

MARRIED WOMEN'S LABOR FORCE PARTICIPATION IN DEVELOPING COUNTRIES: THE CASE OF MEXICO

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Resumen: Se investigan los efectos de factores culturales y estructurales sobre las determinantes de la participación de mujeres casadas en la fuerza de trabajo en México. Encontramos que los factores que más afectan la participación de mujeres casadas en el sector formal de trabajo en México, son similares a los de los países industrializados. Sin embargo, para el sector informal se encontró que los factores considerados en la decisión de las mujeres mexicanas para trabajar en él, podrían ser diferentes a los del sector formal. Un resultado importante del estudio es que el salario de reserva para mujeres casadas parece ser más alto en México, comparado con países más industrializados.

Abstract: This study investigates the effect of cultural and structural features of Mexico on women's labor force determination. Our findings show that the major factors influencing married women's participation in the formal sector in Mexico are similar to those affecting married women's participation in industrialized countries. However, the study indicates that factors driving the decision Mexican women to work in the informal sector may be different from those driving decisions to work in the formal sector. An important result is that the reservation wage for married women appears to be higher in Mexico than in more industrialized countries.

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1. Introduction

For men economic necessity and social norms often dictate labor force participation. Women are viewed as having more choice. Over time and across countries this "choice" has been to increase their participation in the paid labor force. Traditionally women's labor participation has been defined as paid labor in the formal sector. Recently, however, a few researchers have begun to redefine women's work to include informal labor sector work and unpaid work in the home (e.g. Mies, 1988, Ward, 1990, García and de Oliveira, 1994). This paper adopts this expanded view of women's labor force participation. It examines the effect of both supply and demand factors on the labor participation decision and in which of these sectors a married woman will work. This study also investigates the extent to which the findings of determinants of women's labor force participation in industrialized countries hold for women in a developing country, such as Mexico. One difference in the approach used here, relative to some other studies, is that women's unpaid work in the home is treated explicitly as a work choice and not a default or "leisure" category.

There are several reasons to expect some differences in response between Mexican women and those in industrialized countries. First, relative to European and us economies, home production and informal labor sector production (including unpaid work in family businesses) are much more important. In many developing countries it is estimated that more than half of the economically active population may be working in the informal sector (Otero, 1989). Second, family income is lower and much more unevenly distributed, resulting in a higher proportion of poor households. Third, Mexico experienced a rapid decline in real wages during the 1980s, so that the participation decision was being made in the face of falling rather than rising real income.¹ Fourth, Mexico continues to have a strong tradition of a patriarchal family where the wife has a clearly defined role as homemaker. The extent to

¹ See García and de Oliveira (1994, p. 86) for a comparison of the labor force participation rates of women in Mexico between 1982, before the economic crisis, and 1987. One result they found was that in 1982 younger women, aged 20 to 24 years had the largest labor force participation rates. However, by 1987 women 25 to 44 years of age (the majority in this age group being married) had a greater participation rate than the younger women.

which Mexico's traditions and level of economic development alter the determinants of married women's labor force participation is a major focus of this paper.

The decision of the wife to participate in unpaid housework, in the formal or informal sector, is assumed to be made within the context of the well-being of the family as a whole to maximize a family utility function (Becker, 1965). This model expands upon the very early models of the choice between "leisure" work for pay, by having work defined as work in the home (unpaid) and paid work in the formal and informal labor sectors. It was Mincer (1962) who originally pointed out that, especially in the case of women, one should distinguish between work at home and leisure. Although work in the home is work without direct monetary compensation, production in the home (cooking, time spent with children, etc.) can, to some extent, be substituted with purchased market goods (prepared foods, babysitters, etc.). Thus work in the home should be treated and valued as a separate work option.

Economic theory, as well as earlier empirical studies, indicates that the potential wage from paid work, as well as the personal and household attributes of the individual woman, will affect how they allocate their time between the paid labor market and unpaid activities. A number of these "supply-side" models, again beginning with Mincer (1962), generally include proxy variables for personal and household characteristics, such as educational levels, representing human capital, migration status and age. Age is often used as a proxy for labor market experience and/or to capture a possible cohort effect of changing attitudes toward work outside the home by younger women. The length of time in an area may increase knowledge of job availability and connections. Some studies have found the effects of migration to a new area to be indeterminant and others found it to be negatively related to women's labor force participation (Sandell, 1977, Shields and Shields, 1989, Pong, 1991).

Among household characteristics, the presence of children and other family income are expected to be significant. Cohen (1970) found that the presence of a child under 6 years old has the largest effect of any factor in determining labor force participation of married women. García and de Oliveira (1994) also found that the presence of small children (under 3) significantly decreased married women's labor force participation rates, even after the economic crisis. Other family income

is also expected to affect the woman's work decision. In most other studies, other household income is defined to only include the husband's income, as in developed countries extended families and working children usually do not all live in the same household. This is not the case in Mexico, and in most other developing countries, where extended families frequently form the household and children may begin contributing income at a relatively young age. Where a wife's wage may be a substitute for the husband's, children's and other household wages may be complementary. García and de Oliveira (1994) found that, for the most part, women's labor force participation was in response to family need, the husband's income being a key variable to explain women's work, and very rarely was it due to the woman seeking personal fulfillment.

2. Formal vs. Informal Labor Sector

A significant difference between developed and developing country labor markets is the existence of a large informal labor sector in the latter. For this reason this study treats informal sector work as a separate choice.² The distinction between the formal and informal labor sectors is one that has been made in economic development literature starting in the early 1970s. The characteristics of the informal sector listed in the International Labour Organization, ILO, report (1971) are: (1) ease of entry, (2) reliance on indigenous resources, (3) family ownership of enterprises, (4) small scale of operation (5) labor-intensive and adapted technology, (6) skills acquired outside the formal school system, (7) unregulated and competitive markets. This sector is characterized by lack of regulation, including health, safety and minimum wage requirements and lack of access to capital, both physical and human. The sector has the advantages of ease of entrance and the possibility of flexible hours, but

² The informal sector described here is not the same as the dead-ended jobs for women discussed in some of the us dual-labor market literature. Nor is it in developing countries necessarily, or even usually, a sector of "underground", illegal activities as it is in industrialized countries. Hill (1983) has shown that the factors affecting a woman's decision to enter the informal sector are different from those for the formal sector. Therefore, the choices of formal and informal labor sector work need to be treated separately.

the disadvantages of low wages, lack of security, lack of government or property rights protection, lack of opportunity to create human or physical capital and marginalized living.

