Determinants of Female Labor Force Participation in United States

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Abstract

This paper is trying to discover the determinants of female labor force participation in United States from the year 2000 to 2009. The study contains over 1 million observations through-out the 4 business cycles and the household data from Current Population Survey (CPS) suggested that female labor force participation in the United States was influenced by several factors, namely, educational attainment, family income, marital status, age, race, number of children in the household. Women with higher education level and from wealthier households have a greater tendency of joining the labor force while those with only high school or lower degree and from less wealthier families are less likely to participate in the labor force.

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1.0 Introduction

The labor force participation in the United States has been a heating topic and the rate of labor force participation in US has increased almost continuously since the mid-1960s except for the economic downturns in the middle. Female's participation in the labor force has been an increasingly important issue for the economists because it is highly correlated with the most relevant economic indicators of the nation such as GDP, GDP growth, inflation rate, CPI etc. Female labor force participation, generally speaking is central to constructing a measure of potential GDP or projecting the future GDP growth. For example during the years between the 1970 and 1990, the entry of married women greatly expanded the labor force in the United States and thus increased the potential GDP (Juhn, 2006). Therefore, understanding the source that determine the female labor force participation would not only help greatly in analyzing women's decision making behavior and preferences in the job market, but also assist government to predict the potential labor market performance thus to create better economic development policies accordingly.

This study is aimed to discover the tendency of women's participation in the labor force in relate to demographic factors as well as economic and social factors using the most updated data from the year 2000 to 2009. Given the NBER announcement of economic peak period, 2009 was a year during contraction period followed the 2007 peak and it was identified as during the economic downturn. The empirical questions that the study is trying to answer are: what is so different about women's choice of entering or exiting the job market between the two business cycles namely 2003-2007 and 2007-2009? Is household income going to make a difference in women's choice when holding all other variables constant, are low income women more or less

likely to enter the labor force? How about years of education, is it true that highly educated women are more likely to work during economic downturns when holding all other variables constant? Is there a difference in choice among races?

In order to answer the above questions, this study will be guided by the following major objectives that are different from other researches on female labor force participation: first, the analysis discovers the possibility of women entering and exiting the labor force in the United States using the CPS household data from the year 2000 to 2009 with concentration on two special periods which are 2003-2007 which was defined by NBER as expansionary business cycle and 2007-2009 which was defined as recession; second, it incorporates, household income and personal income into the demographic side of the model trying to investigate what would be the possible difference in magnitude of socioeconomic effects on the female labor force participation between the two business cycles .

The paper will be organized in the following sections: Section 2 gives a brief literature review and the trend of female labor force participation in the United State in the history. Section 3 outlines the empirical model. Section 4 a presentation of data and discussion of research methodology will be given. Finally, an analysis of data will be presented with empirical results in section 5, which will be followed by a conclusion in section 6.

2.0 Literature Review

Female labor force participation has drawn attention from socio-scientists from all walks of studies. To really understand the trend of Female Labour Force Participation, the understanding history of Labor force Participation Rate in the United States has become a vital part. According to Juhn (2006) and Potter (2006), "the labor force participation rate in the United States increased almost continuously for two-and-a-half decades after the mid-1960s" except for the economic downturn periods between the year 1948 and 2004 as can be seen in Figure 1. However, it has been decreased since the year 2000 by 1.5% by 2004. It is inevitable to decompose the overall labor force participation into different subgroups; take into account not only the social factors but also the economic determinants. One of the most commonly used methods to decompose the topic is to investigate the difference between female labor and male labor in terms of their participation rate by age groups. Based on the previous literatures and studies, some substantial trend has been shown among those two demographic groups. As an example of a change in population weights, the aging of the baby boom cohort has caused the prim-age 25-54 year old population to increase from approximately 50% of the over 16 population in 1975 to nearly 58 % in 1996 (Juhn, 2006). Prime-age men and women tend to have higher participation rates than either younger or older groups. However, female prime-age labor force participators did not surpass the younger female workers until the early 70s which has contributed to a major difference between male and female workers. Another distinct difference was the prime age labor participation for women has been increased significantly although with minor decrease after 2000 while male's labor participation rate for the prime age group has been decreased over time. What would possibly help to explain the macro dynamics in terms of labor force participation difference between male and female workers? What are the coefficients of the demographic independent variables on the female labor

force participation? What other economic determinants that could help potential female workers to decide whether to work or not? In order to answer the questions above, tracing back the literatures is of great help.

