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Women in the Workforce: How Cultural Factors Affect Labor Supply

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Abstract

This paper estimates the influence of cultural factors on female labor force participation and shows the importance of including these factors in the model for labor supply. The classical labor supply model only includes variables established by the market, such as government unemployment assistance, estimated wage, and educational attainment. However, this study also includes cultural variables on fertility, religion, government type, government spending, and citizen views of work, women in the workforce, and the fulfillment of being a housewife. By including these variables on culture, the model in this paper avoids the problem of omitted variable bias that appears in the classical labor supply model.

Introduction

Understanding a worker's decision to supply labor to the market and the factors that motivate a worker to participate in or refrain from the workforce is crucial information for a government to know in order to effectively help its economy remain healthy. By predicting workers' reactions to economic cycles or shocks to the economy, the government can try to create policies and incentives that preserve or increase the quality of life among its citizens and keep unemployment rates at a manageable level. For example, a government could require its citizens to work in order to receive welfare payments if the economy had a large demand for labor, but a small supply of workers in the market. Many factors that influence a worker's decision to enter the labor market are universal in that they affect workers from different countries in a similar fashion, as long as the factors are present in both countries. As contact with foreign nations has improved and collecting data from previously inaccessible countries has become possible, researchers can refine, test, change and add to theories due to a new wealth of

information available through international data, which greatly adds to the sample size and diversity. The classical labor supply model serves as one of these theories that can be enhanced with improved access to data from foreign countries. Although the Becker Model begins to expand upon the classic labor supply model in its acknowledgement that workers may be influenced by other factors, i.e. the well-being of their families rather than simply the individual worker, Becker does not go far enough to include cultural factors. These factors affect a female worker's decision process just as much as market factors when a woman decides to enter the workforce. Cultural characteristics generally serve as a frame of reference for the woman's decision to enter the workforce and affect her decision through her concern for the well-being of her family, her reputation in the community, and her interactions with the opposite sex, particularly her husband. Cultural factors also carry important implications for the demand of female workers because they influence the mentality of employers when considering possible female applicants for a job. The culture of a society serves as a frame of reference for the employer too; he has been raised with society's prevailing view of women in the workplace and is concerned for his reputation in the community just like individual female workers. The field of economics has largely ignored cultural factors until recently due to the difficulty of quantifying the qualitative characteristics that make up culture. Economists have assumed culture to remain constant and dismissed it under the ceteris paribus clause. However, the importance of cultural factors has gone unnoticed for long enough, so these variables will be removed from ceteris paribus and examined on their own merit. If these cultural variables are indeed important to the explanation of labor supply, their omission from the classical labor supply model would cause omitted variable bias. The presence of omitted variable bias would alter the slope estimates for the variables remaining in the model, which hurts the model because

these slope estimates represent the magnitude of influence that the independent variables have on female labor force participation. In other words, omitted variable bias could cause a government to greatly overestimate or underestimate female labor responses to market and public policy variables that are included in the model when cultural variables are left out. Thus, female labor supply models estimated without cultural variables not only lack the explanatory power of the cultural variables and their influence on female labor force participation, but the absence of these cultural variables also distorts the estimated effects of the variables that are included in the model.

Review of Recent Literature

The classical model of labor supply depends upon a combination of market-derived characteristics and the individual's preferences in order to determine whether a person will work or not and how much he/she will work. This model assumes that a person will participate in work at the level that maximizes utility or "economic well-being" (Fleisher and Kniesner 114). However, the model also assumes that maximizing economic well-being is the first priority of the worker, but women do not necessarily share this priority when they are equally concerned about the general well-being of their families as established by the Becker model (Fleisher and Kniesner 111). If women make decisions for the good of the family and not just for themselves, then women will respond to factors other than what are established by the market when making labor supply decisions in order to further the well-being of the family as a whole, and social or cultural factors play an important role in family dynamics. Women may choose to prioritize the family's social well-being by not working to care for the children or to preserve the family's reputation in a community that does not support females in the workforce over their own

economic well-being. Therefore, the study of factors that influence female labor force participation has evolved from only focusing on the market-derived characteristics that affect a worker as identified by labor economics to including social and cultural factors that are not as relevant to male labor supply (H'madoun 5). Models of modern female labor supply decisions should at least consider the influence of non-market factors on female workers, especially considering the hazards created by omitted variable bias if these cultural factors are significant and not accounted for in the female labor supply model. At the same time, universal factors that affect the rational worker are still relevant and are used in many studies of female employment. Female estimated wage, the presence of government assistance, and educational attainment are important to a female worker's decision to enter the labor force because it provides her with more information to maximize her utility along the budget constraint (Cebula and Coombs 277, 278; H'madoun 10).

However, economists have begun to recognize the impact of culture on the female decision to enter the workforce and on the employer's decision to hire or refusal to hire female employees. In 1985, Reimers broke economic ground by identifying "cultural effects" as the source of a significant difference between the female labor force participation rates of US-born white women and of US-born black and Asian women after accounting for economic variables like family size and educational attainment (255). In 1996, Neumark, Bank, and Van Nort discovered gender discrimination in the hiring practices at high-price restaurants through an audit study, which implied cultural influences on employer preference for discrimination. Neumark's study indicated statistically significant differences in the number of job offers and interviews given to male and female applicants, with more opportunities given to the males, by holding factors for experience, ability and individual characteristics constant (933, 936). In 2006,

Goldschmidt summarized the research of several other economists to emphasize the importance of culture in economic studies, such as highlighting the work of North on the inclusion of informal institutions like societal beliefs in the institutional theory of economics (178). Goldschmidt also surveyed the research of Hayek, who identified culture as important in human evolution and thus, important to understand human decision, and the studies of Tomasello, who provided support for the concept of culture as the way in which an individual connects with his/her society now (179,180). Basically, some economists have begun to add to their classical models by including cultural aspects of societies in order to gain a broader, more comprehensive understanding of the rationale that enters into the decision-making process for the supply of labor and potentially produce more precise estimates of behavioral responses to market and public policy influences.

Fernández extended this study of culture through an "epidemiological approach" in which she analyzed the relationship between the labor force participation of US-born daughters of immigrants and the opinions on female employment of their parents' native countries, which were derived from a survey (5). The results indicated a significant, negative correlation between hours worked by the daughters of immigrants and the level of conservativeness of the parents' native country (Fernández 17). In other words, the daughters of immigrants tended to work fewer hours when their parents came from a country where the native women tend to believe that being a housewife is fulfilling and a job is not necessarily the best way for women to achieve independence (Fernández 11). This research introduces the importance of using micro-level data from surveys in order to understand prevailing belief systems, which cannot be solely accounted for by variables of macro-level data. For example, the majority of a country's citizens may identify with the Muslim religion and categorize themselves as Muslim (macro-level data), but

surveys convey the extent to which the people believe the tenets of Islam and how it affects their view of society. However, this particular study is limited to the daughters of immigrants in the United States, so the scope of the data is narrow due to the high proportion of immigrants from Western Europe and small proportion from other areas, such as Africa. In addition, the study does not look at factors like religion or government type that influence society's view on female labor force participation.

