Pacific Trade and Development
Working Paper YF39-05 | June 2018

PAFTAD

Does Education Increase Women's Labor Force Participation in the Philippines?

Hannah Hassani

The George Washington University

Contact: hjhannah@gwu.edu

Does Education Increase Women's Labor Force Participation in the Philippines?

Hannah Hassani[1]
Department of Economics
The George Washington University

Abstract

In this paper, I test the relationship between educational attainment (i.e., human capital accumulation) and labor force participation of Filipina women in 2014 using data from the National Labor Force Survey. There has not been a national study of women's labor force participation since 1996, when women's employment was lower (28 percent) than it is today (60 percent). This study employs logistic regressions to show that among different levels of education, only a college degree is consistently positive and significant in determining women's participation in the paid labor force. Even when segmenting the population by marital status and age, women's employment is best predicted by a college degree, consistent with other literature on women's labor force participation. As such, women's employment is best predicted by the highest levels of education, so special attention could be paid to women ages 16 to 24, as attainment at every level increases their participation in the labor force.

[1] *Author Information*
Hannah Hassani, hjhannah@gwu.edu, Washington, DC, USA

1. Introduction[2]

If a developing country pursues policy that encourages higher educational attainment for women, will women return the government's investment by participating in paid labor? Broadly speaking, the theoretical relationship between educational attainment and a person's decision to work in the labor force has been studied since human capital theorists sprung onto the scene in the 1960s (see Becker 1965, 1974, 1975; Mincer 1994; Schultz 1961). How *women's* educational attainment affects participation in the paid labor force has also received attention, as women's life and work cycles progress differently than men's (Akbulut 2011; Heckman and Macurdy 1980). In Asia, higher educational levels among women, particularly in the highly developed Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan), presents a large-scale question: Can women in developing Asia capitalize on education to increase their income levels and social statuses? At a micro level, each woman who enters the labor force will see the trajectory of her life change as she accumulates wealth, knowledge, skills, experiences, and geographic mobility. At a national level, the potential contributions of women's paid work could shape a country's economic development.

This paper examines the interaction between increased education, or human capital accumulation, and labor force participation (LFP) among women in the Philippines. Because participation in the labor force is a binary variable—employed or not employed—I perform a logistic regression to best model the micro-level data. Using the Philippines' 2014 National Labor Force Survey, I control for demographic characteristics, in particular those related to age and marriage, that traditionally affect women's LFP. My results indicate that the attainment of a college degree is the biggest and most steady predictor of women's LFP. Because lower degrees do not yield consistently significant results, I run two further regressions on single versus married women and three age groups. For young women, all degrees increase LFP, but college increases LFP for all women regardless of age or marital status. Thus, each stage of education can help women break into the labor force.

There has not been a national labor force analysis of Filipinas since 1996 (Alonzo, Horton, and Nayar 1996). The Philippines is a noteworthy case study because of its high levels of women's educational attainment (Population Reference Bureau 2017). On average, Filipina women are more likely to attend university than their male counterparts (Yamauchi and Tiongco 2013). My study of women's LFP rate in the Philippines in 2014 uses conventional theories of time allocation and human capital investment to assess how Filipina women use the time invested in their education. Does higher human capital accumulation (increased years of schooling) accurately predict women's employment (participation in the paid labor force)?[3] This question is of particular importance

[2] I am greatly indebted to my advisers, Dean Elizabeth Chacko and Dr. Neil Ruiz, for their continued support of this research project. I would also like to thank the George Washington University for funding this research and the Philippines' National Statistics Office for providing me the dataset.

[3] Employment in labor market is any form of formal paid labor. Women's (typically unpaid) work within and around the home is critical to economic and social studies, but I focus on the relationship between education and entry into the labor market. Higher educational attainment among mothers is associated with benefits to development, such as better health outcomes for

for a globalized, developing country such as the Philippines, as low rates of women's LFP could indicate untapped potential, while higher employment rates could foreshadow high, sustained growth.