According to Lichter (1987) and Costanzo (1987), since the Second World War, US labor force participation rates among women have almost doubled, reaching about 55% in 1985. This significant increase in labor force participation rates has been attributed greatly to all subgroups from the labor force especially married women and women with young children. One example according to William Johnson and Jonathan Skinner's report that the rise in divorce rates between 1960 and 1980 may explain up to 17 percent of the rise in labor force participation rates of women during that period. Ralph Smith has also concluded that between the years of 1970 and 1975, the changes and effects of demographics on female has accounted for about 28% of the overall female labor force participation rate. The most relevant demographic compositions according to Lichter (1987) were Fertility, Marital Status, Education and Age. In the report for Bureau of Labor Statistics, the major questions that they strived to answer was "to what extent have changes in fertility rates, marital status, educational levels and age structure accounted for growth in labor force participation rates of women since 1970 (Lichter, 1987)". Some earlier researches has found out that in 1985, nearly half of the married women with children aged under 18 were in the labor force compared with less than 40% decade ago. The decreasing number of child bearing or delay of child bearing has also became a driving force for women in the 70s and 80s to pursue their career that can fully recognize and appreciate their personal characteristics and values other than being housewives. Thus, fertility rate and marital status has been shown their importance in the previous analysis, however, last but not the least important factor according to Lichter and Costanzo (1987) was the increasing level education among female between the decade of early

70s and early 80s. To simply show the change in educational level among female during that period of time, for women age over 25, the median years of schooling has increased from 12.1 to 12.6 years and the percentage of women who graduated form high school has reached a 13 percent growth from 52.8% to 65.8% (Lichter, 1987).

The results from the early studies of Lichter and Costanzo (1987) have multiple implications that let some social scientists to switch the research gear from investigating the overall labor force participation rate to the decomposed labor force participation dynamics from different demographic groups. Lichter (1987)'s simplified explanation of the importance of demographic factors was based on the 1987 report that shows almost half of the change in female labor force participation can be explained by the demographic changes especially the declining fertility that entails the change in women's perception about marriage and occupation.

Another most noted demographic characteristic in most previous literatures is race. According to England (2004), during much of U.S. history, black women had higher employment attachment than white women. However women with more privileged nationalities, from more advantageous ethnic groups are more likely to work for paid job since the late 20th century. Along with other two authors, England (2004) concluded that "White women work for pay more weeks per year than Latinas or Black women, although the gaps are small for all groups but Mexicans". Part of the story can be explained by the demand side of the labor market which is more closely related to employer's hiring decision and job discriminations; or even the policy reform such as the expansion of the Earned Income Tax Credit in the 90s that actually increased the number of non-white women to join the labor force. After the early 1980s, the previously surpassed black women labor force participation converged with the labor force participation for white women,

and this trend continued till now. As England et al. (2004) has found out that white women in 2001 still had the highest rate of employment. It was commonly accepted by many literatures that married women with young children would be more dependent on husband to be the bread winner of the family therefore, those women were less likely to join the labor force. However, as Higginbotham and Romero (1997) discovered that "husband support portion of this view never fit for women of color, immigrants, or working-class white women who historically have not had the option of being supported by a husband with a family wage". They also revealed the possible reasons for the early black women before 1980s being more likely to be involved in the labor force such as "lack of husbands with solid incomes", "lower marriage rates". However, in today's society, does it mean that white women with more husband support and higher possibility of marrying wealthy men are less likely to work? As shown by many earlier studies, today, white women despite being more likely to be married to high-earning men, have higher employment rates than Blacks or Latinas (England et al. 2004). The reason behind the social phenomena is the upgrading of educational level of women. Education as one of the most important determinant of returns to education in Mincer's human capital function, acts as another positive predictor of estimating a person's possibility of joining the labor force. In the research from England et al. (2004), they not only concluded that privileged women are more likely to work but also shown the positive relationship between level of education and a woman's likelihood to work. From their perspective, education is also an indicator of the social class of one's family of origin or one's adult household to some extent. However, when explaining the possibility of joining the labor force, researchers cannot simply consider education level and race or social class as the same determinant, because in today's diverse society, women from less privileged ethnic groups or less wealthier families can also move up to their academic ladder and achieve much higher education

than those who come from the privileged background. One last hypothetical reason that immigrant women would be less likely to be involved in the labor force than the native whites, according to England et al. (2004), was the social connection and language skills. This hypothesis was confirmed in the study as one can assume that some immigrant women with lower level of education have lower level of English proficiency thus are less willingly to participate in any social networks, therefore, they would miss opportunities to be employed.