Prior to the 1980s, a decrease in the size of the informal sector was considered to be a step in the economic development process. After the debt crisis of 1982, however, the informal sector was suddenly seen (especially by lending institutions, such as the World Bank) as not only a panacea for increasingly impoverished families, but as a dynamic bastion of free market capitalism, to be encouraged and funded (de Soto, 1986). Milton Friedman praises the informal sector for allowing "individuals to get around the restrictions imposed by government on personal enterprise" (Graziani, 1978). In developing countries, such as Mexico, where labor legislation is complex and includes constraints on dismissing workers, the informal sector offers employers increased flexibility and decreased risks. It interacts with and subsidizes the formal sector through the provision of cheap goods and services, using the formal sector's surplus labor, buying material from and subcontracting with it. Jacques Charmes (1990) argues that the low wage informal sector acts as a transition to the informal entrepreneur and then to employment in the formal sector.

Another view, Fields (1990) is that rather than a transitional sequence, the informal sector is actually two separate (but unregulated) sectors. Fields calls the low wage segment the "easy entry informal" sector. The other segment, the "upper tier informal", does have barriers to entry in that entrepreneurial activity requires human and physical capital. The low productivity and low remuneration of the participants in the "easy entry" sector have led these workers to be called underemployed. A case study by Carlos Sanchez, *et al.* (1981) on the informal sector in Cordoba, Argentina found that 80.4% of men in the informal sector were in the low wage category (equivalent to Field's easy entry sector) but that 97.8% of all women in the informal sector were in the low wage category. He also found that 63% of the employed population in the informal sector were women. In the formal sector 23% were women. He concludes that "women's participation is relatively greater in low income informal sector activities".³

³ For an expanded analysis of women's labor force participation within a two-tiered informal labor sector, see Anderson and Dimon (forthcoming).

In our study, based on a random representative sample of households in Tijuana and Torreon, only 4.6% of women in the informal sector could be considered upper tier. (See table 1.) This suggests that very few women ever participate in Field's "upper tier informal" sector.

Table 1
Formal vs. Informal Sector Wages Married Women
(cumulative percentage)

<i>Wages</i>	<i>Informal Sector</i>	<i>Formal Sector</i>
1 Minimum Wage or Less = 170 000 pesos/month = \$123	36.9	9.7
2 Minimum Wages or Less = 340 000 pesos/month = \$246	73.8	50.4
3 Minimum Wages or Less = 510 000 pesos/month = \$370	86.2	84.1
High Wage: 1 000 000 pesos/month or more (= \$725/month or more)	4.6	1.8

Note: 1987, Oct.-Dec. Minimum Wage/Day = 5 625 pesos (Exchange rate = 1 378/\$). This is the minimum wage for unskilled labor in Zone I.

3. Wages in the Informal vs. Formal Sector

Minimum wage legislation in Mexico is very detailed. Legislated minimum wages vary both by region and occupation.⁴ They have been treated by many employers as a maximum, as well as a minimum.⁵ In other words it is seen by many as simply a government set wage. Starting with the economic crisis in 1982, government legislated minimum wages were decreased drastically in real terms. Real minimum wages for unskilled workers fell by 48% between 1982 and 1987 (the year the data set was collected).⁶ Many have argued that given this sharp decrease, informal

⁴ The minimum wage quoted in table 1 is the minimum wage for unskilled labor in Zone I. Other legislated minimum wages are calculated as multiples of that wage.

⁵ Workers who are paid above the minimum rate specified for their skill level pay a penalty tax on the amount of earnings above the minimum. Because of this firms often pay higher wages indirectly through bonuses and fringe benefits, like lunches and clothing. Bonuses and fringe benefits are tax free (Catanzarite and Strober, 1993).

⁶ Real wages continued to fall in Mexico until 1989.

sector workers may have fared better than formal sector workers since the former are not subject to the government declared decreases. The differential between formal and informal sector wages may have in fact decreased. As Fields (1990) points out, there is a substantial overlap in the wage distributions between formal and informal sector workers. Nonetheless, even after this dramatic decrease in the real formal sector minimum wage, unadjusted for differences in education, experience, etc., most formal sector workers have higher wages than informal sector workers. As table 1 shows, over a third of women working in the informal sector earned less than the legislated, minimum wage for unskilled workers, (\$123 per month for a 48 hour work week) while less than 10% of formal sector workers fell below this amount. Almost three quarters of all women in the informal sector earned less than two minimum wages, compared to half of those in the formal sector earned less than that amount. In contrast, 4.6% of the women in the informal sector earned more than 1,000,000 pesos per month (\$725) or more while only 1.8% of those in the formal sector achieved that amount.

4. Labor Sector Decision Model

The theoretical framework for this study is derived from the following model, which approaches the married women's work decision at a specific point in time. Women's work activity is assumed to be divided into four categories: (1) in school, (2) work in the home without remuneration, (3) work in the informal sector, and (4) work in the formal sector. It assumes that the married woman's activity decision is made within the context of the family.⁷

Let U = the family utility function, n = family size, δ = woman's choice of activity

$$\text{where } \delta = \begin{cases} \text{school} = S \\ \text{home} = H \\ \text{informal} = I \\ \text{formal} = F \end{cases}$$

⁷ In the Mexican setting the role of the family is stronger than in the us and family is understood to include the extended family.

Then each member of the family, constrained by total hour (HR), chooses an activity in a way that maximizes the joint family utility:

$$\underset{\delta}{\text{Max}} U = U(Y_F, Y_I, Y_H, Y_S)$$

$$\text{Subject to } \sum_j \sum_i hr_{ij} \leq \overline{HR}$$

$i = F, I, H, S$ $j =$ family members of working age

$$\text{assuming } U' > 0, U'' < 0 \text{ and } Y_i = \sum w_i h_i \text{ for each } i \quad (1)$$

where Y_F is the explicit income earned in the formal sector, Y_I is income from the informal sector, Y_H is the implicit income from work performed in the home and Y_S is the present value of future added earnings due to education. The hr_{ij} are the hours worked by each family member in the four activity categories. Expected income in the formal and informal sectors depends on wages, W_{Fj} and W_{Ij} , respectively, times hours of work, times the probability of paid employment. Determinants of potential formal and informal sector wages for family member (j) are:

$$W_{ij} = \omega_{ij} \text{ (experience, education, gender, number of years since migration) for } i = I, F \quad (2)$$

The implicit income from work in the home is a function of a reservation wage equal to the vacile of the household functions performed W_{Hj} , and the time spent in performing these functions. The value of household functions, and thus the reservation wage: (1) increases with the number of young children; (2) decreases with older children, who can help; (3) decreases with the existence of other women in the home to do the house work; and (4) increases where there is a strong belief in the tradicional role of a woman as homemaker. Then the reservation wage for household work can be expressed as:

$$W_{Hj} = k_j(ch_{0-5}, ch_{6-12}, ch_{13-18}, \sum_{k \neq j} OW_k) \quad (3)$$

where ch_{0-5} is the number of children in the household, ages 0 to 5 years, etc. and $\sum_{k \neq j} OW_k$ is the number of other homemakers in the household.