2. Intersecting Theories about Human Capital and Labor Force Participation

Labor economics, broadly, is the study of time allocation decisions. That is, what drives people to sell their time in the ways they do, and how can we qualify how they sell their labor? Like an analysis of a goods market, economists can analyze labor market outcomes through supply and demand: the intersection of available workers and employers' desired quantity of labor and skill levels will determine the quantity and wage of labor in a market. A study of labor force participation principally examines the supply side. First, how do utility-maximizing individuals and households decide how they spend their time? How do these market decisions differ for men and women? One component of these decisions is human capital theory. Capital, such as machinery or computers, is any investment for which higher returns are expected in the long term rather than the short term. If paying for education is seen as an investment—that is, capital that exists in a person—people allocate their time to cultivate their knowledge and skills for higher future returns. This is the theory's premise. This paper's central contribution is to understand whether human capital significantly influences women's LFP in a developing country. If the relationship is significant, governments can maximize women's productivity by investing in their schooling, and women can become more financially autonomous.

Becker (1965) was the first to introduce time into the utility function and to extend the unit of analysis from the individual consumer to the household. An individual's utility function describes the combinations of work and leisure that will maximize her satisfaction, or utility. In Becker's study, the individuals of a household make labor and leisure decisions as a group based on the household's income.

Becker (1975) also introduced the next crucial idea in time allocation theory: the household unit of analysis. Extrapolating to the household level established a gendered component. Households might send sons, not daughters, to school if they anticipate their sons will have higher income and be more useful to the household. Similarly, women's working lives are more impacted by their marital status than men. Understanding how a household collectively decides to educate and sell its work puts women's labor force decisions in context.

Women's ages also impact their labor force participation. Heckman and Macurdy's (1980) econometric analysis questions the validity of previous studies' assumptions that nonmarket time at one age is a perfect substitute at any other age. They quantified a way to incorporate age into labor supply analysis, as common sense would tell us: an 18-year-old's labor force decision will depend on factors different from a 50- or 70-year-old's. For women, age affects the stages of their lives, as they tend to enter and exit the labor market more frequently than men because of marriage, childbirth, family care, and other obligations. We

children and higher schooling for daughters, but the relationship between education and domestic work is not as direct and is not a component of this study.

cannot presume that any worker's age is substitutable across the life span, especially for women. Consequently, this study employs age as a causal variable but then segments different ages to test how women in different stages of their lives spend their working and leisure hours.

Table 1, Major literature on labor supply

Major Literature on Labor Supply

Author	*Year*	*Addition to literature*
Time allocation		
Becker	1965	Add time into the utility function
Becker	1974	Expand unit of analysis to household
Heckman and Macurdy	1980	Analyze women's age on labor force participation
Tomoda	1985	Call for new definition of women's labor
Human capital		
Schultz	1961	Introduce human capital as an investment
Mincer and Polacheck	1974	Women's workforce attachment is less than men's; readily enter or exit
Eckstein and Lifshitz	2011	Women's human capital can explain rise in income in the past 50 years
Empirical studies		
Alonzo, Horton, and Nayar	1996	Positive coefficient on earnings for women
Yamauchi and Tiongco	2013	Female coefficient decreases log earnings by 0.283

The logic in the existing literature suggests that if women's engagement in the paid labor force is so different from men's, perhaps women's decisions would be best modeled by a different framework. At a minimum, a nuanced understanding of women's engagement in the labor market is necessary. To that end, Tomoda (1985) proposes that the definition of "labor force" is too ambiguous; what constitutes employment in one country might not be considered part of the labor force in another. Similarly, LFP is self-reported. One person's definition of actively looking for work could vary considerably from the next person's, and women could underreport employment, especially in the informal sector. Instead, Tomoda studies four Asian countries to assert that much of women's contributions to their economies are neglected in official records, as women's work is often unpaid, even though women are integral to the success and welfare of family units. Defining labor in an alternative way, such as the

social savings of children growing up near their parents, would be a different perspective on women and the workforce. Tomoda's time allocation approach still does not incorporate much of women's work as economically valuable. Instead, she exhorts researchers to find "a more refined and standardized methodology and perhaps a redefinition of labor force activities, in order to arrive at a fairer evaluation of women's economic contribution" (670). It would be interesting to conduct a time allocation study for my designated population and see the nuances of education on work-life balance, but this study maintains traditional labor market definitions to address the central research question of *whether* education influences entry into the labor market, not *how* people spend their time in different sectors.

Just as a woman's labor market decisions are informed by how she decides to spend her time, another key factor in labor market outcomes is the amount of human capital with which a person is endowed. Schultz (1961) was an early pioneer of human capital theory, which posits that all workers are not endowed equally. As workers gain experience and skills, their productive capacity increases. Thus, workers have an incentive to invest in education and training, even if there is a short-run loss in income, to increase their future earnings. This notion is similar to investment in capital or land and seems intuitive now, but it was revolutionary in the 1960s.