Except for the human capital and demographic determinants that have possible impact on women's decision making in terms of being employed or not, Jacob Mincer's original framework for analyzing women's labor force participation also makes the conclusion that market wage not only influence the allocation of time between work and leisure but also between the time distribution of work for the market and work at home (O'Neill, 1981). From previous study we have seen an increase tendency of women taking part in the labor force. If the education and employment experience significantly increase women's potential earnings, it would be less likely for women to be home-oriented, because of the fact that the opportunity cost of staying home has been substantially increased. From Mincer's earlier study, he had also found out the changes in family income and the wife's wage could account for about 70% of the increase in labor force participation of married women from the decade between 1919 and 1929 as well as the decade between 1949 and 1959 (O'Neill, 1981).

Thus, personal income and family income has become two important factors in terms of estimating a woman's possibility of working. Economic market factors seem to be increasingly important in explaining the women's behaviour in the job market. As more women join the job market, the employers have also adapted corporate or working regulations accordingly, such as

working hours to better suit women's needs. Some big corporations even provide Day Care service for some of their women employees to encourage them working for longer hours without worrying too much about taking care of their children at home. This kind of enticement has helped in turn to attract more capable women to enter the job market.

This research will be an updated one for the critical year 2009 which has been defined as during the contraction period during the economic recession after the 2007 peak. It acts as a complement for the previous studies on the same subjects by defining and combining all previous mentioned possible independent variables that are correlated with female labor force participation decision. A regression analysis will be presented to examine the net association of female employment with age, number of children under 5 year old, marital status, personal and family income as well as educational level, races.

3.0 Trend

The increase in the proportion of women who are working or looking for work that began shortly after World War II has been one of the most significant social and economic trends in modern U.S. history. By the 1980s, there were signs that the rise was beginning to slow down and during the early 1990s, the growth of female labor force participation rate almost came to stagnation. Luckily during 1994, the new growth began to occur, the upward trend of female labor force participation rate start to resume gradually. As Hayghe (1997) stated, the rise in women's labor force participation rate came to a virtual halt as decline in participation among women under age of 25 and women in the prime working-age group combined with the early 90s recession. This historical data posts a suspicious question of whether economic downturn or the so-called recession has a negative effect on women's decision to work when holding all other factors constant. In order to answer the question, this study has to incorporate one or two economic factors that can precisely measure the economic condition of a period of time under study.

From March 1975 to March 1996, the labor force participation rate of women rose from 46 percent to nearly 59 percent (Table 1). The increase slowed down gradually over time. Between 1975 and 1980, women's labor force participation rate increased an average of 1 percentage point every year; then from 1980 to 1985, the average annual growth fell to 0.7 percentage point. The next 5 year period from 1985 to 1990, the growth rate was much slower to an average of 0.5 percentage point each year according to Hayghe (1997). The next 3 years from 1990 to 1993 witnessed an upward trend of overall female labor force participation rate, however, started form 1994, the growth rate started to resume from a rate of 58.4 percent in March 1994 to 58.8 percent in March 1996 and again the rate reached to another higher point at 59.5 percent in the first quarter

of 1997. The prospective of female labor force participation was quite promising until the economy entered a recession in March 2001. Thus it lead to a substantial decline of the labor force participation rate especially in the groups of workers aged from 16 to 24 and 25 to 54 age groups. This sudden dropoff in labor force participation was much greater than the one occurred in the early 1990s economic downturn. Comparing the two economic downturns, the dropoff from the labor force for both women and men from the same age group 25-54, the decline was much greater for women than for men although both faced a decline in from the first quarter of 2001 to the second quarter of 2003 while only male labor force faced a decline from the third quarter of 1990 to the third quarter of 1992 (Figure 2). The change in labor force participation rate for women aged 25-54 was about 1.5% between the economic downturn in the 90s and the recession period in early 2001 while this rate was only 0.8% for the male counterparts.

To sum up, overall, the labor force participation rate for women grew between 1975 and 1990, but at a gradually slowing pace. From 1990 to 1993, however, it changed little. Subsequently, the participation rate in 1994 started to resume to its original upward trend.