The probability, P , of the activity decision of the j^{th} household member is a joint family decision which depends on the potential wages from each sector, the earnings of other family members, the homemaking contributions of other family members and gender of the person. Cultural norms also dictate activity by gender within the family: the male head of household works in the paid labor sector and the female spouse works in the home. Married women may be more likely to enter the paid labor sector when the husband's wage is lower, in order to supplement their husband's wage. Other family members may also enter the labor force as secondary workers. If this is the case, the married woman's wage would tend to be a substitute for the husband's wage and complementary to other family members' wages. In addition to these factors, labor demand, represented by D_L , is assumed to affect the decision.

The equation for the probability of the activity decision of the j^{th} married woman can be expressed as:⁸

$$P(\delta_j) = p(\text{age, years in school, years since migration, } ch_{6-5}, ch_{6-12}, ch_{13-18}, \sum_{k \neq j} OW_k, \text{ potential wage}_j, \text{ husband's wage, } \sum \text{ wages of other family members, } D_L) \quad (4)$$

The multinomial logit model used to estimate equation (4) is of the form:

$$\ln_e(P_i/P_h) = a_i + b_i X + e_i \quad (5)$$

where P_h refers to the probability that a woman works in the home and the P_i 's refer to the probability a woman is in school, in the informal

⁸ This model does not explicitly include leisure. Indirectly leisure for women is included in that if a woman is working in the home she has more leisure than in the paid labor force, given the tendency for double duty of working women (Brown, 1977, Fernandez-Kelly, 1983, Tiano, 1990). The amount of leisure that a woman has may also increase as additional women in the home contribute to home production.

sector, or the formal sector. The work choices are mutually exclusive, and the sum of the probabilities are constrained to equal one. The vector of independent variables, the right-hand side of equation (4), is designated by X . The parameters estimated enable one to determine the effect of the independent variables on the relative probabilities of a woman's work decision. Age is assumed to affect the work decision nonlinearly. For this reason age squared is added to equation (4).

5. Estimation of the Model

The data used to estimate this model are from a household survey done in two Mexican cities: Tijuana, Baja California, and Torreon, Coahuila, in 1987. These settings have two advantages. First, they are in Mexico where there is a strong traditional role for women (the cultural element). Second, these two cities offer a clear contrast in the demand for labor.⁹ Tijuana is on the us-Mexican border and has been a leading center of off-shore production facilities of *maquiladoras*. At the time of the survey Tijuana had 250 *maquiladora* plants employing approximately 40 000 workers, which was slightly more than 15% of all formal sector workers for the city, and was second only to Ciudad Juárez in number of jobs created by offshore production facilities (Stoddard, 1988) and Instituto Nacional de Estadística, Geografía e Informática, INEGI, 1991. These production facilities were expanding rapidly so that Tijuana in 1987 was experiencing a period of high formal sector demand, particularly for female labor. One piece of evidence for this was the permanently displayed help wanted signs on almost all the plants. Another support for the claim of an existence of high, if not excess demand for *maquiladora* workers, were the very high turnover rates in the plants and the fact that new migrants reportedly found work within a few days of their arrival in Tijuana.

By comparison, Torreon is an interior city with a more traditional, agriculturally based industry. It is the largest of the *Región Lagunera* cities and an important cotton, wheat, mining and dairy farming center.

⁹ Chant's (1991) descriptive study compared the female labor forces of the Mexican cities of Puerto Vallarta, León, and Querétaro to capture the impact of labor demand on female labor force participation.

Mining accounted for 66% of the total value of production at the time of the survey (INEGI, 1991). The potential labor force (defined as population 12 and over) is two thirds the size of Tijuana's (334,267 persons compared to Tijuana's 525,879 persons). The year 1987 was a year of crisis in Mexico and certainly in Torreon. An indicator of the higher labor demand in Tijuana compared to Torreon at the time is that the labor force participation rate in Torreon was 44.2% while in Tijuana it was 49.7% (INEGI, 1991). The contrast between the booming Tijuana economy and the struggling Torreon economy permits a test for the effect of economic fluctuation on women's labor force participation. García and de Oliveira (1994), using data for all of Mexico, compare the impact of diverse economic conditions by examining variables' effect on women's labor force participation for the years 1982 and 1987 in Mexico.

The data set consists of a usable (without missing observations) sample of 734 married¹⁰ women, age 13 and older.¹¹ A woman was categorized as working, in the home only if she specifically answered yes to doing housework and/or unpaid work in a family business as her main activity. In contrast to many other studies, this category is not a catchall "doesn't work" category. There is a fourth category (in which there was only 12 married women in the sample) for those in school,

¹⁰ "Married" includes both married and free union.

¹¹ The questionnaire and statistical sampling were designed and data collected by the Colegio de la Frontera Norte. The sampling is random, based on the sampling table established by INEGI the agency that conducts the Mexican census. The sampling is stratified by income proportional to the number of houses (according to the census) in each category classified as either high, medium, or low income. The survey is a household survey where household is defined as the family unit, including extended family. It is possible to have multiple households in one physical house. Where more than one household existed, a separate questionnaire for each was administered. The data include both information on individual women and the members of their households. Information on domestic employees who do not live in the household is not included in the survey.

The sampling universe is limited to the urban areas of Tijuana and Torreon, which omit many of the marginal, squatter neighborhoods (the less established ones). This biases the population, especially in the rapidly growing Tijuana, by omitting a proportion of the poorest population. For example, according to official Tijuana municipio figures for 1987, 48.1 percent of houses have running water. In the present sample 58.6 percent have water inside the home and another 10.5 percent have running water outside the home (or 69 percent compared to the 48 percent overall). This bias needs to be taken into account when examining the means of the variables and the empirical results.

retired, disabled or living on capital. The work in the home category is treated as an active work decision (and *not* a leisure decision) with an implicit economic value.

A woman was categorized as being in the paid work force if she either answered yes to working, on leave due to illness or vacation, or actively looking for work. Within the paid work force she was grouped into either the informal or formal sector. The key variable for differentiating between these two sectors was whether or not the person was covered by social security. Those with social security were classified as being in the formal sector. For those without social security we used the two methods to classify, one based on occupation and the other on industrial classification.¹² Women who did unpaid work in a family business were included in the informal sector.¹³

Table 2 presents the mean values for all of the variables used in the estimation of equation (4). The age of the women range from 14 to 88 years with an average of 35 years, almost the same in both cities. Years of schooling average 7.0 years, ranging from 0 to 18. On average, married women in Torreon have about one more year of schooling than do women in Tijuana. The average number of children per household in each age group is slightly under 1 in both cities. The average number of years in the city, over 22, indicates considerable stability in the households in the survey and, as expected, more stability in Torreon, over 25 years, than in

¹² Specifically the definition based on occupation defined "formal" as those who received social security or were a professional, government official or private sector manager. "Informal" are those who received no social security and who were in any of the other 17 occupational categories. For example, self-employed professionals, such as medical doctors, do not receive social security yet they would not be considered part of the informal sector. In other occupations, such as seamstresses, the receiving of social security distinguishes between the formal and informal sector. The alternative method, based on the industrial branch, defined "formal" as those who received social security or who worked in education or government. "Informal" are those who receive no social security and who fall in any of the other of the 17 industrial branches. If there was a discrepancy between these two definitions then each case was individually evaluated.