Schultz also discusses the role of human capital investment in the "productive superiority of the technically advanced countries" (1961, 3). That is, human capital spurs economic growth, a novel assertion at the time. Eckstein and Lifshitz (2011) corroborate this finding in the narrower field of female labor supply. They use a dynamic model of female labor that specifies social and educational variables to follow a state-dependent discrete stochastic dynamic process, and their wages follow standard Mincer and Ben-Porath functions. The model's dynamism arises from a woman's choice to maximize her present utility by working or not, subject to the budget constraint. The study finds that the rise in educational attainment during the past 50 years has accounted for 33 percent of the increase in female employment. It would follow that for my population of interest, education and LFP are positively related. Notably, this study does not use panel or time-series data and can give only a snapshot of how education influenced labor decisions at a given time.

Women around the world have flocked to the paid labor force in the past half-century (Akbulut 2011), but employment numbers are only part of the story. To reveal the gainfulness of work performed, researchers look at wage earnings, which are lower for women than for men across the lifespan, often for the same work (Goldin 1990; Murray and Keith 2003). My study, however, aims to see if education prompts women to enter the labor force at all, because simply entering can change the dynamics within a household and increase a woman's autonomy and self-sufficiency. Further, a study of age would consider occupational sectors and hierarchical distribution of male versus female workers, which is not this paper's principal aim.

The discussion of the literature thus far has been limited to broad populations and to women in general. If we turn to the Philippines, much of the econometric literature on the determinants of women's LFP uses earnings as the dependent variable and finds a negative coefficient on female variable dummies using ordinary least squares regressions.

Alonzo, Horton, and Nayar (1996) use ordinary least squares regressions to find that male and female urban employees in 1978 and 1988 earn more with each degree they earn. Perhaps unsurprisingly, women's returns to tertiary secondary education are nearly double that of men's. In 1978, the coefficient was 0.682 for women and 0.339 for men, and in 1988, the coefficient was 0.506 for women and 0.307 for men. This might be because women's incipient entries into the labor force facilitated an enormous increase in earnings, and in recent years, the effect has subsided. Basic human capital theory predicts that greater returns compel people to undertake the costs of investing time and money in their education. Yamauchi and Tiongco (2013) find that for a sample of Filipinos ages 20 to 49, being female decreases daily log earnings by 0.283. This value increases in magnitude with older age cohorts, suggesting that the gender gap has narrowed. Yamauchi and Tiongco also find that each additional educational degree increases log earnings, with college and postgraduate degrees increasing earnings the most.

What differentiates my study is the partition of the data to include only women to examine LFP. This isolation allows me to predict the labor market behavior for a more homogenous group, rather than just controlling for gender. To understand women's engagement in the labor force, researchers must create models that account for gendered variables, such as marital status. Even nongendered variables, such as age and educational attainment, take on a new meaning when examined for women only. As such, this paper examines the role of time allocation and human capital as they relate to female labor supply.

3. The Philippines' National Labor Force Survey

The data for this analysis come from the Filipino government's National Statistics Office. The survey is the National Labor Force Survey for the fourth quarter of 2014, which contains 202,047 respondents of all ages up to 99. Because I am interested in adult women, I truncated the data to include only women ages 16 to 65 who are not full-time students (52,311 respondents). Some labor force surveys run from ages 18 to 65, but I chose 16 as my lower bound because Filipino students graduate high school at 16. Because I excluded full-time students, I can account for 16- to 18-year-old women who do not pursue a higher degree.

Each respondent's data contain up to 48 economic indicators. Six indicators are pertinent to my analysis of human capital accumulation (table 2). Of these, I kept only *Age* and Age^2 as discrete; the rest, I converted to dummy variables to ensure the relevance of the variable to my regressions. For this reason, all non-age-related coefficients' means describe the share of the survey population that fits that description. The dependent variable, LFP, has a mean of 0.60, indicating that 60 percent of the women in the survey participate in the labor force. Other dummy variables can be similarly interpreted.

