
CV of Men's Wage	-0.0661	-0.0140	0.1028*	0.0764*	-0.0661	-0.0140
	(-0.74)	(-0.21)	(2.30)	(2.21)	(-0.74)	(-0.21)
P50/P10 of Men's Wage	-0.0061	-0.0029	-0.0099**	-0.0077**	-0.0061	-0.0029
	(-1.06)	(-0.96)	(-2.88)	(-3.09)	(-1.06)	(-0.96)
Observations	13077	13077	50477	50477	13077	13077

[1]. Upper Income Group: Husband's Income > P90 in the Husband's Age & Region Group
[2]. Middle Income Group: Husband's Income Falls between P90 and P50
[3]. Lower Income Group: Husband's Income < P50 in the Husband's Age & Region Group
Robust Standard Errors are used to calculate *t-statistics*.
Regressions include dummy for Census Region or State, husband's age group, each year and for high school and college graduates.
* significant at 5%; ** significant at 1

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