A report published by the World Bank conducted a similar cross-country comparison of the significance of culture on female labor force participation that included male and female opinions of the value of work and their attitude toward working women (*Environment for Women's Entrepreneurship* 52-53). However, this study compared the male and female perspectives on female employment with the labor force participation of women currently in the country, as opposed to the labor force participation of immigrants living in another country. The report determined positive, statistically significant relationships between women's value of work and their labor force participation and between both men and women's positive attitude toward working women and female labor force participation (*Environment for Women's Entrepreneurship* 54, 55). Therefore, the study concluded that both of these measures of society's attitude toward female employment were influential on women's decision to join the workforce. These results could simultaneously represent a positive correlation between the attitude of employers towards female workers and female labor force participation. If a higher proportion of society views female employment in a positive light, then this positive opinion of working women will also likely influence employers to treat male and female applicants equally and be open to female employees when jobs open up. The inclusion of micro-level data through individual surveys along with macro-level data on culture serves as the study's major strength

because it establishes both the social norm measured by macro data and how deeply imbedded these beliefs are within the society through micro data. However, the study still does not address the specific cultural elements, like religion, that bring men and women to these views of female employment. Identifying these aspects of culture and discovering their respective influence on society's acceptance of female participation in the labor force is important to understanding which areas of culture, if not all of them, have a significant impact on female labor supply.

Religion, a key component of culture, was addressed by H'madoun through his study of the effects of religious affiliation, fervency of belief, and participation in religion on female labor force participation in different countries (12). When all three religious factors were considered, fervency of belief had a negative, statistically significant effect on female labor force participation (H'madoun 25). H'madoun cited fervency of belief as a measure of "religious conservatism," the idea in a majority of religious teachings that men should serve as the main source of income and women should serve as housewives, which would account for the negative relationship between fervency of belief and female labor force participation (25). However, participation in religious activities had a positive effect on female employment, causing H'madoun to stipulate that this participation "cultivate[s] a work ethic and an active engagement that is reflected in a higher likelihood of employment" (25-26). H'madoun's study achieves an in-depth look at one aspect of culture, religion, which can be very influential on society's perspective of female employment. Not only would religion conceivably affect female labor supply, but could also have serious implications for labor demand. For example, employers that possess these religious beliefs, including the view of women as the homemakers and not part of the labor market, are less likely to hire women in the formal market as well. However, the study

stops at one element of culture, while using multiple measures of culture is particularly important to capture society's view of female employment in non-religious cultures.

Jaumotte explored a different area of culture: the role of government in helping women reconcile work and home life (53). Although Jaumotte claimed that "cultural attitudes" were a constant in her study, she implemented variables on policies concerning parental leave, child benefits, and taxation of secondary income in the model, which reflect culture in that they represent society's expectations of the government to help women achieve this balance between employment and family life. In the 17 OECD countries that were studied, Jaumotte found that female labor force participation increased with an increase in childcare subsidies and compensated parental leave (54). Although the positive relationship between compensated maternity leave and female labor force participation should be expected because maternity leave benefits allow women to have children while still earning an income, the results for childcare subsidies are particularly interesting. Theoretically, childcare subsidies should increase female net earnings by reducing the cost of childcare out of pocket while the woman is at work, assuming that the father does not stay at home with the children. An increase in net earnings should not have a clear negative or positive influence on female labor force participation due to the contrasting substitution and income effects that will vary by individual. Jaumotte's econometric model also accounted for levels of female educational attainment, government welfare assistance, and other market factors because of their influence on women as rational workers, (53, 71-72). The strength of this study is derived from its break down of the components of government, serving in its capacity as representative of the people and their priorities, which help women participate in the workplace and maintain a life at home. The results from this study also indicate that childcare subsidies have a positive influence on female

labor force participation rates, which will be tested in the model. However, the study lacks other measures of culture apart from the government, and these other cultural factors are more influential in countries with weaker and lesser-developed systems of government.

Mishra and Smyth specifically studied the relationship between total fertility rate and the female labor force participation rate in twenty-eight OECD countries to see if the presence and number of children affected female employment, basically as a broad measure of society's acceptance of working mothers (par. 1). They found that total fertility rate and female labor force participation rate had a negative relationship, which was expected, but they also determined bidirectional Granger causality between these variables for women aged 15-64 (Mishra and Smyth par.18-19). Bidirectional Granger causality calls into question the role of total fertility rate as the independent variable affecting the female labor force participation rate as the dependent variable. Since total fertility rate and female labor force participation rate have a significant, negative relationship, it is still important to consider total fertility rate as an independent variable because this negative relationship indicates a certain societal intolerance of single working mothers, or at least a lack of effort to help these mothers reconcile work and home life. The tenets of the Becker model characterize the negative relationship between total fertility rate and female labor force participation for married women as well in that the model assumes that workers take family needs into account when making a work decision (Fleisher and Kniesner 111). Therefore, married women with a working spouse and more children may put a higher emotional premium on staying home and spending time on home production or may be making the economically efficient decision to care for the children than pay for daycare and enter the labor force. The presence of bidirectional Granger causality requires that one must

proceed with caution, but include the variable for total fertility rate nonetheless because of its significant influence on female labor force participation.

Lessons from the Literature Review

Characteristics of each of these studies brought different ideas on how to construct the model for this paper. The results from the Fernández study signal the importance of micro-level data in its capacity to represent the actual views of citizens within the country on social issues that will affect female labor force participation. Although people are not always honest on surveys and studying actions tends to be more definitive, the citizens that participate in the survey are products of their culture and think a certain way because they have seen it accepted and replicated in their society. Thus, the Fernández study was influential in the decision to use results from the World Values Survey in this paper and to expect a negative sign on the estimated coefficient for the variable on the percentage of people that believe being a housewife is fulfilling. The report published by the World Bank introduced the idea of combining micro and macro-level data on culture within the model for this paper. The strengths of micro-level data have been discussed above, but macro-level data provides information on large-scale cultural institutions within a nation, such as government social programs, that will influence female labor supply, and thus, must be included in the model for this paper. The World Bank report was also instrumental in the decision to include variables from the World Values Survey, specifically the variable measuring people's agreement with the statement that men should have a greater right to a job than women when jobs are scarce. The study conducted by H'madoun specifically analyzed the role of religion and its influence on female labor supply by introducing the concept that fervency of belief in any religion had a negative effect on female labor force

participation and was responsible for the inclusion of dummy variables for Islam and Christianity in the model for this paper. The study by Jaumotte highlighted the influence of maternity leave benefits and government-subsidized childcare on female labor supply, and thus, the inclusion of these two variables in the model in this paper. The Jaumotte study is also responsible for the positive expected sign on the estimated coefficient for the government-subsidized childcare variable in the model for this paper since economic theory does not expect a positive or negative effect due to the contrasting substitution and income effects. The study conducted by Mishra and Smyth indicates the importance of including total fertility rate due to the fact that the presence and number of children increase the cost of home production and the emotional opportunity cost for working mothers who might be concerned about keeping the house clean and leaving their children with a daycare while the mothers are at work. The cost of daycare also effectively decreases the mother's expected wage, which influences her labor supply decision. All of these studies and their variables combined should portray a more complete picture of culture that will help determine its impact on female labor force participation.