Summary Statistics

Table 2, Survey Variables

Variable	*Observations*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
LFP	52311	0.600	0.490	0	1
LessPrimary	52311	0.122	0.328	0	1
LessHS	52311	0.256	0.437	0	1
HS	52311	0.444	0.497	0	1
College	52311	0.177	0.382	0	1
Age	52311	39.0	13.5	16	65
Age^2	52311	1698.8	1089.2	256	4225
Married	52311	0.688	0.463	0	1
GradTech	52311	0.961	0.194	0	1
Urban	52311	0.487	0.500	0	1

Notes: GradTech = graduate of a technical program; HS = high school; LFP = labor force participation. A value of 0 for *GradTech* indicates that the respondent did not undertake a course, so 96.1 percent of women are not graduates of a technical program.

The dependent variable, *Labor force participation (LFP)*, comes from the survey's employment status variable. Women who are currently employed or unemployed and actively seeking work are included in the labor force. All others are excluded from the labor force and have a value of zero.

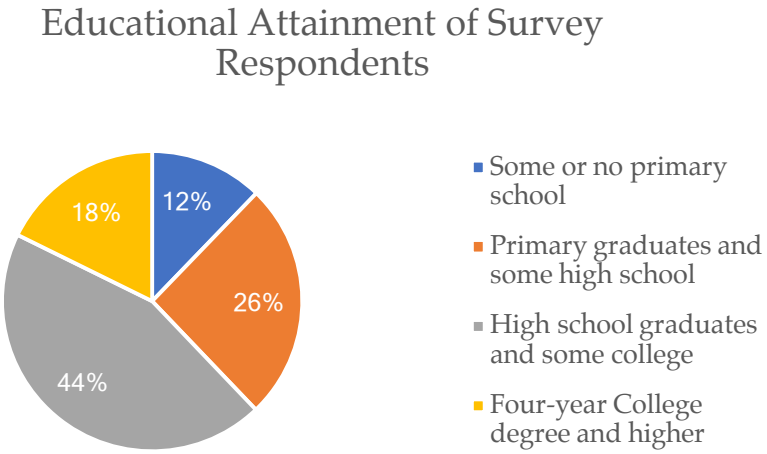
The first four independent variables of interest are the human capital variables. I used the survey's *Educational level* variable to create the following four dummy variables: *LessPrimary, LessHS, HS, and College*. *LessPrimary* includes women who have completed some or no primary (elementary) school. *LessPrimary* is the baseline level of education and is not included in the regression to avoid multicollinearity. As such, the next three educational variable results can be compared with *LessPrimary*. *LessHS* includes women who have completed primary school but do not have a high school degree. *HS* includes high school graduates and those who have attended some college. *College* includes anyone with a college degree or higher. Figure 1 shows the breakdown of the education levels.

Notably, 44 percent of the survey respondents have completed high school (versus 42 percent of men), and 18 percent have completed a four-year university degree or higher (versus 12 percent of men). The higher rate of Filipino women's educational attainment was one of the motivations for this paper, as Filipinas present an interesting case study for how education can impact women's working lives and possible financial autonomy.

The demographic controls include age and marriage variables. *Age* is the age of the respondent as of her last birthday. Age^2 is the square of that age. Including a squared age variable is standard practice, as age exhibits a negative parabolic relationship with working. That is, LFP increases as people get older but drops off as they age past their prime and retire. Although the Phillippines

has no standard retirement age, this study examines women only up to age 65. This upper bound limits generational variation and drop-offs for retirement[4] in workforce patterns. A more detailed analysis of age cohorts follows in the results section. The data comprise a snapshot of a person's life, specifically in the fourth quarter of 2014. The data do *not* follow the same respondents over time (like in panel data), so this study does not account for how age affects women over the lifespan. Next, the dummy variable *Married* indicates whether the respondent is married. It is essential to include a marriage variable for women, as expectations for single and married women differ greatly in Asia and around the world. Although it might be acceptable for single women to work, married women might be more obliged to stay home and manage the house or children.[5]

Figure 1, Educational attainment of survey respondents



The final variables, *TechGrad* and *Urban*, might control for characteristics in women's working lives. *TechGrad* indicates whether the respondent has participated in a technical training course, or any nondegree course that presents practical or vocational training. The courses that compose 1 percent or more of the technical courses taken are listed in table 3. Only a few women have participated in one of these courses, but the variable can be a useful control because many women who do not have higher education or have been out of school for many years can quickly gain an employable skill. One fact that supports this hypothesis is that nearly all the top courses, except for computer programing, are in traditionally feminized fields—caretaking, cosmetics, fashion,

[4] See Raymo and Cornman (1999) for a discussion of retirement patterns in East Asia, specifically that women are working more into their later years.