Table 1: Labor Force Participation Rate (percentage)

Year	Male	Female
1960	80. 4	35. 7
1970	76. 6	41. 4
1975		45. 9
1980	75. 1	49. 9
1985		54. 5
1990	76. 4	57. 5
1991		57. 0
1992		57. 4
1993		57. 2
1994		58. 4
1995		58. 7
1996		58. 8
1997		59. 5
2000	74. 8	60. 2
2001	74. 4	59. 8
2002	74. 1	59. 6
2003	73. 5	59. 5
2004	73. 3	59. 2
2005	73. 3	59. 3
2006	73. 5	59. 4
2007	73. 2	59. 3
2008	73. 0	59. 5

Sources: U.S. Department of Commerce, Bureau of the Census, <u>Census of Population</u>, May 2004; and U.S. Department of Labor, 2008

Figure 1: Labor Force Participation Rates, 1975-2008
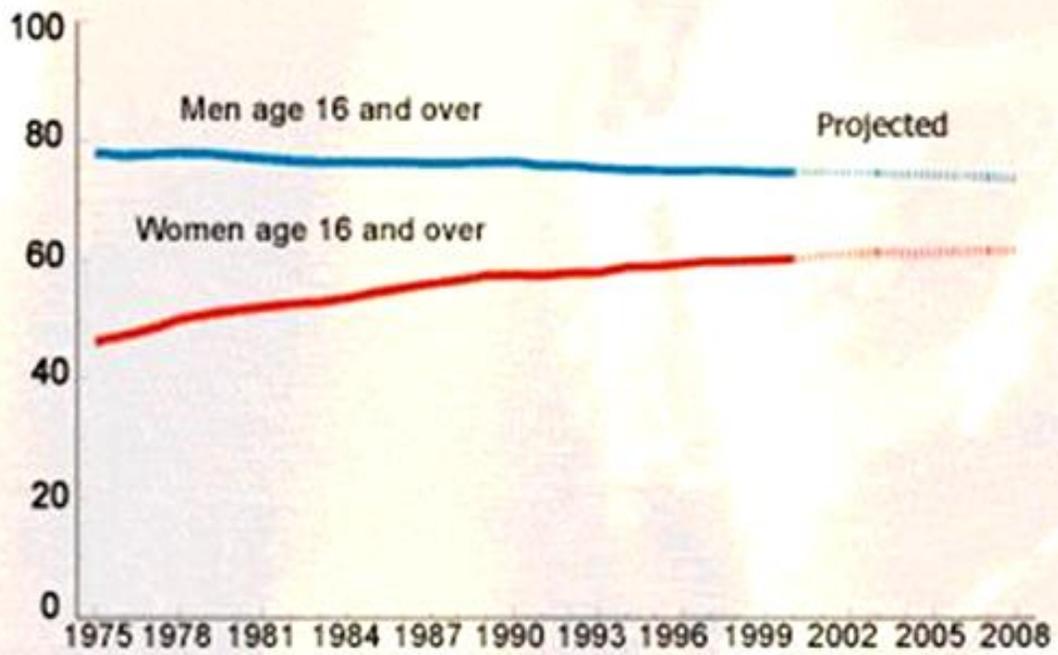
Source: Bureau of Labor Statistics. In percent.

Figure2: Change in Labor Force Participation Rate during

Recent Economic Downturns, by Age and Sex

4.0 Empirical Model

The regression model was originated from many sociology researches in terms of studying the determinants of labor force participation. One of the most prominent research touched upon the study of determinants of female labor force participation in South Korea, in which incorporated a logit regression model with a dummy variable LABFORCE as dependent variable; and number of children under 6 years old, age, marital status, educational level and household head's occupation as independent variables. The basic model has been adjusted according to meet the needs of this study as follow:

$$\text{LABFORCE} = \alpha + \beta_1 \text{ HHINCOM} + \beta_2 \text{ INCTOT} + \beta_3 \text{ NCHLT5} + \beta_4 \text{ AGE} + \beta_5 \text{ RACE} + \beta_6 \text{ MARST} + \beta_7 \text{ EDUC} + \beta_8 \text{ YEAR} + \varepsilon \quad (1)$$

$$\text{Log (inLabforce/1-inLabforce)} = \alpha + \beta_1 \text{ HHINCOM} + \beta_2 \text{ INCTOT} + \beta_3 \text{WHITES} + \beta_4 \text{ BACHELORS} + \beta_5 \text{ MARRIED} + \beta_6 \text{ NCHLT5} + \beta_7 \text{ AGE} + \beta_8 \text{ YEAR} + \varepsilon \quad (2)$$

4.1 Explanation of variables

The dependent variable is LABFORCE, which appears as a dichotomous variable indicating whether the respondent participated in the labor force during the preceding week. Those coded as "yes" in LABFORCE were either: were at work; held a job but were temporarily absent from work due to factors like vacation or illness; were seeking work; or were temporarily laid off from a job during the reference period. Because the CPS is designed to measure unemployment in the civilian population, the original dichotomous employment status variable in the survey classifies members of the armed forces as Not in Use (NIU).