Economic studies that highlight the influence of cultural factors on female labor force participation rates, such as the ones discussed previously, usually share a narrow focus. A majority of them concentrate on the cultural forces in a single country or on one specific aspect of culture for many countries. However, the studies in a single country will have difficulty identifying the influence of culture due to the fact that the nation's citizens may have a shared background and culture. Studies focusing on a single characteristic of culture unnecessarily narrow the over-all societal influence on the female labor supply decision. Culture is not something that can be measured by one defining aspect like religion; it must include many characteristics of society to even begin to account for the broad influence of culture. In addition,

few of these studies have included developed, developing and third world countries, which represents a greater variety of different cultures in order to strengthen the model. Therefore, many different countries around the world and multiple aspects of culture are considered in this study in order to understand varying female labor force participation rates across countries.

Theoretical Framework and Importance of the Variables Used

The model put forth in this paper concerning female labor force participation rates is based on the concept that women will seek to maximize their utility along a budget constraint, but will also make their employment decision within a cultural context. In the classical labor supply model, societal, non-market influences are usually accounted for in the ceteris paribus clause and assumed to be constant or absorbed in the random error of the regression. However, cultural elements cannot be held constant or assumed random when studying female labor force participation across countries, or even across regions, with very different societal perspectives, and thus, these elements must be included in the model. Since cultural factors should display a significant influence on women, these cultural variables cannot be excluded from the model because they would cause omitted variable bias, which would cause a bias in the other slope estimates of the independent variables that are correlated with the omitted variable (Halcoussis 72).

Omitted variable bias could be exemplified by the relationship between the variables for government childcare subsidies and government-provided social security and welfare. Assume that government provision of childcare subsidies has a positive influence on female labor force participation rates, which is expected from the results of other studies. A government that promotes social spending, such as higher expenditures on social security and welfare, is more

likely to support spending on all social areas, including childcare. Therefore, it follows logically that the variable for government-provided social security and welfare should be positively correlated with the variable for government childcare subsidies. The following equation demonstrates the possible direction of bias on the included independent variable, the variable for government social security and welfare, given the sign on the slope estimate for the variable on government childcare subsidies ($B_{omitted}$) and the correlation coefficient between the two variables ($r_{included,\ omitted}$):

$$\text{Direction of bias} = \text{sign of } B_{omitted} \bullet \text{sign of } r_{included,\ omitted} = (+) \bullet (+) = +$$

Since the sign on both the slope estimate and the correlated coefficient are positive, the slope estimate for the variable on government social security and welfare should display a positive bias in the model with only market-derived variables. This slope estimate bias creates real world problems when governments try to estimate how much they should budget for social security and welfare. The results of a model with only market-derived variables will indicate that social security and welfare payments create a greater disincentive for females to enter the workforce than the payments actually create due to the positive bias on the slope estimate. Therefore, if the variable for government childcare subsidies and other cultural variables are statistically significant and are not included in the model, they will create bias in the slope estimates for the remaining independent variables, which will create problems as governments assess how to allocate their budgets. To test the significance of cultural influence on female labor force participation, this study will feature two econometric models: one including only market factors that affect the supply of labor and labor demanded as defined by classical theory and the other adding cultural factors that are relevant to the female decision to join the workforce and the employer's decision to hire a female worker.

Labor supply is generally characterized by three types of choices for the worker: the decision to invest in human capital, the decision to be employed, and the decision to work a certain number of hours (Wachtel 49). In the classical model, the budget constraint is determined by factors such as government unemployment assistance, female offer wage, and average educational attainment of women. The independent variable, female labor force participation rate, is measured in the model as the number of females in the labor force as a percentage of the female population aged 15 to 64. For this variable, the female labor force includes women that are employed or unemployed and actively searching for work. The data on female labor force participation is indicated in Table 1.A below and comes from the World Data Bank. The variable measuring government assistance to the unemployed captures the influence of non-wage income and has a strong influence on both the decision to work at all and the decision of how many hours to work. In this situation, government assistance and other forms of non-wage income have a pure positive income effect, which creates a disincentive to work and is expected to decrease the female labor force participation rate (King 53). If a person's indifference curve is tangent to the budget constraint or if there is a corner solution at the level of government assistance, meaning that he/she can maximize utility at that point, then the person will choose not to work. Government assistance also tends to discourage workers from working more hours, but government assistance specifically seems to deter low-skilled potential workers because of their low offer wage (Jaumotte 71). Therefore, government unemployment assistance is expected to have a negative effect on the female labor force participation rate within a country. In the model, the variable for government-provided social security and welfare payments per capita represents government unemployment assistance, as seen in Table 1.A. Although the inclusion of social security is not as applicable for the female population of ages 15-64 included

in the female labor force participation rate, it is the best measure available. The data comes from Euromonitor at http://www.portal.euromonitor.com/Portal/Default.aspx.

Table 1.A

Variable Name (Expected Sign)	**Description**	**Sample Mean (Standard Deviation) [Min, Max]**
FLFPR	Females in the labor force as a percentage of the female population aged 15-64	59.477 (12.852) [16.1, 79.1]
Disp_Income (?)	Female annual average disposable income for each country measured in 2010 USD in $1000s with constant 2010 exchange rates	12.149 (8.532) [0.277, 35.97]
SS_Welfare (–)	Government-provided social security and welfare per capita measured in 2010 USD with constant 2010 exchange rates	3769.795 (3457.797) [12.9,13150.2]
A.Yrs_Edu (+)	Average years of education completed by women 25 years or older	8.992 (2.178) [2.523,12.908]
TFR (–)	Total fertility rate measured as births per woman if a woman survived her child-bearing years and maintained the national corresponding fertility rate by age	1.778 (0.710) [0.966, 5.5]
IMR (?)	Infant mortality rate measured as number of infant deaths per 1,000 live births	10.672 (10.468) [2.1, 54.3]
Islam (–)	Dummy variable for Muslim countries (= 1 for countries in which at least 50% of the population are identified as Muslim and = 0 otherwise)	0.143 (0.352) [0, 1]
Christianity (–)	Dummy variable for Christian countries (= 1 for countries in which at least 50% of the population are identified as Christian and = 0 otherwise)	0.686 (0.468) [0, 1]

Variable Name (Expected Sign)	Description	Sample Mean (Standard Deviation) [Min, Max]
Dem (+)	Dummy variable for democratic countries (= 1 for countries that are identified as "democracies" by the CIA and = 0 otherwise)	0.243 (0.432) [0, 1]
Work (+)	Importance of work measured as the percentage of people that rank work as "very important" or "rather important" in life	90.148 (5.051) [77.8, 99.2]
Job (–)	Percentage of people that agree with the statement "When jobs are scarce, men should have more right to a job than women"	27.506 (16.316) [2.1, 89.1]
Wife (–)	Percentage of people that agree with the statement "Being a housewife is just as fulfilling as working for pay"	64.195 (14.565) [22.7, 92]
Religious (–)	Percentage of self-reported religious people within a country	62.493 (18.901) [21.8, 94.6]
M_Benefits (+)	Percentage of wages covered during maternity leave by the government and employer	87.728 (20.828) [0, 100]
Childcare (+)	Government spending on benefits-in-kind for day care and home-help services per person in 2010 USD	177.236 (169.814) [0.887, 645.921]

The variable for female disposable income serves as a proxy for the female offer wage, which would be the ideal variable, but is unattainable. Female disposable income is equal to the female wage rate multiplied by hours worked plus any nonlabor income and minus taxes. Thus, the variable for female disposable income indirectly measures the female wage rate, which is the absolute value of the slope of the budget constraint curve and is crucial information for the decision as to how many hours to invest in work (Wachtel 49, 52). Before a woman enters the

labor force, she takes into account her offer wage. If the offer wage rate is above her reservation wage rate, then she will enter the workforce. However, she will not work at all if her offer wage is lower than her reservation wage (Fleisher and Kniesner 121). The level of female wage also influences both the income and substitution effects on female preferences to participate in a certain amount of work. For example, a higher wage could play out in two ways. In light of the income effect, a higher wage means that women consume more of all normal goods, including leisure, which can cause them to work fewer hours if they are satisfied with a relatively low level of wage (Wachtel 58). However, a higher wage also increases the opportunity cost of leisure, according to the substitution effect, and creates an incentive to work more hours (Wachtel 57). Therefore, there is no way to predict how the offer wage will affect the female labor force participation rate because of the opposing forces of the income and substitution effects. Due to lack of data, female annual average disposable income per capita represents the effect of female offer wage in the model, as indicated in Table 1.A. Euromonitor provides the data for this variable.