[5] This paper's major caveat is that there is no variable that accounts for the respondent's number of dependent children. Having children tends to negatively affect women's LFP, as demands at home increase significantly, and unless a family can rely on relatives or paid child care, the burden falls heavily on women's shoulders. In the Filipino context, partly because the country is Roman Catholic, only 44 percent of young married women have access to family planning resources such as birth control (Population Reference Bureau 2017). As such, many families have children immediately following marriage. Thus, in some sense, more than in other countries, marriage in the Philippines could account for childbearing and the associated duties for women. Either way, number of dependent children is not included.

and secretarial work—that have high demand and low entry costs. The top tracks suggest that women want to gain skills in traditionally female-dominated fields because perhaps that is all that is available to them.

Table 3, Top vocational courses

Top Technical Courses

Name of Course	*Number of Participants*	*Percentage of total vocational participants (N=2052)*
Dressmaking	268	13.06%
Secretarial	150	7.31%
Cosmetology	145	7.07%
Caregiving	62	3.02%
Midwifery	59	2.88%
Tailoring	43	2.10%
Computer programming	36	1.75%
Housekeeping	35	1.71%
Human resource management	35	1.71%
Computer secretarial	26	1.27%
Cooking	25	1.22%
Junior secretarial	23	1.12%
Nursing aide	22	1.07%

Lastly, *Urban* is a dummy indicating whether the respondent's city is urban. Notably, 48.7 percent of women live in urban areas. The effect of urbanization on women's employment is mixed. Urban women might have more spatial mobility and have the freedom to choose their occupations. On the other hand, rural women might be inclined to engage in agricultural work out of necessity, though they might not self-identify as employed. Regardless of the effect, it is important to control for urbanization because women in spatially concentrated and sparse areas behave differently, and the purpose is to find the effects of education, not region.

4. Empirical Model

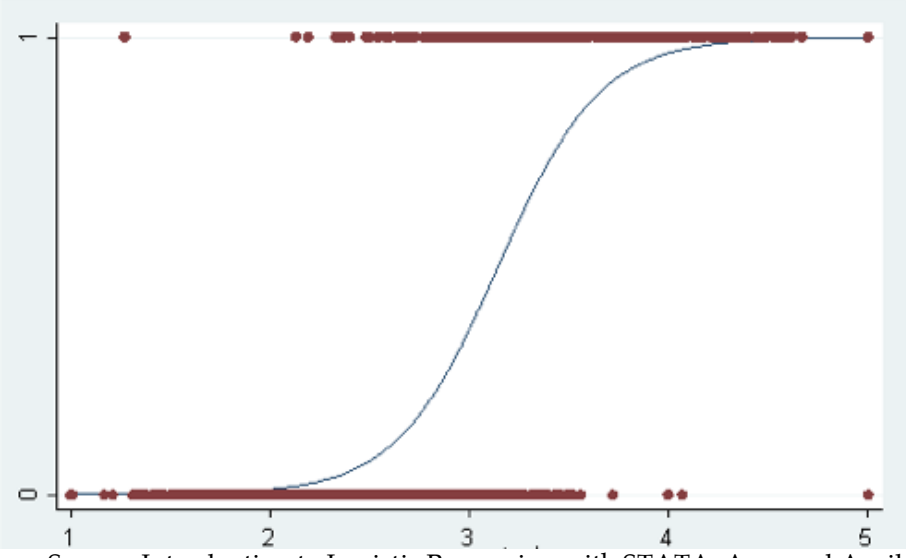
The standard method of testing the empirical relationship between a dichotomous dependent variable (here, labor force participation) and independent variables (discrete, continuous, or dummy human capital indicators) is a logit regression, which is a logistic model. I expect the human capital variables to have a positive coefficient because I hypothesize that increased education enables women to take advantage of greater opportunities in the labor force and would thus increase a woman's chances of participating in the labor market. I also expect *Age* to yield a positive coefficient for two reasons: first,

young people might still be enrolled in school and not in the labor force, and second, because women often exit the labor market when they are raising children but return later in life (Goldin 1990). Lastly, I expect *GradTech* to have a positive coefficient because the variable indicates that the woman has taken the initiative to gain technical skills to make her labor more attractive to potential employers or to start her own business, as in the case of many of the cosmetic courses listed in table 3.