When the results of the two definitions were compared only 16 discrepancies existed. Each of these were examined and a decision made as to formal or informal sector participation based on their answers to the whole questionnaire, including their own (not the family's) monthly income. In a couple of cases where it was very unclear which was the correct category, the observations were omitted.

¹³ This group is too small to be treated as a separate category.

Table 2
Means of Variable for Married Women
(Tijuana and Torreon)

<i>Variable</i>	<i>Combined</i> <i>(n = 734)</i>	<i>Torreon</i> <i>(n = 388)</i>	<i>Tijuana</i> <i>(n = 346)</i>
Age	35.152	35.216	35.054
Age squared	1 394.041	1 384.938	1 408.547
Number of other Homemakers in the House	0.252	0.244	0.272
Years of school	7.039	7.427	6.579
Number of children ages 0-5	0.819	0.755	0.861
Number of children ages 6-12	0.906	0.948	0.858
Number of children ages 13-18	0.857	0.814	0.918
Years in the city	22.364	25.490	18.640
Lives in Tijuana (yes = 1)	0.471		
Monthly Income of Married Woman (pesos)	76 319	82 588	69 386
Potential Woman's Monthly Income (pesos)	278 794	315 995	273 038
Husband's Monthly Income (pesos)	452 322	480 090	417 917
Other Family Monthly Income (pesos)	163 250	152 582	174 458

Tijuana, with over 18 years.¹⁴ Average monthly earnings of married women (converted at the 1 378 old peso/dollar exchange rate) is \$55 per month.

The potencial wage for a woman is estimated following the methodology suggested by Heckman (1979). A wage equation was estimated for women employed full time as a function of their household and personal characteristics. Included in this equation is an inverse Mill's ratio to correct for selection bias.¹⁵ The fitted value of this equation,

¹⁴ Recalling that this survey omits many of the marginal, squatter neighborhoods (the less established ones), from the sampling universe, the average tenure in the city is likely to be biased upward.

¹⁵ The auxiliary probit equation, used to calculate the inverse Mill's ratio, λ , is:

$$\begin{array}{ll}
 \text{Work} & = -2.64 + 0.0933 \text{ AGE} & -0.0012 \text{ AGE}^2 \\
 & (6.37) & (6.04) \\
 & + 0.0807 \text{ Years in school} & -0.1343 \text{ Child 0-5} \\
 & (7.01) & (2.60) \\
 & + 0.0214 \text{ Children 6-12} & -0.0350 \text{ Children 13-18} \\
 & (0.548) & (0.878) \\
 & + 0.1492 \text{ Other housekeepers} & -0.3777 \text{ RUNWAT} \\
 & (2.64) & (3.72) \\
 & -0.000006 \text{ Husband's wage} & + 0.000005 \text{ Other family wage} \\
 & (4.92) & (5.10)
 \end{array}$$

representing a potential or offer wage, based on a woman's personal and household characteristics, was then calculated for all women and included in the labor force participation equation. The average potential wage is \$202.32. The equation includes the husband's wage, hypothesized to be a substitute for the wife's wage and other family wage which includes wages of working children and other contributing household members. These wages may be complements to the wife's wage if entry into the labor force by these family members is to supplement family income.

Table 3 presents the means of the variables for the data grouped by work participation. In this sample 21 % of the married women work for pay,¹⁶ with only 5 out of 734 married women enrolled in school (not shown). The Mexican cultural norms are such that marriage appears to effectively and educational pursuits for women. Those working in the formal sector are the youngest in age. This is true not only in Tijuana, where there is a large maquiladora industry, but also in Torreon. Those

where t scores are in parentheses and RUNWAT is a dummy equal to 1 if the house has running water.

The wage equation in 1987 pesos estimated for 286 full time employed women in both the formal and informal sector yielded the equation:

$$\begin{array}{rll}
 \text{Wage} & = 2322904 - 48482.61 \text{ Age} & + 617.13 \text{ Age 2} \\
 & (3.59) & (3.69) \\
 - 31070.05 \text{ Years in school} & & - 482.67 \text{ Years in city} & + 19191.85 \text{ Children 0-5} \\
 & (3.16) & (0.335) & (0.475) \\
 + 58206.98 \text{ Children 6-12} & & - 39257.10 \text{ Children 13-} & \\
 & (3.16) & 18 & - 28516.30 \text{ OW} \\
 & & (2.098) & (0.926) \\
 & & + 0.3910 \text{ Husband's wage} & \\
 & & (7.89) & \\
 - 31831.09 \text{ TJ Dummy} & & - 676182.9 \lambda & \\
 & (1.12) & (4.99) &
 \end{array}$$

The coefficient on the inverse Mill's ratio (λ) is significant and negative, suggesting that not correcting for selection bias would result in an over-estimate of potential income.

¹⁶ The labor force participation rate for the single women in the sample is 35%. Overall the labor force participation rate for married and single women is 28%. For 1990, INEGI reports a labor force participation rate of women in Mexico as 23.5%. Garcia and de Oliveira (1994) calculated a labor force participation rate of 37.4% for all Mexican women with married women having a rate of 28.2%. Our sample is restricted to only two cities and it includes informal sector employment that may not be captured in the Mexican census data.

participating, in the formal sector have, on average, substantially more years of schooling than those in the other sectors. The average level of education for those working in the home and in the informal sector is virtually the same. The presence of young children in the household is highest, on average, in those households where the woman works at home in Tijuana, but close to the same in all three sectors in Torreon. The woman's average earnings, the husband's earnings and other family income are all higher on average for women working in the formal sector.

Table 3
Means of Variables by Work Participation of Married Women
(Tijuana and Torreon combined)

	<i>Work in the home</i>	<i>Informal sector</i>	<i>Formal sector</i>
Age	35.29	36.47	33.59
Other homemakers	0.26	0.23	0.17
Years of school	6.37	6.40	11.12
Children 0-5	0.88	0.70	0.70
Children 6-12	0.95	0.98	0.58
Children 13-18	0.85	0.98	0.80
Years in city	22.19	24.25	22.24
Potential income of woman (pesos)	256 371	282 468	397 673
Monthly income of husban (pesos)	432 258	422 333	585 190
Monthly other family income (pesos)	156 701	135 719	216 730
Sample size	577	57	100
<i>Torreon</i>			
	<i>Work in the home</i>	<i>Informal sector</i>	<i>Formal sector</i>
Age	35.55	34.71	32.61
Other homemakers	0.27	0.25	0.10
Years of school	6.75	6.68	11.94
Children 0-5	0.77	0.75	0.77
Children 6-12	1.00	1.11	0.56
Children 13-18	0.84	0.93	0.58
Years in city	25.55	27.18	24.36
Potential income of woman (pesos)	257 164	298 372	423 291
Monthly income of husban (pesos)	447 737	529 107	668 115
Monthly other family income (pesos)	159 977	97 857	166 134
Sample size	308	28	52