The variable for average years of educational attainment serves as a measure of women's decision to invest in human capital and therefore earnings potential, i.e. more education should translate into a higher offer wage. In general, the decision to invest in education is based on a woman's calculation of her net lifetime benefit based on future earnings in present value minus the foregone income that she sacrifices while she receives her education as well as the direct costs of her education like tuition (Fleisher and Kniesner 290-291). Although educational attainment affects offer wage and could create problems with co-linearity between the variables in the regression, educational attainment remains an important variable in the model because it also indirectly measures a woman's attachment to the workforce. Despite other factors like

marriage or children that could discourage a woman from working, a rational woman will be more likely to remain in the labor market for a longer period of time in order to maximize the rate of return on her educational investment as opposed to a woman with a lower level of educational attainment (Fleisher and Kniesner 294-295). Thus, educational attainment is expected to have a positive influence on the female labor force participation rate. In the model, this variable is measured as the average years of education completed by women above the age of 25, as stated in Table 1.A. Granted, average educational attainment can be skewed by the outliers with very little and a lot of education. Although median educational attainment would be more appropriate, data was only available on average completed education, but this variable will still accurately capture the influence of education. The data for this variable comes from the World Data Bank.

Assuming ceteris paribus, market factors like government unemployment assistance, offer wage, and educational attainment are expected to affect any rational worker in the same direction. However, as pointed out previously, market factors alone cannot explain the female decision to work because cultural factors are not held constant between countries, and they particularly affect women's decision to supply their labor in the market and their employers' decision to hire women. Therefore, the second model will include variables on religion, government, and male and female opinions of women in the workforce, in addition to the variables previously mentioned, in order to test the hypothesis that cultural factors have a statistically significant effect on female labor force participation rates and identify empirical biases in the slope estimates from the first model.

Dummy variables for religion and government are included to reflect a certain cultural view of the role of women and their acceptance in the workforce. Dummy variables for Islam

and Christianity are included to represent two religions whose religious texts tend to re-enforce gender roles by depicting women as the primary "homemakers," which would discourage married women from entering the workforce (H'madoun 13). Thus, these variables are expected to have a negative effect on over-all female labor force participation. The dummy variable Islam equals one if at least 50% of the population is classified as Muslim by the CIA, but it equals zero if less than 50% of the population is classified as Muslim. The dummy variable called Christianity equals one if at least 50% of the population is classified as part of a Christian denomination by the CIA, but it equals zero if less than 50% of the population is classified as Christian. Refer to Table 1.A for details. The data is available on the CIA World Factbook. A dummy variable for democracy called "Dem" is included to represent more developed nations that generally have established infrastructure to promote equality between male and female workers. Democratic governments are more likely to pass anti-discrimination laws, work to decrease the gender pay gap, or create programs to help women reconcile work and home life, which all increase female participation (Jaumotte 60, 65, 70-71). If these conjectures hold true, the presence of democratic governments should have a positive effect on the female labor force participation rates in their respective countries. The dummy variable for democracy equals one if the country's government is labeled as a "Democracy" on the CIA World Factbook, but the variable equals zero if the country is not labeled as such. More information is provided in Table 1.A. This variable is not a perfect measure of government characteristics because constitutional monarchs and federal republics are not included, even though they tend to be progressive systems that would champion some of the goals listed above. However, the democracy variable serves as an adequate representative for governments that encourage female labor supply. A dummy variable for the presence of a dictator or military rule in a country would have been

included in the study, but these types of oppressive governments are rarely officially identified as such in other countries. This study also includes a variable measured as the percentage of self-reported "religious" people of any denomination within the country, which has proven to negatively influence female labor force participation in previous studies (H'madoun 25). Table 1.A gives more information on the variable.

Variables for total fertility rate, infant mortality rate, maternal leave benefits and childcare subsidies are included to measure the government's attempt to aid women in reconciling home and work life. These government programs can also act as an indirect measure of society's desire to help women balance a career and home production. Total fertility rate can serve as a significant factor in female labor force participation for a number of reasons. The presence of children incurs a direct cost as the result of childcare expenses unless the mother has a family member to take care of the children. Without any government assistance, women with more children have a higher childcare cost and, therefore, a higher reservation wage rate in order to compensate for the childcare cost and to reap a net benefit from working. Therefore, countries with higher total fertility rates are expected to have lower female labor force participation rates due to the expense of children and need for more home production, as has historically been the case (Jaumotte 72). The variable for total fertility rate in the model is measured as births per woman if the woman has survived through her childbearing years and maintained the national fertility rate by age. The data comes from the World Data Bank and is demonstrated in Table 1.A. However, it is important to note that the total fertility rate could provide misleading results for female participation in underdeveloped countries with a high infant mortality rate because the only children that require childcare in these countries will be those that survive past infancy when the mother goes to work. Therefore, a variable for infant mortality rate is included in the

model and measured as the number of infant deaths per 1,000 live births, as seen in Table 1.A. World Data Bank provides the data for infant mortality rate as well, but research does not predict that infant mortality rate will have a positive or negative influence on female labor force participation. An increase in maternal leave benefits also help women maintain a job and a family simultaneously, and thus, should have a positive influence on the female labor force participation rate (Jaumotte 65, 78). This variable is measured as the percentage of wages covered during maternity leave by the government and/or the employer, as demonstrated in Table 1.A. The data comes from the World Data Bank for 1995 and Euromonitor for 1999, 2000, and 2005. An increase in childcare subsidies should also help women balance an occupation and family life and should, theoretically, have a positive influence on the female labor force participation rate. However, childcare subsidies in practice actually increase the female net return to work because the woman no longer has to subtract that cost for childcare from her wage when estimating her net benefit from working. Therefore, childcare subsidies will have the same effect on female labor force participation as higher female estimated wage, which is not definitive due to the contrasting influences of the substitution and income effects as described previously. Since data on government spending on childcare per person is unavailable, the variable used in this model is measured as government spending on benefits-in-kind for day care and home-help services per person as indicated in Table 1.A. The data comes from the OECD Data Bank.