On the negative end, I expect the variable *Married* to yield a negative coefficient because married women are traditionally expected to stay home and raise children, which would impede their participation in the labor market. In the Filipino context, I predict that *Urban* will have a negative coefficient because high educational attainment might not be necessary for rural women to find employment, especially if women identify agricultural work as employment. It follows that being in a rural area might increase LFP and, by comparison, render urban women less likely to participate.

Two logistic models are commonly used to predict a dichotomous variable: the probit and the logit. I use the logit because the coefficients can be converted to odds ratios, which are easier to interpret. In both logistic regressions, the estimated probabilities will be necessarily between 0 and 1 because of logarithmic asymptotes. Standard ordinary least squares regression does not have such endpoints and predicts values other than 0 and 1 for LFP, which are not possible. For a dichotomous variable such as LFP, the only values are 0 and 1, so any values other than the endpoints do not predict the variable. The logit yields an s-shaped curve, which fits the data better because of the steep slope at values between 0 and 1 (figure 2). The curve moves quickly through all impossible values while maintaining a continuous function. The red points denote data that correspond to 0 (no participation in the labor force) and 1 (participation in the labor force), the binary options for a dichotomous dependent variable.

Figure 2, Sample Logistic Regression Curve



Source: Introduction to Logistic Regression with STATA. Accessed April 2017. In Logistic Regression with STATA. Retrieved from

http://stats.idre.ucla.edu/stata/webbooks/logistic/chapter1/logistic-regression-with-statachapter-1-introduction-to-logistic-regression-with-stata/

In terms of a mathematical model, the standard logistic regression equation is as follows:

Equation 1, Standard Logit

$$\ln\frac{p}{1-p} = \alpha_i + \beta_i x + \varepsilon_i \qquad (1)$$

where p is probability of the dependent variable, α is a constant that determines the logistic intercept, β is the coefficient that determines the slope of the curve, x is the independent variable, and ε is the residual. $\frac{p}{1-p}$ is the odds ratio, and $\ln\frac{p}{1-p}$ is the log odds ratio, or "logit."

My regression model is as follows:

Equation 2, Logistic regression equation for this study

$$\ln\frac{LFP}{1-LFP} = \alpha_i + \beta_{1i}LessHS_i + \beta_{2i}HS_i + \beta_{3i}College_i + \beta_{4i}Age_i + \beta_{5i}Age\hat{}2_i + \beta_{6i}Married_i + \beta_{7i}Urban_i + \beta_{8i}GradTech_i + \varepsilon_i \qquad (2)$$

The unit for the coefficients are in log odd units because the dependent variable, LFP, is on a logit scale. In the raw model, the coefficient thus estimates how much a one-unit increase in an independent variable, holding all other variables constant, will increase the predicted log odds of the dependent variable, LFP, equaling 1. Variables that are not statistically significant are effectively 0, which will be taken into consideration in the regression equation. In addition, a one-point increase in a dummy variable would mean going from one binary outcome to another, such as no participation in vocational training to participation in vocational training. To get an intuitive sense of the interpretation, I present an arbitrary example: a 37-year-old woman who has a high school degree, lives in an urban area, is single, and has not participated in a vocational course would produce this equation:

Equation 3, Sample equation

$$\ln\frac{LFP}{1-LFP} = \alpha + \beta_2 * 1 + \beta_4 * 1 + \beta_5 * 37 + \beta_6 * 37^2 + \varepsilon \qquad (3)$$

In the logit, each independent variable must be interpreted individually against the dependent variable. In this example, the woman's high school degree increases the log odds of her participating in the labor force by β_2, holding all other variables constant. $\beta_4, \beta_5,$ and β_6 can be similarly interpreted.

To ease the interpretation of the logit regression, I present my findings in odds ratios. The odds ratio reports the percentage increase in the probability of the dependent variable at any value of the independent variable. In the case of the 37-year-old woman in equation 3, $\beta_2, \beta_4, \beta_5,$ and β_6 would represent percentages. For example, her high school degree increases her odds of

participating in the labor force by $(\beta_2 - 1) * 100$ (a value of 1 is 100 percent, so any value below 1 decreases the likelihood, and any value above 1 increases the likelihood).[6] For odds ratios less than 1, we divide the ratio into 1 to interpret the odds ratio (i.e., $[1/\beta_2] * 100$). This way, we can measure the magnitude of difference, not just the direction.