Followed by the dependent variable, there are totally 7 independent variables in the basic logistic regression model. The first is HHINCOME, which reports the total money income during the previous calendar year of all adult household members. The amount should equal the sum of all household members' individual incomes as recorded in the IPUMS-CPS variable

INCTOT. The persons included were those present in the household at the time of the survey. People who lived in the household during the previous year but were not still living there at the time of the survey are not included; household members who lived elsewhere during the previous year but had joined the household at the time of the survey are included.

INCTOT indicates each respondent's total pre-tax personal income or losses from all sources for the previous calendar year. Amounts are expressed as they were reported to the interviewer.

NCHLT5 counts the number of own children age 4 and under residing with each individual. NCHLT5 includes step-children and adopted children as well as biological children. Persons with no children under 5 present are coded 0.Age gives each person's age at last birthday.

Racial categories in the CPS have been more consistent than racial categories in the census. Up through 2002, the number of race categories ranged from 3 (white, negro, and other) to 5 (white, black, American Indian/Eskimo/Aleut, Asian or Pacific Islander, and other). Beginning in 2003, respondents could report more than one race, and the number of codes rose to 21. However, through-out the study, only three categories, whites, blacks and Asians will be considered and compared.

MARST gives each person's current marital status, including whether the spouse was currently living in the same household, it is also a categorical independent variable which features married, separated, divorced, widowed and people who never get married/ single.

EDUC99 has become the most complicated independent variable which reports the respondent's highest level of educational attainment. Respondents without high school diplomas were to indicate the highest school grade they had completed, while those with high school diplomas were to indicate the highest diploma or degree they had obtained. There are totally 16 categories including, not in universe (NIU), no school completed, 1-4th grade, 5th-8th grade, 9th grade, 10th grade, 11th grade, 12th grade without diploma, high school graduates, some college without degree, associate degree in occupational program, associate degree in academic program, bachelors degree, masters degree, professional degree and doctorates degree. In the original CPS data, there is no such variable that captures years of education completed by the respondents, therefore, another variable called EDUC was created to replace the EDUC99 categorical variable. Only after the creation of the new variable EDUC, can we further group the years of education completed variable (EDUC) into three bigger categories that account for everyone in the data. The first category are those respondents who had obtained a high school degree with years of education less than 16 years, the second category features those we had obtained a bachelors degree with years of education equal to 16 years, still the third category captures those we had obtained a degree that is higher than Bachelors degree including masters degree, professional degree and doctorates degree with years of education over 16 years.

The last important variable is YEAR which captures the year in which the survey was conducted. Because the data set was collected from year 2000 to 2009, according to National Bureau of Economic Research (NBER), years between 2000 and 2009 can be further divided up into four periods of expansionary business cycle and recession business cycle. In this study, we will be comparing two period namely periodE and periodR which represent expansionary period (from 2004 to 2006) and recession period (from 2007 to 2009) respectively.

4.2 Data

The study retrieves household data from 2000 to 2009 in the United States. All data were obtained from the Current Population Survey (CPS) – IPUMS-CPS website which is a project dedicated to integrating and disseminating data from the Current Population Survey.

Table 2: Summary of Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
HHINCOME	1949589	71071.55	69088.92	-28454	1202802
INCTOT	1949589	268500.9	418964.1	-28796	999999
NCHLT5	1949589	0.1275448	0.4185193	0	6
AGE	1949589	34.02891	21.82345	0	90
RACE	1949589	153.1278	149.7321	100	830
MARST	1949589	3.709452	2.343397	1	6
EDUC99	1949589	8.262459	5.500304	0	18
EDUC	1949589	9.880282	6.217055	0	22
YEAR	1949589	2004.79	2.733892	2000	2009
SEX	1949589	1.514616	0.4997865	1	2
LABFORORCE	1949589	1.255431	0.8253837	0	2
inLabforce	1949589	0.5009671	0.4999992	0	1

5.0 Empirical Results

According to Nam (1991), the logit coefficients in the following tables represent the linear effect of a unit change in an independent variable on the log odds of a dependent variable, when holding all other variables constant. Therefore, exponential transformation of the logit is

needed for interpreting the proportional change in the odds of a dependent variable for a unit change in an independent variable. For example, the first logistic probability regression model (Table 3) has confirmed the historical trends of overall labor force participation in the United States. Although with an increasing labor force participation rate within the female demographic group, their likelihood of participating in the labor force was about 1.786 times less than that of their male counterparts from the year 2000 to 2009, since the coefficient in the model (Table 3) equals to negative 0.58, we get the odds of labor force participation for female by transforming exponentially the number of 0.58 to e $^{0.58}$ which calculated as 1.786. Therefore, the following interpretation of logit coefficients will follow the same calculation process.