Micro-level variables are also used in the model to directly reflect male and female attitudes toward gender equality in the work environment. The World Values Survey asked a random sample of people from different countries to rank their feelings toward the statement, "Being a housewife is just as fulfilling as working for pay." Countries with a high percentage of

citizens that agreed with this statement are expected to have lower female labor force participation because women will have a lesser attachment to the workforce as a means to realize their independence and reach autonomy. Societies that agree with this statement should also have lower levels of female educational attainment if the women are expected to become housewives when they reach adulthood. Society's view on the woman's role as a housewife should also have a negative effect on the demand for female workers because employers will be more likely to think that a female applicant should be investing in home production and not consider her as a serious contender for the position when hiring. The correlation between a society's opinion of housewives and female labor force participation in that community serves as another example of pending omitted variable bias on the slope estimate for educational attainment if the variable on housewives is neglected from the model. The World Values Survey also gauged people's feelings toward the concept that men are more entitled to a job than women when jobs are scarce. Societies that believe men are more entitled to jobs are expected to have lower female labor force participation because women will anticipate unfair hiring practices when men apply for the same position, and they will be deterred from entering the labor market. Some women in the society may also believe that men have a larger claim to jobs in the marketplace and refrain from entering the labor force because these women think that they should be devoted to the children and home production. The World Values Survey questioned participants about their feelings on the importance of work in their lives. Nations that place a greater value on work should, theoretically, be more open to female workers if they value the product of the work or the importance of contributing to society over the gender of the worker. Therefore, countries with a higher percentage of people that ranked work as "very important" or

"rather important" should have a higher female labor force participation rate. The details of these three variables are displayed in Table 1.A.

Although culture is a broad concept with many different aspects that are difficult to quantify, it is a significant influence on female labor force participation and, therefore, can no longer be ignored. Since these cultural factors can be made to fit into model form, they should be accounted for in an effort to better understand and explain the world.

Econometric Models and Estimation Models

Model 1:

$$flfpr = B_0 + B_1 disp\_income + B_2 ss\_welfare + B_3 ayrs\_edu + u_i + e$$

Model 2:

$$flfpr = B_0 + B_1 disp\_income + B_2 ss\_welfare + B_3 ayrs\_edu + B_4 tfr + B_5 imr + B_6 work + B_7 job + B_8 wife + B_9 religious + B_{10} m\_benefits + B_{11} childcare + u_i + e$$

Unbalanced panel data from 45 countries in the years 1990, 1995, 2000 and 2005 was used for the regressions. An F-Test was initially conducted for Models 1 and 2 to determine whether "pooled" Ordinary Least Squares or a fixed effects estimator would be more appropriate. The null hypothesis was rejected, and a fixed effects estimator was preferred to "pooled" OLS. A Breusch-Pagan Lagrange Multiplier Test was then conducted for both models to decide between "pooled" OLS and a random effects estimator. Again, the null hypothesis was rejected, and a random effects estimator was better suited to the models than "pooled" OLS. A Hausman Test was conducted to determine the consistency of a fixed effects estimator v. a random effects estimator. The results for Model 1 failed to reject the null hypothesis, so both estimators were consistent. Therefore, a random effects estimator was chosen over a fixed

effects estimator for Model 1 due to its greater degrees of freedom and its particular use for a sample of a population, which is the case for all of these variables. However, the results for Model 2 rejected the null hypothesis, thus indicating that a random effects estimator is not consistent. Therefore, a fixed effects estimator was used to regress Model 2. The results for the fixed effects estimator and the random effects estimator for Model 1 were qualitatively similar, as were the results for the fixed effects estimator and the random effects estimator for Model 2.

Data Context

The data only seems like a table of useless numbers until it is given meaning; it must be interpreted. The data for the dependent variable, female labor force participation rates, ranges from 16.1% in the country of Jordan in 1990 to 79.1% in Vietnam in 1995 with an over-all average of 59.5%. The majority of female labor force participation rates increased from 1990-2005 within the countries that had data values for multiple years. Belgium, Germany, Greece, Ireland and Portugal–all European countries–had increases of at least 7 percentage points in female labor force participation in at least a 15 year span. Egypt and Jordan had particularly low participation rates below 25%, which is particularly interesting considering that both countries are non-democratic Muslim nations. The values for the independent variable on female average annual disposable income range from $276.50 in Vietnam in 1995 to $35,969.00 in Switzerland in 2005 with the average at $12,149.00. It is surprising for Vietnam to have the highest female labor force participation rate (79.1%) and the lowest female average annual disposable income ($276.50) in the same year or 1995. This revelation serves as a testament to the work ethic of the women in Vietnam. However, the Vietnamese citizens ranked the importance of work below the

average (90.2%) in 2005 at 89.1% and slightly above the average in 2000 at 93.9%, which are the best indicators since this data variable was not available for Vietnam in 1995.

Values for the variable on government spending on social security and welfare per person range from $12.90 in Indonesia in 1995 to $13,150.20 in Denmark in 2005 with the average at $3796.80. These numbers appear logical, especially since Denmark is renowned for its welfare state and government social programs. China, Egypt, Indonesia, Jordan, and Vietnam all consistently provide less than $200 in social security and welfare over time, and therefore, provide the lowest assistance to its citizens. This variable serves as an example of Asian and African countries performing lower than the countries from Western Europe that have the highest levels of government social security and welfare, such as Austria, Denmark, Norway and Sweden. The variable for educational attainment ranges from 2.53 years in Indonesia in 2000 to 12.9 years in the Czech Republic in 2005 with an average of 8.99 years. Again, Indonesia comes up with the lowest value, but Czech Republic acts as a surprise since the country's values for disposable income and social security and welfare are both below the average. Granted, the female labor force participation rate for the Czech Republic is slightly higher than the over-all average.

The variable for total fertility rate ranges from 0.96 in Hong Kong in 2005 to 5.5 in Jordan in 1990 with the average at a low 1.78. The variable for infant mortality rate ranges from 2.1 in Hong Kong in 2005 to 54.3 in South Africa in 2000. The fact that Hong Kong had the lowest infant mortality rate puts its rank as the lowest total fertility rate into perspective. Concerning the dummy variable for Islam, the only countries in the sample that qualified as Muslim nations were China, Indonesia, and Jordan. Since these countries have consistently demonstrated low values for their market-derived factors, the slope estimate for the dummy

variable Islam will be excessively high and negative. A larger sample of Muslim nations would help decrease this problem, but a majority of these countries like Iran and Iraq do not have accessible data. On the other hand, 32 of the 45 countries have at least 50% of the population that is identified as Christian, and therefore, qualify as countries with a 1 for the dummy variable Christianity. This observation shows a lack of diversity in the sample, which will hinder the regression from being able to distinguish the difference between non-Christian and Christian countries. However, countries whose Christian population makes up less than 50% do not tend to collect and/or publish data on their nations. Only 12 of the 45 countries are categorized as "democracies" for the dummy variable on democracy, which is low for the number of governments that promote female labor supply. However, there are a many classifications of government that are all conducive to female labor force participation, but they could not all be concluded.

The variable demonstrating the percentage of a society that ranks work as important in life ranges from 77.8% in the United Kingdom in 2005 to 99.2% in Indonesia in 2000 with an average of 90.1%. Since the government does not provide many social security or welfare benefits and women tend to receive little education, the value of work is understandable for the Indonesian people. The variable reporting the percentage of people who agree with gender discrimination in job hire when jobs are scarce ranges from 2.1% in Sweden in 2005 to 89.1% in Egypt in 2005 with the average of 27.5%. Although the value for Sweden appears startlingly low, people from Sweden responded in the same fashion in the year 2000 as well. The variable representing the percentage of people who agree that the role of housewife is fulfilling ranges from 22.7% in Indonesia in 2000 to 92% in Japan in 2005 with an average of 64.2%. The variable indicating the percentage of self-reported "religious" people ranges from 21.8% in

China in 2005, whose female labor force participation rate is above average despite the Muslim influence, to 94.6% in Poland in 2005.