Table 3 (continued)

	<i>Tijuana</i>		
	<i>Work in the home</i>	<i>Informal sector</i>	<i>Formal sector</i>
Age	35.00	38.17	34.65
Other homemakers	0.27	0.21	0.25
Years of school	5.94	6.13	10.23
Children 0-5	0.94	0.65	0.65
Children 6-12	0.90	0.86	0.60
Children 13-18	0.87	1.03	1.04
Years in city	18.34	21.43	19.95
Potential income of woman (pesos)	255 463	267 112	369 919
Monthly income of husband (pesos)	414 535	319 241	495 354
Monthly other family income (pesos)	152 951	172 275	271 541
Sample size	269	29	48

Table 4 presents a profile of employment by industry for the informal and formal sector married women workers. In the informal sector 41.5% are in commerce, another 22% in domestic service and 15.8% in other service. For the 82 married women in the sample working in the informal sector, 47.5% are described as self-employed or the boss. Another 28% receive fixed wages and 10% are paid piece work. The rest work unpaid in family businesses. A third of those working in the formal sector are in education. Another 28% work in maquiladoras or manufacturing, with 11.3% each working in commerce and other service. Of the 124 married women in the sample working in the formal sector, 84% are on fixed wages.

Despite the higher level of labor demand in Tijuana than Torreon, the average formal sector wage of women is higher in Torreon than in Tijuana. There are several reasons for this. One is that women in Torreon who are working in the formal sector have more human capital than those in Tijuana, on average over a year and a half more of education. Second, is the difference in the structure of formal sector employment in the two cities. As shown in table 4, 41% of those employed in the formal sector in Torreon were in education, compared to 26% in Tijuana. In Tijuana 26% were employed in the manufacturing/maquiladora sector compared to 18% in Torreon. This difference can be accounted for

Table 4
*Formal and Informal Sector Employment
 by Industry for Married Women
 (percentage)*

<i>Tijuana and Torreon combined</i>		
<i>Industry</i>	<i>Informal sector</i>	<i>Formal sector</i>
Maquiladoras	1.2	11.3
Manufacturing	2.4	10.5
Commerce	41.5	11.3
Government	0.0	5.6
Hotels	11.0	10.5
Education	1.2	33.9
Domestic service	22.0	0.0
Other service	15.8	11.3
Number of women (not percent)	82	124
<i>Torreon</i>		
<i>Industry</i>	<i>Informal sector</i>	<i>Formal sector</i>
Maquiladoras	2.1	6.1
Manufacturing	0.0	12.1
Commerce	44.7	1.5
Government	0.0	4.5
Hotels	12.8	9.1
Education	0.0	40.9
Domestic Service	25.6	13.6
Other Service	2.1	0.0
<i>Tijuana</i>		
<i>Industry</i>	<i>Informal sector</i>	<i>Formal sector</i>
Maquiladoras	2.9	17.2
Manufacturing	2.9	8.6
Commerce	37.1	13.8
Government	0.0	6.9
Hotels	8.6	12.1
Education	0.0	25.9
Domestic service	40.0	8.6
Other service	5.7	0.0

Note: The sample size is larger in this table as it includes all married women before missing observations decreased the sample size.

by differences in educational levels, as well as the high demand for maquiladora workers in Tijuana. Third is the fact that formal sector wages in Mexico are institutionally set. Government minimum wages (a com-

plex structure of minimums for each skill level and occupation) have been treated as *the* wages and, by law, maquiladora workers are considered as unskilled labor, regardless of the skill level. The high demand for maquiladora labor in Tijuana is shown by a very high turnover rate, a lowering of educational requirements for jobs and an increase in fringe and non-monetary benefits. As documented by Sklair (1989) there is a tacit agreement among maquiladora operators not to compete for labor on the basis of wage. On the other hand, in the informal sector, where wages are more market determined, the average wage is higher in Tijuana than in Torreon. Due to the small sample sizes of women in the formal and informal sectors in each city (table 3), the two cities are combined and a dummy variable, D_t , equal to 1 if the city is Tijuana, is added to capture the effect of the different economic conditions in the two cities.¹⁷

The multinomial logit results of estimating equation (5) using the combined data from the two cities are presented in table 5. The logit coefficients, displayed in brackets, can be interpreted as the change in the natural log of the odds ratio, P_i/P_h , with respect to a unit change in the independent variables. Because of the difficulty in interpreting these coefficients, the probability of being in each of the alternatives: work in the home, P_h , paid informal sector, P_{in} , or formal sector, P_f , are calculated

¹⁷ A likelihood ratio test to test the null hypothesis that the vector of coefficients in Tijuana, β_{TJ} , is equal to the vector of coefficients in Torreon, β_{TN} was calculated. The test statistic is given as:

$$\lambda = -2\{L(\hat{\beta}) - [L(\hat{\beta}_{TJ}) + L(\hat{\beta}_{TN})]\} \quad (6)$$

λ is asymptotically chi-squared distributed with 24 degrees of freedom and $L(\hat{\beta})$ is the log-likelihood function of the equation estimated for the Tijuana subsample, including both Tijuana and Torreon, $L(\hat{\beta}_{TJ})$ is the log-likelihood function of the equation estimated for the Tijuana subsample and $L(\hat{\beta}_{TN})$ for that of the Torreon subsample (Ben-Akiva, 1985). the test statistic, λ , equals 51.64 and the null hypothesis of no difference is therefore rejected. A second log likelihood ratio test between the sub samples of married women and single women was performed. The likelihood ratio test for the hypothesis that there is no difference between married and single women (single women include single heads of household) yields a chi-squared statistic of 274 and is also rejected. For that reason, in this paper results and analysis are limited to married women only. Several studies of us women, beginning with Mincer, 1962, have used the same approach. A dummy variable equal to 1 when the city is Tijuana is included to account for differences between the cities.