When taking into account the house hold income variable, it was confirmed that the wealthier the family, the more likely that the person will be more active in terms of participating in the labor force while personal income has a negative impact on the probability of being in the labor force. From Table 3, we conclude that when house hold income increased by 1 dollar, the odds of entering the labor force would be 1 time more. This phenomenon has been explained by labor economists in terms of utility maximization and opportunity cost. Regardless of the approach that a person used in accumulating his or her personal income, the more income he or she has, for example the unemployment insurance, the more dependent the respondent will be on the benefits, the less likely that he or she will be enticed into the labor force. Another possible explanation is that as personal income accumulated to a certain level, people would like to better allocate their time between work and leisure in order to maximize their utility especially for women with good educational background and accumulated income, they might choose to stay away from work and spend more time with family members instead if they were married. Household income on the other hand can be viewed as an inspirational variable that encourages

respondents to take part in the labor. In terms of odds of labor force participation across racial categories, white people are 1.07 times more likely to be involved in the labor force than all other ethnic groups. Respondents with Bachelors degree would be 2.13 times more likely to be involved in the labor force than those without formal college education, thus education attainment has played a vital part in labor supply decision. For those who are married are 2.085 times more likely to participate in the labor force compared with the base categories like separated, divorced, widowed and single. The age factor was confirmed with a negative impact on the probability of participating the labor force, however, we will need to further divided age into different age profiles, for example, people aged from 16 to 25 and people aged from 25-44 might have a difference result in terms of its contribution to the labor force participation. What is surprising from the basic logistic regression model is the independent variable of NCHLT5, number of children under age of 5, which has a positive relationship with the probability of involving in the labor force. The reason could be contributed to the fact that this regression model was a combined model with male and female respondents. Overall, if the family has more children under 5 years old, parents will need to work in order to take good care of the children.

In order to further discover the relationship between number of children under 5 years old and the probability of entering the labor force, an interaction variable has been created as NCHLT5F which captures how many children under 5 does a female respondent has. We then regress the same basic logistic model with an additional variable NCHLT5F. The coefficient of this variable has significantly confirmed our hypothesis that if a person is a female, the more children she has under the age of 5, the less likely that she will be able to participate in the labor force, in other words, she will be 5.98 times less likely to be involved in the market job than housework. However, for their male counterparts, the coefficient has appeared to be statistically

and positively significant. The more children under 5 years old the male has, the more likely that

they will expose themselves in the labor market as the bread winner of the family.

Table 3: Logistic Probability Regression Result for InLabforce

	InLabforce		
	I	II	III
CONSTANT	1.280	1.21	-0.950
	(0.007)	(0.007)	(0.006)
female	-.580***	-.415***	
	(.004)	(.004)	
hhincome	6.29e-06***	6.28e-06***	6.42e-06***
	(3.33e-08)	(3.34e-08)	(3.30e-08)
inctot	-5.59e-06***	-5.60e-06***	-5.46e-06***
	(1.29e-08)	(1.30e-08)	(1.25e-08)
whites	0.065***	0.063***	0.079***
	(0.005)	(0.005)	(0.005)
bachelors	0.76***	0.77***	0.75***
	(0.006)	(0.006)	(0.006)
married	0.735***	0.713***	0.778***
	(0.004)	(0.004)	(0.004)
Nchlt5	0.043***	1.404***	0.016***
	(0.005)	(.014)	(0.004)
age	-0.026***	-0.26***	-0.026***
	(0.0001)	(.0001)	(0.0001)
NCHLT5F		-1.789***	
		(0.15)	
Pseudo R2	0.339	0.347	0.330
LR chi2	915562.80	938833.63	890715.67
Number of obs.	1949589	1949589	1949589

Note: ***, **, and * denotes significance at the 1%, 5%, and 10% respectively. Standard errors in parentheses

In order to compare the two time periods which defined by National Bureau of Economics Research (NBER) as expansionary and contraction periods, another two variables has been created, the first of which is called periodE, which defined as expansionary business cycle in the year of 2004, 2005 and 2006; the second is called period, which was recognized as economic recession from the year 2007 to the year of 2009. Since we are interested in female labor force participation in both periods, two interaction variables Efemale and Rfemale were created which captures females in expansionary period and female in economic recession respectively.