The variable on the percentage of wages covered during maternal leave ranges from 0% in Australia in 2000 and 2005 as well as in the USA in 2005 to 100% in 27 countries over several years with an average of 87.7%. The number of countries in which the government and/or employer covers 100% of wages while on maternity leave is astonishing and must be inflated somehow. It is possible that only select occupations receive 100% of wages while on maternity leave or the country's law requires the employers to cover wages, but the practice is not enforced. The variable for government spending on childcare per person ranges from $0.88 in Mexico in 1990 to $645.92 in Sweden in 2005 with an average of $177.23.

In general, countries in Western Europe tend to have high female labor force participation rates accompanied by views of equality between men and women in the workforce and high levels of government assistance for social security and welfare, wages paid during maternity leave, and childcare subsidies. These variables are usually characteristic of developed nations, but especially true for the welfare nations in Western Europe like the Scandinavian countries. Countries in Africa tend to have lower female labor force participation rates and male-dominated hierarchical views of the workforce. These countries as well as developing nations in Asia tend to have lower levels of government assistance as well. The countries in Asia are more difficult to generalize because the variables fluctuate across countries and across time periods. Having better understood the context of the data, these values are plugged into the models and run through the regressions.

Results

Table 2.A demonstrates the results for Model 1 ($flfpr = B_0 + B_1disp\_income + B_2ss\_welfare + B_3ayrs\_edu + u_i + e$), which determines the influence of independent variables established by the market. These variables serve as a numeric representation of the market characteristics that influence labor supply in the classical model. A random effects estimator was implemented to obtain the results of Model 1 after conducting a Breusch-Pagan Lagrange Multiplier Test (to ensure the necessity of the unit-specific error term of the random effects model as opposed to a "pooled" OLS estimator) and a Hausman Test (to ensure that the random effects estimator was consistent). Although a fixed effects estimator could have been used to run the regression, a random effects estimator offers more degrees of freedom and is generally used for a sample of a population, which is appropriate for a model with only a sample of countries out of the entire world.

Table 2.A Results for Model 1

Dependent Variable: Female Labor Force Participation Rate
(Females in the labor force as a percentage of the female population aged 15-64)

Variable	**Model**
Constant	41.796*
	(3.787)
Disp_Income	0.602*
	(0.166)
SS_Welfare	-0.0002
	(0.0005)
A.Yrs_Edu	1.284*
	(0.431)

$R^2 = 0.2238$
n (# of observations) = 116
[Standard Errors are in Parenthesis]
* indicates statistical significance at a 10% level

The results in Table 2.A indicate that the R^2 value (0.22) for the regression is relatively low, which means that the model as a whole does not very effectively predict the changes in the female labor force participation rate. Although individual independent variables are statistically significant, the model as a whole only explains about 22% of the change in female labor force participation rates across countries, which is low but not horribly low considering the number of observations (116). Thus, the model needs more independent variables to help explain the changes in female labor force participation rates. The variables for female annual disposable income and average years of educational attainment are statistically significant at a 1% level, which support the assumptions of the classical theory of labor supply. The sign on the slope estimate for the variable on wage indicates a dominant substitution effect over the income effect because a higher expected income has incentivized women to enter the labor market by increasing the opportunity cost of leisure, as is the case under the substitution effect. If the income effect were dominant, women would work less when expecting a higher wage because they would consume more of all normal goods, including leisure, and the sign on the slope estimate for the variable on wage would be negative. However, in the model, an increase of $1000 in estimated disposable income causes an increase in the female labor force participation rate by 0.602 percentage points. In addition, higher educational attainment should increase a worker's attachment to the labor force and increase labor supply because a worker will want to reap the benefits of investing in education in order to make the direct and opportunity costs worthwhile. Higher educational attainment should result in a higher offer wage as well, which would increase a female worker's attraction to the workforce. This theory is supported by the model in that an increase in female average educational attainment by one year is expected to increase the female labor force participation rate by 1.284 percentage points.

The variable for government social security and welfare payments per person may not have shown a statistically significant influence on female labor force participation rates due to the different requirements of these programs across countries, which are not accounted for in the model. For example, a welfare program that requires citizens to work in order to receive the benefits is more likely to increase labor force participation in that country, while other welfare programs that do not require citizens to work in order to qualify for the benefits may disincentivize potential workers from entering the labor force.

To determine if the independent variables on culture are significant to the female labor supply model, Model 2 ($flfpr = B_0 + B_1 disp\_income + B_2 ss\_welfare + B_3 ayrs\_edu + B_4 tfr + B_5 imr + B_6 work + B_7 job + B_8 wife + B_9 religious + B_{10} m\_benefits + B_{11} childcare + u_i + e$) includes independent variables that represent non-market, cultural characteristics of a country as well as the market-based variables from Model 1. The results from an F-Test indicated that a fixed effects estimator is preferred to a "pooled" OLS test, and the results from a Breusch-Pagan Lagrange Multiplier Test revealed that a random effects estimator is also preferred to a "pooled" OLS test. The results from the Hausman Test rejected the null hypothesis that both a fixed effects estimator and a random effects estimator are consistent, so a fixed effects estimator was used to estimate Model 2.

Table 2.B Results for Model 2

Dependent Variable: Female Labor Force Participation (Females in the labor force as a percentage of the female population aged 15-64)	
Variable	**Model**
Constant	64.543*
	(20.580)
Disp_Income	1.623*
	(0.389)

Variable	Model
SS_Welfare	-0.004*
	(0.0008)
A.Yrs_Edu	0.547
	(0.639)
TFR	5.828*
	(3.035)
IMR	-0.728*
	(0.264)
Work	-0.459*
	(0.206)
Job	-0.241*
	(0.092)
Wife	-0.086*
	(0.046)
Religious	-0.056
	(0.077)
M_Benefits	0.433*
	(0.134)
Childcare	-0.009
	(0.010)

$R^2 = 0.5994$
n (# of observations) = 44
[Standard Errors are in Parenthesis]
*indicates statistical significance at a 10% level

Despite the small number of observations (44), the R^2 value (0.599) for Model 2 is much higher than for Model 1, which signifies the Model 2's greater ability to predict the changes in the female labor force participation rate. Basically, Model 2 can explain almost 60% of the variability in the dependent variable as opposed to Model 1's ability to explain only 22% of the variability in the female labor force participation rate. The results for Model 2 in Table 2.B show statistical significance for six of the eight independent variables on culture, which strongly support the inclusion of measures of culture in the female labor supply model. The independent variables on disposable income and government spending on social security and welfare are statistically significant a 10% level, so the inclusion of cultural variables has not completely

changed the relationship between the market-derived variables from Model 1 and the variable for female labor force participation rates. The sign on the slope estimate for the variable on wage remains positive as explained in the results of Model 1. The negative sign on the slope estimate for the variable on social security and welfare fulfills expectations established by the theory that nonlabor income would have a pure income effect and serve as a disincentive for females to enter the workforce. However, the model reveals the importance of individual cultural variables in their own right because so many are statistically significant.