Table 5
Married Women in Tijuana and Torreon
Multinomial Logit Results (n = 734)

	<i>Informal sector</i> $\frac{\partial P_{in}}{\partial X}$ [β_{in}]	<i>Formal sector</i> $\frac{\partial P_f}{\partial X}$ [β_f]
Constant	[-4.2238] (-2.84)	[-9.35] (-5.62)
Age	-0.0883 [0.0278] (1.17)	0.2446 [0.0345] (2.64)
Age ²	-0.0011 [-0.0003] (-1.21)	-0.0034 [-0.0005] (-2.72)
Years of school	-0.0034 [0.00113] (-0.11)	0.1890 [0.0229] (4.07)
Years in the city	0.0131 [0.0023] (1.05)	0.0068 [0.0015] (0.60)
No. of children age 0-5	-0.1101 [-0.0123] (-0.56)	0.0521 [0.0005] (0.26)
No. of children age 6-12	-0.0400 [-0.0415] (-0.30)	-0.5721 [-0.0720] (-3.72)
No. of children age 13-18	0.0543 [0.0241] (0.37)	0.2361 [0.0350] (1.72)
No. of other homemakers in the house	-0.0014 [-0.0026] (-0.05)	-0.0394 [-0.0045] (-0.15)
Lives in Tijuana (1 = yes)	0.3056 [0.0842] (1.01)	0.6536 [0.0960] (2.27)
Potential Wage	6.393E-07 [5.835E-07] (0.53)	7.876E-06 [9.959E-07] (2.69)

Table 5 (continued)

	<i>Informal sector</i>	<i>Formal sector</i>
	$\partial P_{in} / \partial X$	$\partial P_f / \partial X$
	[β_{in}]	[β_f]
Husband's wage	-2.689E-07 [-1.52E-07] (-0.60)	-1.830E-06 [-2.378E-07] (-2.89)
Other family member's wage	-5.006E-07 [-9.872E-08] (-0.77)	-4.444E-07 [-8.075E-08] (-0.78)
Log of Likelihood Function = - 410.333.		

Notes: P_{in} is the probability of working in the informal sector and P_f is the probability of working in the formal sector.

Partial derivatives are evaluated at the sample means.

The logit coefficients are reported in brackets where β_i is the natural log of the odds of working in category i with respect to working in the home. Asymptotic t -ratios are in parentheses.

assuming the independent variables equal their respective means (Hill, 1983).¹⁸ The equation for the probabilities is:

$$P_{ij} = \frac{e^{\beta_i X_j}}{e^{\beta_{in} X_j} + e^{\beta_f X_j} + e^{\beta_h X_j}} \quad (7)$$

where X_j is a vector of independent variables explaining labor force participation, β_i is the parameter vector and the subscript in is for the informal sector, f for the formal sector and h for working in the home.

By differentiating equation (7) the marginal effects of the independent variables on the probabilities can be calculated.

¹⁸ This equation was originally estimated with four sectors: work in the home, in school, informal sector, formal sector. However, due to the very small number of women in school, the equation was re-estimated for only three categories, omitting "in school" and dropping the 5 observations of women in school. The coefficients and probabilities for the remaining sectors, however, remain virtually unchanged. Given the logit property of independence from irrelevant alternatives, IIA, alternatives can be excluded without affecting the consistency of the estimation of the relative probabilities within the remaining subsets (Train, 1986, p. 20). A few observations of retired and/or disabled women were also omitted.

$$\frac{\partial P_i}{\partial X} = P_i(1 - P_i) \frac{\partial \beta_i}{\partial X} - P_i P_k \frac{\partial \beta_k}{\partial X} - P_i P_h \frac{\partial \beta_h}{\partial X} \quad (8)$$

where $i, k = in, f, i \neq k$.

For work in the formal sector, years of schooling, number of children, the woman's potential wage, the husband's wage, the quadratic form of age, and the city dummy are all statistically significant. Not significant are the length of time in the city, the number of other housekeepers and other family wages. Age, operating as a proxy for experience, increases the probability of formal sector work, but at a decreasing rate. Based on this estimate, after 39.8 years old, age becomes a negative factor. The number of children between 6 and 12 has a negative, and significant, effect on formal sector work participation. The coefficient for preschool children is also negative and significant until the potential wage variable is added to the equation, suggesting that multicollinearity may be accounting for the lack of significance of that variable. The number of children over 13 is weakly associated with increased formal sector participation. The woman's potential wage is, as expected, positively associated with increased formal sector participation while a higher husband's wage decreases the probability of formal sector participation. This suggests that the wife's earnings are viewed as a substitute for the husband's. Children's and other family wages are not statistically significant. The positive, significant dummy variable suggests a higher probability of formal sector work in Tijuana, where the *maquiladora* industry was booming, than in Torreon. This variable gives a measure of the effects of increased demand on labor force participation.

Overall the statistical results for formal sector participation. However, participation in the informal sector does not appear to be determined by these usual factors. The only independent variable which is statistically significant is the quadratic form of age.¹⁹ The coefficients of age indicate that increasing age increases the probability of informal sector participation up until the age of 39.4 years and then it decreases.

¹⁹ Since age and age squared are a quadratic form of one variable the usual *t*-tests on individual coefficients are not the appropriate test for significance. A log likelihood ratio test for joint significance of age and age squared yields a value of 12.76 with 4 degrees of freedom, statistically significant at the 5% level.

None of the other usual personal and household variables, including education, number of children, potential wage, wages of other family members or the city dummy variable are significant. The importance of the city variable for the choice between formal sector work and work in the home and its lack of importance for the choice between informal work and work in the home suggests that higher demand for labor is more likely to draw women into the formal sector. The lack of significance of the independent variables in the informal sector vs. home work choice may be due to the loss of efficiency from the relatively small sample size of women in the informal sector (57). Similar results were obtained by using a larger sample size by omitting size²⁰ and from the logit analysis of García and de Oliveira (1994).²¹ All this suggests that the determinants of informal labor force participation may be different from the variables affecting formal labor force participation in Mexico.

6. Simulation on the Probabilities of Labor Force Participation

From equation (7) the overall probabilities of being in each of the alternatives: work in the home, P_h , paid informal sector, P_{in} , or paid formal sector labor, P_f are graphed in figure 1. The probability of married women working in the home is 85 percent. The probabilities of formal and informal sector work are 8% and 7%, respectively. In addition to the log-odds coefficients and marginal probabilities, calculating overall probabilities using values other than the means of the variables can give added insight into the effects of personal and household characteristics on labor sector participation. Specific values for several of these probabilities are presented in table 6 and are displayed graphically in figures 2 to 5.

²⁰ Because there are only 57 informal labor force participants in the sample, an additional estimate that excluded the income variables was done. Given the missing income observations this allowed the whole sample size to increase, increasing the informal sector participants to 80. The results however remained essentially the same with age/age squared the only significant variable.

²¹ García and de Oliveiras category of *manuales no asalariados*, which is a proxy for the informal sector, also found the coefficients for education in both their 1982 or 1987 models to be insignificant in determining labor force participation rates of women. The number of children were significant only in the 1987 model, but with signs on the coefficients opposite of those predicted. Their findings also show age to be significant, consistent with this study's results.