As indicated in Table 4, the comparison between two economic periods is surprisingly unconventional. From the demand side of the labor market, during the economic downturns, we have seen increasing unemployment rate which indicate the simple fact that employers would usually start to cut back their labor costs by simply increasing the number of laid-off workers. There would be little job opening and therefore less demand for employees in general. We would have expected that labor force participation would be less promising during the economic downturns than during the expansionary period. However, the above regression has indicated a different finding that female during the time from 2007 to 2009 have higher chance of participating in the labor force than female during the time of expansion from 2004 to 2006. The difference in difference in terms of coefficient between the possibility of working for women in expansionary period and recession period can be calculated by adding the two coefficients 0.008 and 0.024 together which equals to 0.032. We can also conclude from the above number that the chance of women taking part in the labor force in the recession business cycle is 1.024 times more than women during other critical business cycles and women during expansionary period specifically from 2004 to 2006 have a 1.008 times less chance to be involved in the labor force than women during other business cycles.

Table 4: Regression Results for Female in the Labor Force

	InLabforce	InLabforce
	2004-2006	2007-2009
CONSTANT	1.283	1.297
	(0.007)	(0.007)
female	-.577***	-.588***
	(.004)	(.004)
hhincome	6.29e-06***	6.33e-06***
	(3.33e-08)	(3.34e-08)
inctot	-5.59e-06***	-5.59e-06***
	(1.29e-08)	(1.29e-08)
whites	0.065***	0.064***
	(0.005)	(0.005)
bachelors	0.76***	0.76***
	(0.006)	(0.006)
married	0.735***	0.734***
	(0.004)	(0.004)
Nchlt5	0.043***	0.044***
	(0.005)	(0.005)
age	-0.026***	-0.026***
	(0.0001)	(.0001)
Efemale/Rfemale	-0.008	0.024***
	（0.008）	(0.15)
periodE/periodR	-0.010*	-0.058***
	(0.006)	（0.006）
Pseudo R2	0.339	0.339
LR chi2	915567.70	915701.43
Number of obs.	1949589	1949589

Note: *** , **, and * denotes significance at the 1%, 5%, and 10% respectively.   Standard errors in parentheses

One of the previous studies has attributed the possible reason why women are more likely to work during economic downturns to the fact that more males have been laid off during recession than expansionary period. In order to confirm the above assertion, we were able to run the same logistic regression model in male case only (that is when sex=0). The regression result has indicated that the chance of male being involved in the labor force during recession has is 1.03 times less than male in other business cycles, which was almost identical with the increase in odds of female case during the same period of time.

Another interesting demographic variable that we would like to take into account is the racial categories (Table 5). Three new interaction variables were generated as Femalewhites, Femalebalcks and Femaleasians. Originally we were interested in finding out the difference of racial groups between two economic time periods, however, little difference was found through-out the timeline. What makes significant difference is the change among difference ethnic groups namely white females, black females and asian females.

Table 5: Female Labor Force Participation Logit Coefficients across Race

	InLabforce	InLabforce
	2004-2006	2007-2009
Femalewhite	-0.403***	-0.403***
	(0.009)	(0.009)
Femaleblacks	0.607***	0.606***
	(0.113)	(0.011)
Femaleasians	-0.145***	-0.149***
	(0.020)	(0.020)

Note: *** , **, and * denotes significance at the 1%, 5%, and 10% respectively.   Standard errors in parentheses

Comparing the three races, black women have the greatest chance of taking part in the labor force during both expansionary and recession periods while white females are least possible in terms of participating in the labor force. According to Table 5, white females are 1.496 times less likely to enter the labor force than female in other ethnic groups while black females are 1.835 times more likely to be involved in the labor force than female in other racial groups which ranks the highest among the three groups. Asian women are 1.156 times less likely to participate in the labor force than women from other ethnic groups. Again, regardless of the demand side of the labor market, considering only the female employee's choice of whether to work for the market or work as housewives, black women has a much higher tendency to work in the labor market than the other two groups. Some previous studies have also shown the same trend that attributed to the household heads' employment status. Therefore, in the future study we will need to pair the husbands' data with the wives' data to discover the possible relationship between the degree of dependence on husbands and probability of the choice to work.