The positive sign on the slope estimate for the variable total fertility rate comes as a surprise because theory would suggest that an increasing number of children would cause childcare costs to increase, which should discourage women from working since they would need to find a high enough wage to compensate for the extra childcare cost. At the same time, a family with more children also has more basic costs like food and clothing, which may require a greater percentage of women in both two parent and one parent homes to work in order to provide for the family. This logic would explain the positive relationship between total fertility rate and the female labor force participation rate, and in the model, an increase in the births per woman by one child causes an increase in female labor force participation rate by 5.83 percentage points. The results for the variable infant mortality rate indicate that a increase in the infant mortality rate by one child, meaning one more child died out of every thousand live births in a country, would decrease the female labor force participation rate by 0.772 percentage points in that nation.

The variables measuring a society's opinion on the importance of work ("Work"), women's right to a job ("Job"), and the fulfillment provided by being a housewife are all statistically significant ("Wife"). Although the variables "Job" and "Wife" both understandably

have negative signs on their slope estimates, the variable "Work" surprisingly also displays a negative sign on its slope estimate. According to Table 2.B, an increase by one percentage point in the percentage of society that agrees with the statement "When jobs are scarce, men should have more right to a job than women," should decrease the female labor force participation rate by 0.24 percentage points. An increase by one percentage point in the percentage of society that believes being a housewife is fulfilling should decrease the female labor force participation rate by 0.08 percentage points. Although the magnitude of these slope coefficients is not very large, they still serve as important contributors in the over-all explanation of the change in the dependent variable in the model. For the variable "Work," theory would suggest that a society that values the act of work should not be concerned with who completes the work, and thus, should welcome female employees and boost female participation. However, the results in Table 2.B indicate that an increase of one percentage point in the percentage of society that ranks work as "very important" or "rather important" should cause a decrease in the female labor force participation rate by 0.46 percentage points. The magnitude of this slope coefficient is not very large either, but the variable also helps the over-all ability of the model to explain the changes in female labor force participation rates.

The variable on wages covered during maternity leave is the last statistically significant variable measuring culture. The positive sign on the slope estimate is the manifestation of the theory that views increased percentage of wages paid during maternity leave as an increase in women's ability to balance work and home life, which creates an incentive for women to work. Results in Table 2.B indicate that an increase by one percentage point in the percentage of wages paid during maternity leave should cause an increase of 0.43 percentage points in the female labor force participation rate. Therefore, all of these results support the importance of including

cultural factors in the labor supply model for women, though this conclusion must be made with caution due to the small number of observations in the model and the potential for a nonrepresentive sample as a result of limited data availability.

Model 2.1 ($flfpr = B_0 + B_1 disp\_income + B_2 ss\_welfare + B_3 ayrs\_edu + B_4 islam + B_5 christianity + B_6 dem + e$) was created as a variation of Model 2 with cross-sectional data from 2005 and estimated with an OLS regression because the dummy variables were dropped in the regression of Model 2 since they do not change over the different time periods in the panel data. Model 2.1 focuses only on the independent variables established by the market that appear in Model 1 and the dummy variables on religion and government.

Table 2.C Results for Model 2.1

Dependent Variable: Female Labor Force Participation
(Females in the labor force as a percentage of the female population aged 15-64)

Variable	**Model**
Constant	64.362*
	(6.874)
Disp_Income	-0.050
	(0.216)
SS_Welfare	0.002*
	(0.0006)
A.Yrs_Edu	-0.246
	(0.738)
Islam	-39.536*
	(6.215)
Christianity	-6.494*
	(2.875)
Dem	1.837
	(2.892)

$R^2 = 0.6712$
n (# of observations) = 44
[Standard Errors are in Parenthesis]
*indicates statistical significance at a 10% level

Looking at the model from a holistic standpoint, the R^2 value (0.67) for Model 2.1 is higher than its corresponding values in Model 1 and Model 2, which credits the model's ability to predict the changes in the female labor force participation rate. On first reaction, one would expect the R^2 value to be lower than the R^2 value for Model 2 due to the fewer number of independent variables. However, this higher R^2 value may be the result of the fact that cultural differences are greater between countries than across time, and these results come from an OLS regression with cross-sectional data. Therefore, the results of Model 2.1 also support the inclusion of cultural factors because the model can better explain the changes in the female labor force participation rate when isolating differences across societies. The R^2 value must still be considered with caution due to the small number of observations and the possibility of a nonrepresentative sample.

The results for Model 2.1 reveal that the dummy variables "Islam" and "Christianity" are both statically significant, and the independent variables for wage and education are no longer statistically significant at any reasonable level. Granted, the variable on government social security and welfare payments is still statistically significant at a 10% level. However, the sign on the slope estimate is positive instead of negative like it is in Model 2, which is surprising. Both dummy variables "Islam" and "Christianity" have negative signs on their slope estimates, as expected by the study on religious variables. For the variable "Christianity," Table 2.C indicates that countries in which at least fifty percent of the population identifies with the Christian religion have a female labor force participation rate that is 6.49 percentage points lower than countries in which the majority of the population does not identify themselves as Christians. As for the variable "Islam," countries in which at least fifty percent of the population identifies with the Islamic religion have a female labor force participation rate that is 39.54 percentage

points lower than countries in which the majority of the population does not identify themselves as Muslim. Although the small number of observations (44) in this model is likely to exacerbate the influence of the Islam variable, the large magnitude of the slope estimate of this variable is important to note. The influence of the Islamic religion on female labor force participation should be considered within countries that have sizable Muslim populations as well. The United States has a substantial Muslim population and should take this fact into account when looking at policy implications. For example, if the US government is trying to isolate the effect of an increase in the percentage of wage covered during maternity leave on female labor force participation, it is important for the government to weigh the negative influence of the Muslim religion against the positive influence of wages covered on maternity leave for that section of the population. Basically, the deterrence of the Muslim religion may completely outweigh the opposing influence of the wages covered during maternity leave on female labor supply for that portion of the population, which would render the policy moot. This analysis applies to countries with a large section of the population that is Christian as well. Policies are never created in a vacuum, so a government must be aware of all significant influences when estimating the effect of a policy.

Due to the statistical significance of the variable Islam and the large magnitude of its corresponding estimated slope coefficient, this variable serves as a strong example of omitted variable bias when it is left out of the regression and, therefore, strengthens the argument for the inclusion of cultural variables in the labor supply model. The interaction between the variable Islam and the variable for average female educational attainment depicts the omitted variable bias phenomenon. If the variable Islam is correlated with the variable for female educational

attainment, then the estimated slope coefficient for the education variable will be affected by the following equation:

Direction of bias = sign of $B_{omitted}$ • sign of $r_{included, omitted}$ = (–) • (–) = +

As shown in Table 2.C, the sign of $B_{omitted}$ or the sign of the slope estimate for the variable Islam is negative, indicating a lower female labor force participation rate in Muslim countries. The calculated correlation coefficient for the Islam and education variables ($r_{included, omitted}$) is also negative. In addition, when an OLS regression is conducted with female educational attainment as the dependent variable and the Islam variable as the independent variable, the Islam variable is statistically significant at a 1% level with a slope estimate equal to -4.457, confirming a negative correlation between the two variables. Thus, the equation above does apply to these two variables, and the slope estimate for the education variable should display a positive bias due to the multiplication of the negative correlation coefficient and the negative slope estimate of the Islam variable. This positive bias is supported and demonstrated by the results of Models 1 and 2.1. When the variable for Islam is excluded from the model, the slope estimate for the education variable in Model 1 (1.284) is higher than its corresponding slope estimate in Model 2.1 (-0.246) when the Islam variable is included, even though the later slope estimate is not the true value since it is not statistically significant. Therefore, the dummy variable indicating Muslim countries lends support for the inclusion of cultural variables in general in the model and should be included in the labor supply model once it is tested with a larger cross-section sample.