Table 6
*Comparison of Impact from Characteristics of the Women
 and their Household on the Probabilities of Work Activity*

	<i>Work in the home</i>	<i>Informal sector</i>	<i>Formal sector</i>
<i>Individual characteristics</i>			
Age			
15 years old	0.919	0.053	0.028
25 years old	0.848	0.076	0.076
45 years old	0.827	0.090	0.083
62 years old	0.919	0.065	0.017
Education			
Three years	0.887	0.085	0.029
Nine years	0.837	0.078	0.085
Twelve years	0.787	0.073	0.141
Sixteen years	0.679	0.062	0.259
City of residence			
Tijuana	0.817	0.090	0.093
Torreon	0.877	0.071	0.052
Potential income			
1 Minimum wage	0.891	0.078	0.030
2 Minimum wages	0.814	0.080	0.106
3 Minimum wages	0.623	0.068	0.310
1 000 000	0.040	0.006	0.954
2 000 000	0	0	1.0
<i>Household characteristics</i>			
Children			
No children aged 0-5	0.848	0.087	0.065
Three children aged 0-5	0.859	0.063	0.077
No children aged 6-12	0.811	0.079	0.110
Three children aged 6-12	0.900	0.078	0.022
Husband's income			
1 Minimum wage	0.809	0.082	0.109
2 Minimum wages	0.836	0.081	0.083
3 Minimum wages	0.858	0.079	0.062
1 000 000	0.900	0.073	0.027
2 000 000	0.938	0.058	0.004

Note: All probabilities are evaluated at the mean values for the variables unless otherwise indicated.

Figure 1
Labor Sector Participation of Married Women
(evaluated at the mean)

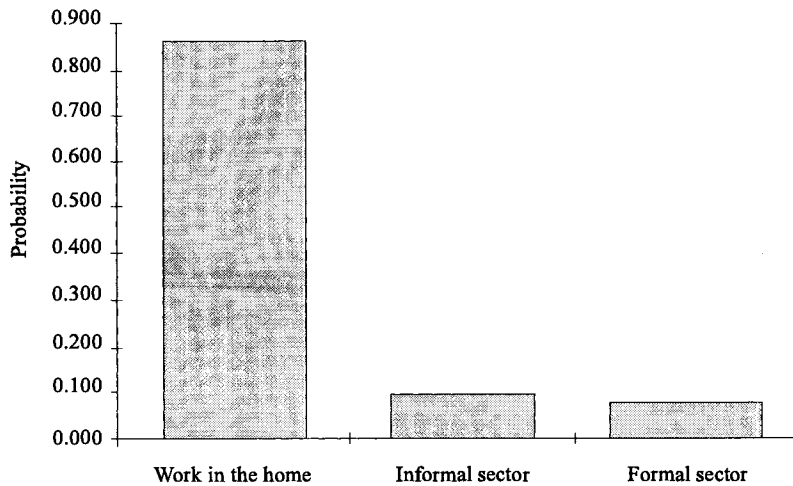


Figure 2
Age and the Probability of Paid Labor Participation
by Sector for Married Women

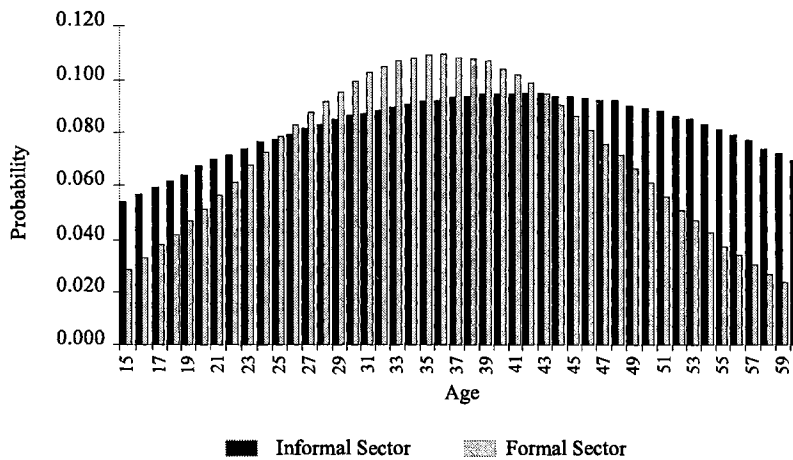
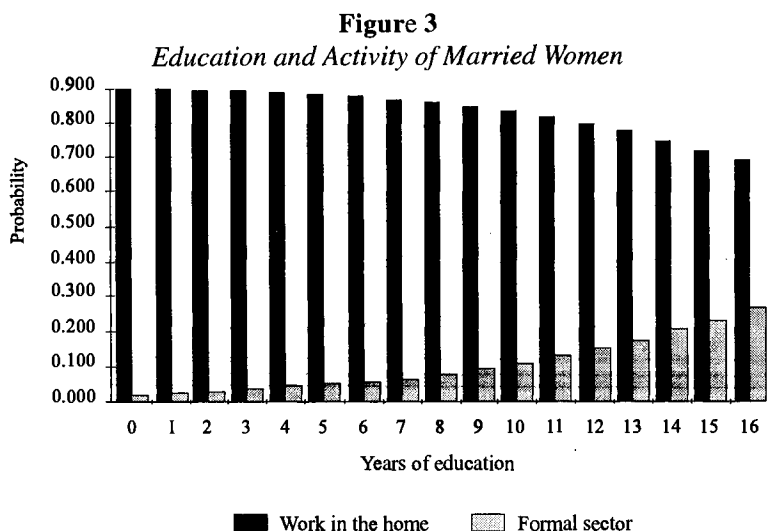


Figure 2 shows the impact that age has on the probability that these Mexican women decide to enter the work force. Although the probability of paid labor sector participation is relative low at all ages, participation in the formal sector exhibits an inverted "U" characteristic similar to that found currently in developed countries. In the 1960s in the United States participation rates for women peaked at age 18, dropped during the childbearing years, then increased peaking again around 50 years of age, giving a double peak pattern. Since that time the participation rates of all women under 65 have increased significantly in the US particularly among women aged 20 to 44 years, including women with young children. This results in an inverted "U" for female labor force participation over the life cycle and is similar to that of males in the US, with a single peak around 35-45 years of age. The informal sector also exhibits an inverted "U", with respect to age, but much less pronounced. In the prime working years between 25 and 43, women have a higher probability of working in the formal than in the informal sector, while below and above that age range probability of informal sector labor is higher.

Figure 3 shows how education affects the probability of participation in the formal sector and in the home. As women receive more education, the potential market wage increases, raising the opportunity cost of non-market activities (Mincer, 1974). Education also increases the scope of opportunities for employment outside the home. Figure 3 shows that as years of schooling increase, the probability of working in the formal sector increases at an increasing rate. The probability of a married woman participating in the formal sector rises to over 25% if she possesses a college degree. Nevertheless, traditional roles for women continue to be very strong in Mexico even for women with higher levels of education.

Demand side factors are also generally cited as of primary importance in explaining labor force participation. Labor demand conditions are reflected in the difference across the two cities in our sample, Torreon and Tijuana. The demand for female labor in Tijuana has been growing faster than the national average due to the large influx of maquiladora firms and their propensity to hire female workers, particularly those younger and still single. There is a small, but significantly larger probability that married women will work in the formal sector in Tijuana. The probability is 9% for those living in Tijuana, compared to 5% for those in Torreon, all other factors being equal.