5. Results and Analysis

Regression 1: Baseline Regression, Odds Ratios

	Dependent variable:				
	LFP				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
LessHS	0.930**	0.943*	0.998	1.009	1.007
	(0.0306)	(0.0309)	(0.0344)	(0.0349)	(0.0349)
HS	0.981	1.030	1.011	1.038	1.026
	(0.0300)	(0.0321)	(0.0332)	(0.0347)	(0.0345)
College	2.643***	2.727***	2.407***	2.491***	2.484***
	(0.0998)	(0.105)	(0.0957)	(0.102)	(0.101)
Age		1.068***	1.173***	1.174***	1.174***
		(0.00490)	(0.00613)	(0.00614)	(0.00614)
Age^2		0.999***	0.998***	0.998***	0.998***
		(5.73e-05)	(6.42e-05)	(6.41e-05)	(6.42e-05)
Married			0.342***	0.340***	0.340***
			(0.00890)	(0.00889)	(0.00890)
Urban				0.920***	0.918***
				(0.0189)	(0.0189)
TechGrad					0.832***
					(0.0440)
Constant	1.296***	0.337***	0.116***	0.118***	0.142***
	(0.0352)	(0.0299)	(0.0110)	(0.0111)	(0.0153)
Observations	52,311	52,311	52,311	52,311	52,311
Wald chi^2	1278.03	1501.7	3112.58	3111.7	3116.61
Prob > chi^2	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.0234	0.028	0.0594	0.0597	0.0599

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

In the table Regression 1, I first tested the educational variables (*LessHS*, *HS*, *College*, and *TechGrad*) and LFP exclusively. Column 1 shows that *College* is

[6] The same logit regression produces the raw coefficients and odds ratios, but programming code will display different outputs. Interested readers can find the raw coefficients for all the regressions presented in section 5 in appendixes A through D.

significant and positive at a 1 percent level; attending college (compared with *LessPrimary*, or no degree) increases the odds of women's labor force participation 164 percent. In contrast, both *LessHS* and *HS* marginally decrease the likelihood of participation, and *HS* is not significant. This is perhaps because middle or high school degrees do not offer much of a premium over no degree and therefore do not affect women's paid employment. Column 2 includes the *Age* and Age^2 variables, both of which are significant at a 1 percent level. In this scenario, a one-year increase in age corresponds to a 6 percent increase in the odds of LFP. Age^2 has effectively no impact. When I account for age, *LessHS* becomes less significant, moving down to a 10 percent level, and *HS* remains insignificant. The effect of college actually increases to 173 percent, suggesting that accounting for age, having a college degree is even more of a predictor of LFP.

Column 3 accounts for the major demographic variable that impacts most women in the workforce: marriage. It is the addition of *Married* that begins to unravel female interaction with the labor market. *LessHS* and *HS* still have a minimal effect on LFP. Interestingly, the effect of *College* diminishes 30 percent, meaning that before, single women (probably) positively skewed the effect of college upward toward having a larger effect than it actually does. When accounting for marriage, women with a college degree are less likely to work. Remarkably, the odds ratio for *Married* is low, implying that single women are 194 percent more likely to participate in the labor force than their married counterparts, significant at a 1 percent level.[7] This value could offset the large coefficient on *College*, which reveals the dramatic effect of marriage on women's entrance into and continuation in the paid labor market. Lastly, column 4 adds *Urban*, which has a slight downward effect. Compared with urban women, rural women are 8 percent more likely to work. Lastly, contrary to my hypothesis, *GradTech* decreases the likelihood of LFP at a 1 percent significance level. Only 3.92 percent of women participated in a vocational training course and so the effect on other variables is small, but it is still surprising that women who did not participate in a technical course are 20 percent more likely than their participant counterparts to work. One possible explanation is that currently 10 percent of the Filipino population works as overseas contract workers, and the technical courses are geared toward training workers to go abroad. In that case, women who remain in the Philippines who have taken these courses are either waiting to go or return from abroad or have returned and are satisfied with their (higher) earnings.

The downward effect of *Married* is even greater than expected. Because the predictor has such a severe impact, I run a second regression that segments single and married women to see how the educational controls affect LFP within marital statuses. Regression 2 presents the results. There are about three times as many married women (35,985) as there are single ones (11,517). Second, all dependent variables now become significant, suggesting that perhaps single and

[7] This percentage is derived from the expression $[1/0.34] * 100$, as discussed in section 4. Other odds ratios in this section are calculated using the same formula. The interpretation would be straightforward if all variables had odds ratios greater than 1, but variables change magnitude across regressions. For consistency, I use the same variables across all regressions, even if the interpretation must be adjusted slightly.

married women behave so differently in the labor market that it is better to compare them separately than to include them in the same model.