Educational attainment is always an essential factor that initiates someone to participate in the labor force or not. Overall, we would expect a positive relationship between educational level and the chance of taking part in the labor force. Our model has confirms that it is only true in the female case rather than for male labor force participation. The coefficients between two business cycles are almost identical; therefore the main concentration will be put on the expansionary period (Table 6). We have found out that females who are high school graduates are 5.17 times less likely to participate in the labor force than females with degrees higher than high school degree, when moving up the educational ladders, the chance of female to be involved in the work place has been increased, female with a Bachelors degree would be 1.298 times more likely to work than female with more or less than a Bachelors degree; female with

more than a Bachelors degree would have an even greater chance to be exposed in the labor

market at a magnitude of 1.59 times more than those who have degrees lower or equal to 16

years. However, in the male case, we have witnessed a different pattern in terms of the odds of

being involved in the labor force. Males at a high school level are 6.221 times less likely to

participate in the labor force than those with a degree that is higher than high school degree,

while those males with a Bachelors degree would be 1.599 times more likely to be employed and

at an even higher level of education, males are 1.42 times greater chance to participate in the

labor force than those with educations less or equal to 16 years. Therefore, we can confirm with

the previous findings that higher education has helped female to be more confident and self-

fulfilled in the labor market therefore contributes a great deal to female's decision to work.

Table 6: FLFP Logit Coefficient across Education Attainment

Gender	Educational Attainment			R-square
	High School Graduates	Bachelors	More than Bachelors	
Female	-1.642901***	0.26096***	0.46084***	0.1252
	(0.0055)	(0.008)	(0.01139)	
Male	-1.827884***	0.4699094***	0.35086***	0.1407
	(0.0065)	(0.01068)	(0.0129)	

Note: ***, **, and * denotes significance at the 1%, 5%, and 10% respectively. Standard errors in parentheses

To further investigate the gap between chance of women to participate in the labor force and the chance of men's labor force participation, holding educational level constant is an essential process. The table (Table 7) below has shown the logit coefficients that help to explain female's chance of participating in the labor force when holding each educational level constant.

Table 7: FLFP Logit Coefficients by Gender at Different Educational Levels

	High school degree	Bachelors	More than Bachelors
Female	-0.8288***	-0.760412***	-0.4415***
	(0.007)	(0.011)	(0.015)

Note: *** , **, and * denotes significance at the 1%, 5%, and 10% respectively.   Standard errors in parentheses

From the above table, at high school level, women are 2.29 times less likely to participate in the labor force than men at the same educational level; women with Bachelors degree are 2.141 times less likely to be involved in the labor force than their male counterparts with the same degree. Moreover, female with education of more than 16 years are 1.56 times less likely to work compared with their males counterparts with education of more than 16 years. We can therefore draw the conclusion that although male has an absolute advantage in terms of being employed or being active in participating in the labor force from 2000 to 2009, the odds gap between male and female has been narrowed as female achieving higher education.

6.0 Conclusion

The study has found out that female from wealthier families with higher household income are more likely to participate in the labor force than those who are less wealthier while women with higher personal income are less likely to become part of the labor force. The implication of this finding is that the probability of female participating in the labor force has been attributed more to household income than personal income. However, we cannot conclude to what extend do female's decision to work depend on their spouse/household head's working status; a further study of the husbands' data will be greatly needed in the future. The other important finding from the study is that female's decision to work has been largely and negatively impacted by the number of young children they have in the household which implies that child bearing and taking care of children are still the primary responsibilities and roles for women in today's society. The third empirical finding is the female labor force participation among different races in which we've discovered black females has the highest probability in taking part in the labor force comparing with the other two groups while white females has the least tendency of joining the labor force. The fourth empirical result indicates the impact of economic recession on female labor force participation, as a result, a conclusion can be drawn that female during economic downturns have higher possibility of joining the labor force than female during the expansionary business cycle due to decline in male's labor force participation during recession which in turn confirm the indispensible dependence of women's decision making toward joining the labor force on their husbands' employment status rather than making decision on their own. A final discovery implies how the change of educational levels affect women's intention to work, the empirical finding shows that higher education helps to increase the probability of women participating in the labor force and provides them with more incentives to work rather than to stay at home.

Appendix A: Definition of variables

LFP	labor force participation	In the labor force=1 Not in the labor force=0	Expected sign
HHINCOM	Household Income		+
INCTOT	Personal Income		+/-
NCHLT5	Number of children under 5 year old	Ranges from 0 to 6	_
AGE	Age		_
RACE	race	Whites Blacks Asians only	+/-
MARST	Marital status	Married Never married/single Divorced Separated Widowed	+/-
EDUC99	Educational attainment	Under 11th grade Associate degree Bachelors High school graduates Masters Doctorate professional Some college with no degree	+/-
EDUC	Years of education completed	Range from 0 to 22 hsE (educ<16), Bachelors (educ=16), more than bachelors (educ>16)	+
Year	Year when the survey was conducted	From 2000 to 2009 Expasionary(2004,2005,2006) Recession (2007, 2008, 2009)	

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