Figures 4 and 5 show how earnings affect formal sector participation and working in the home. Changes in the income of other family members did not influence informal sector activity. Figure 4 shows that as potential income increases married women shift significantly from working in the home to formal sector work. If potential earnings are equivalent to earnings of one minimum wage (approximately \$123 per month) women have a probability of working in the home of 90% and in the formal sector of 3%. However, in a high wage category (of approximately \$725 per month) the probability of work without pay decreases to only 4%, with the probability of formal sector activity rising to 95%. Many analysts have argued that real wage growth in the us can explain most of the increase in female labor force participation from 1950 to 1980 in that country (Smith and Ward, 1985). Thus as the opportunity cost from higher potential earnings in the formal sector increases, Mexican women are likely to respond similarly to women in more industrialized countries.

Figure 5 shows how the probabilities of working in the home and formal sector activity vary with changes in husband's earnings.²² There

²² Mincer (1962) was the first to point out the negative effect on married women's labor force participation due to rising real income of their husbands. However, more

Figure 4
Potential Income and Activity of Married Women

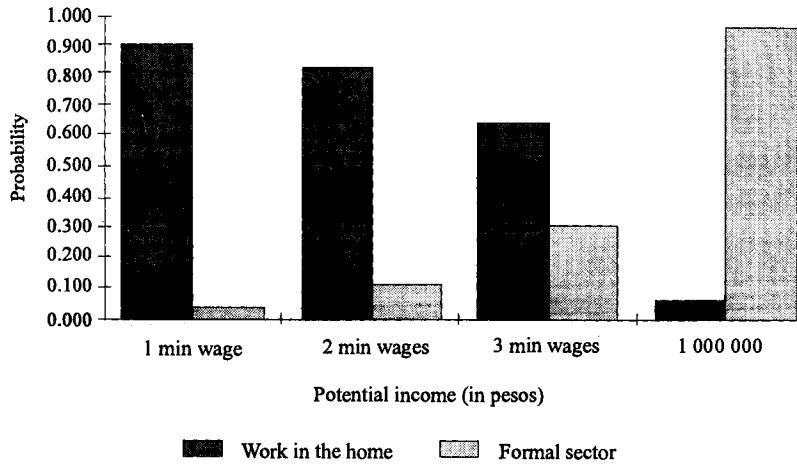
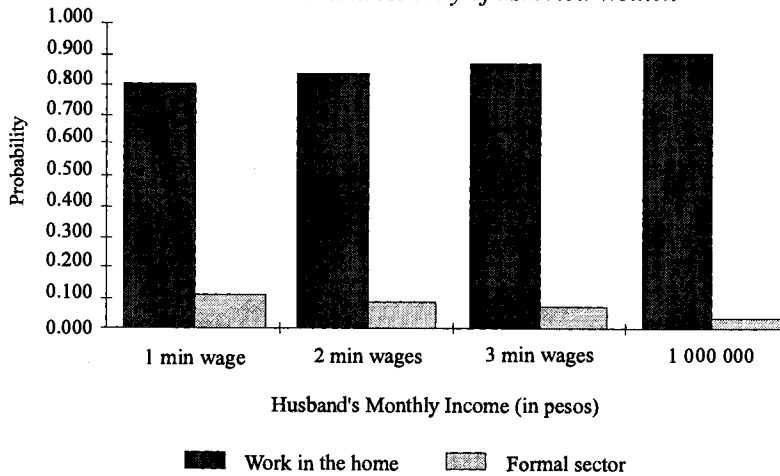


Figure 5
Husband's Income and Activity of Married Women



recent studies of us women have shown that this income elasticity has been declining for married women (e.g. Goldin, 1990).

is a significant, yet small increase in the probability of working in the home as husband's earnings go from a very low monthly income (equivalent to receiving one minimum hourly wage or \$123) to high income (\$725). Previous studies of developed countries have found that labor force participation is negatively related to the husband's income, all else equal, although decreasing with younger cohorts. Other studies of developing countries, which expand the definition of income to include other family members and not just that of the husband's income, have also found that other family earnings significantly reduce women's labor force participation probabilities (Pong, 1991). However, our study did not find a significant relationship between earnings of other family members and the labor sector participation decision of married women.

7. Concluding Remarks

The primary purpose of this study has been to investigate how the structural features of developing nations affect women's labor force participation. An expanded definition of work was used that included working in the home, work in the informal sector (which includes unpaid work in family business) and work in the formal labor sector. In particular work in the home is defined and treated as an active work category and is not an "everybody-who-is-not-in-the-paid-labor-force" category, or a synonym for leisure. Overall our study indicates that the overwhelming work option for married women in Mexico is working in the home. Only 21% of married women participated in the paid labor sectors and only 5 married women in the sample attended school. Cultural roles, low potential wages and labor market discrimination could all play a part in making housework the most viable work option for married women.

A major structural difference in the labor markets between industrialized and developing countries is the existence of a large informal labor sector in the latter. Our findings suggest that the major factors influencing married women's participation in the formal sector in Mexico are much the same as those affecting married women's participation in industrialized countries: age, education and number of young children in the home, potential wage and husband's wage. On the other hand, women's participation in the informal sector, which includes unpaid work in family business, does not appear to be affected by any of

these variables except age (a proxy for experience). According to our empirical results, informal sector work showed no significant relationship to years of education, years in the city, the presence of children and income variables. Factors driving the informal sector decisions appear to be different from those driving formal sector choices. This result may be symptomatic of Connolly's (1985) observation that in developed countries the informal sector is employment disguised as unemployment, while in developing countries the informal sector is unemployment disguised as employment.

Though the determinants of labor force participation in the formal sector for married Mexican women are similar to those in developed countries, the overall and partial probabilities are smaller. This suggests that the reservation wage of housework is higher and/or the potential wage in the paid labor force is lower. A higher reservation wage may be due, at least in part, to the fact that, for all but a small proportion of upper and upper middle class households, there are fewer labor-saving devices, washing machines, dishwashers, etc. In addition, cultural views of the appropriate role of married women contribute to the higher reservation wage by increasing the woman's value in maintaining a household and family. It may be that the higher reservation wage, combined with low informal sector wages is part of the explanation for low participation of married women in the informal sector and may also explain in part the insignificance of household and personal variables in the choice between informal sector work and home work.

Cultural values may reinforce labor market discrimination that tends to decrease women's paid labor market wages, contributing to a feedback effect. Women are thus discouraged from seeking investment in themselves through activities such as education, job search, etc. which increase their potential wages in the paid labor market. Economic development that expands opportunities for women's employment in the formal sector, and that increases the accessibility of labor-saving household capital could narrow the reservation wage/potential market wage gap. The result would be an increase in the paid labor force participation of married women, a trend that has been prominent in developed countries in recent decades.

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