Since the previous two models had very few observations, the next two models were estimated in order to get a larger sample size and simultaneously account for differences in micro and macro-level data on culture. Model 2.2 ($flfpr = B_0 + B_1 disp\_income + B_2 ss\_welfare + B_3 ayrs\_edu + B_4 work + B_5 job + B_6 wife + B_7 religious + u_i + e$) includes the three independent

variables from Model 1 and four cultural independent variables demonstrating micro-level data obtained through cultural surveys. Since Model 2.2 relies upon panel data, a random effects estimator was used to estimate the slope coefficients of the model after conducting the appropriate tests to ensure that the extra structure of the random effects model was appropriate. Although it was necessary to use a fixed effects estimator for Model 2, a random effects estimator is consistent for this model, and the advantages listed previously make a random effects estimator better for Model 2.2.

Table 2.D Results for Model 2.2

Dependent Variable: Female Labor Force Participation
(Females in the labor force as a percentage of the female population aged 15-64)

Variable	**Model**
Constant	33.949*
	(17.813)
Disp_Income	0.308
	(0.241)
SS_Welfare	-0.0001
	(0.0006)
A.Yrs_Edu	0.803
	(0.557)
Work	0.349*
	(0.169)
Job	-0.174*
	(0.073)
Wife	0.017
	(0.041)
Religious	-0.190*
	(0.054)

$R^2 = 0.4169$
n (# of observations) = 81
[Standard Errors are in Parenthesis]
*indicates statistical significance at a 10% level

Although the number of observations has doubled in comparison with Models 2 and 2.1, the R^2 value (0.4169) has decreased, and the model can only explain about 42% of the variation in the female labor force participation rate. However, this R^2 value is still higher than the R^2 value for Model 1, which only included variables for market-derived factors, and it may have decreased some due to the fewer number of independent variables. Therefore, the cultural independent variables still aid in explaining the change in the dependent variable, but the micro-level data may not be as influential on the labor force participation rate. The results for Model 2.2 in Table 2.D indicate statistical significance for the variables "Work," "Job," and "Religious" at a 10% level. The sign on the slope coefficient for the variable "Work" is positive for this model, which causes concern since it is negative in Model 2, but a positive sign was expected by the theory. According to Table 2.D, an increase by one percentage point in the percentage of the population that believes work is important should cause an increase in the female labor force participation rate by 0.35 percentage points. The sign on the slope estimate for the variable "Job" remains negative as it is in Model 2. These results indicate that an increase by one percentage point in the percentage of society that agrees with the idea that men are more deserving of a job than women when jobs are scarce should decrease female labor force participation rate by 0.17 percentage points. The negative sign on the slope estimate for the variable "Religious" also reflects the theoretical expectations, and the slope estimate can be understood as an increase by one percentage point in the percentage of self-reported religious persons within a country decreases the female labor force participation rate by 0.19 percentage points. Even though the number of observations (81) almost doubled in comparison with Models 2 and 2.1, the regression could still benefit from more observations, though the data on social indicators is scarce.

Since Model 2.2 focuses on cultural independent variables characterizing micro-level data, Model 2.3 ($flfpr = B_0 + B_1disp\_income + B_2ss\_welfare + B_3ayrs\_edu + B_4tfr + B_5imr + B_6m\_benefits + B_7childcare + u_i + e$) was constructed to focus on the influence of cultural macro-level data, but also includes the three market-derived independent variables through panel data. A random effects estimator was used to regress the model after conducting the appropriate tests.

Table 2.E Results for Model 2.3

Dependent Variable: Female Labor Force Participation
(Females in the labor force as a percentage of the female population aged 15-64)

Variable	**Model**
Constant	40.938*
	(7.678)
Disp_Income	0.797*
	(0.184)
SS_Welfare	-0.0008
	(0.0005)
A.Yrs_Edu	0.571
	(0.553)
TFR	1.073
	(3.143)
IMR	-0.358
	(0.248)
M_Benefits	0.033
	(0.039)
Childcare	0.019*
	(0.007)

$R^2 = 0.5550$
n (# of observations) = 66
[Standard Errors are in Parenthesis]
*indicates statistical significance at a 10% level

Despite the lack of statistical significance of cultural independent variables and the minuscule, albeit statistically significant, influence of childcare subsidies on the female labor

force participation rate, the higher R^2 value (0.55) indicates the strength of the model as a whole. Model 2.3 explains more of the variation in the dependent variable than Model 1 can explain. However, these results may indicate multicollinearity among independent variables like the percentage of wages covered during maternity leave and government childcare subsidies. If the government prioritizes aiding women in their attempt to balance work and home life by subsidizing childcare, then the government is much more likely to mandate a higher percentage of wages paid during maternity leave as well. Yet, all of these variables are important enough to remain in the model, and the presence of multicollinearity does not bias the slope estimates or diminish the goodness of fit of the model. Multicollinearity merely increases the standard errors of slope estimates.

The results for Model 2.3 as shown in Table 2.E demonstrate statistical significance for the variables on income and childcare benefits. In the model, an increase in the female disposable income by $1,000 should increase the female labor force participation rate by 0.797 percentage points. An increase in government subsidy of childcare benefits-in-kind by $1 per person increases the female labor force participation rate by 0.019 percentage points. As with all of the other models, the relatively small number of observations for Model 2.3(66) does not allow for confident conclusions, but it provides more data than Models 2 and 2.1 provide.

Conclusion

Cultural and social norms have an important effect on female willingness to supply labor in the market and an employer's willingness to hire a female worker. The results on the R^2 values suggest that the influence of cultural factors as a whole on the female labor force participation rate cannot be disregarded. The R^2 values for the models with cultural factors were

much higher than the R^2 value for the first model with only market-derived independent variables. Although the R^2 values by themselves were not high enough to support the importance of cultural factors without a doubt, the explanatory power of the cultural factors together should be included in the model until otherwise proven unnecessary. Several examples of omitted variable bias were presented, such as the bias on government-provided social security and welfare and female educational attainment. The classical labor supply model is likely to demonstrate more cases of omitted variable bias other than the ones discussed above as well. In addition, the all of the independent variables representing culture except those measuring democracy and government-subsidized childcare display statistically significant influences on female labor force participation rates in at least one of the models. Therefore, the variables for culture must be included in the model for female labor supply due to the significance of these variables and in order to avoid bias in the market-derived variables, which could cause policy mistakes and inefficiencies in the real world.

Upon the availability of more country-level international data, these cultural factors could be tested again, preferably with an OLS regression using cross-sectional data to best capture the differences in culture across countries. The relatively small number of observations for these models hurt the legitimacy of the findings and the representativeness of the sample. Future studies should also consider focusing on different cultural backgrounds within a single country, which would be crucial information for the government.

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