For single women, each level of education increases their likelihood to participate significantly and sizably. Having only a middle school (*LessHS*) or high school (*HS*) degree increases the likelihood of participating by 129 and 191 percent, respectively. The college effect triples from the previous regression to 590 percent. That educational variables are correlated with LFP does not mean education is a causal factor. It is possible that to work certain jobs, women need college degrees, and so it is the labor force opportunity that causes women to get a degree, not the other way around. Urbanization tends to affect women differently. For single women here, being urban increases the likelihood of LFP 49 percent, but again, there might be factors that are unaccounted for. There could be a self-selection bias where single women migrate to urban areas to find work, regardless of educational level. But the fact that single women at all educational levels—controlling for demographics, geography, and nontraditional educational attainment—are more likely than women without any degree to work suggests a strong, positive relationship between the two variables of interest.

Regression 2: Single and Married Women, Odds Ratio

	Dependent variable:	
	LFP	
	Single	*Married*
LessHS	2.292***	0.856***
	(0.220)	(0.0335)
HS	2.912***	0.827***
	(0.248)	(0.0318)
College	6.899***	2.039***
	(0.655)	(0.0981)
Age	1.119***	1.234***
	(0.0141)	(0.00859)
Age^2	0.998***	0.998***
	(0.000172)	(8.23e-05)
Urban	1.490***	0.823***
	(0.0688)	(0.0202)
TechGrad	0.781**	0.821***
	(0.0880)	(0.0541)
Constant	0.153***	0.0172***
	(0.0370)	(0.00270)
Observations	11,517	35,985
Wald chi^2	778.3	1967.49
Prob > chi^2	0.000	0.000
Pseudo R^2	0.0691	0.0541

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

Married women present an almost reverse picture. Single women with a middle school (*LessHS*) or high school (*HS*) degree compared with no degree are 17 and 21 percent more likely to participate in the labor force. College degrees still increase the likelihood of working in paid labor 104 percent, though less than for single women. One possible explanation for the downward effect of middle and high school degrees is that these two educational variables might represent lower-middle-income members of society. For the lowest income levels (assuming income and education are positively correlated), having no degree might not hinder a wife from working out of sheer necessity. In contrast, women who have more education might have a choice about whether they want to work or stay home with the children. It is also possible that there is a geographic or income explanation: married women living in rural areas are 22 percent more likely to participate in the labor force, meaning urban, married women are more likely to work than their rural counterparts. Again, perhaps this is out of necessity rather than choice.[8]

In the two preceding regressions, age was a control variable. But different age groups' educational levels might cause them to make decisions differently. In particular, the level of education might not be as important for older generations of women looking for employment because protoindustrial and industrial jobs require less education than service-sector jobs more present in the Filipino economy today. To test this, I ran another regression on three age cohorts: ages 16 to 24, 25 to 44, and 45 to 65. The results are presented in regression 3.

In the first column, 16-to-24-year-olds show an increasing positive and significant coefficient for all the educational variables. Although *LessHS* increases the odds of participating in the labor force 47 percent, *HS* increases them 78 percent, and *College* increases them 297 percent. For the two groups of older women, college remains a positive predictor, though its effect decreases (from 297 to 168 to 81 percent, respectively). This could mean two things. First, older women did not need a college degree to enter the labor market, but young women are finding it increasingly difficult to find a job without one. Second, the Philippines is slowly growing, and as families have higher levels of disposable income, they can afford to send their daughters to school (both in terms of material cost and opportunity cost of losing the help around the house or farm). This aligns with Becker's household decisionmaking model.

Women who get married before age 24 have a lower chance of joining the labor force compared with their single counterparts. This effect dampens for older women, as 25-to-44-year-olds are 34 percent and 45-to-65-year-olds are 73 percent more likely to participate than their single counterparts. Single 16-to-24-year-olds are 545 percent more likely to work, compared with 195 percent of 25-to-44-year-olds and 37 percent of 45-to-65-year-olds. This finding would account for the fact that women who get married later might have established a career and are more attached to the workforce. Similarly, older women are less likely to

[8] Cameron, Dowling, and Worswick (2001) state that many time-series approaches find a similar u-shaped curve for educational levels because of income determinants. They think a better model is one in which educated women gain bargaining power with their husbands regarding whether they want to work. At the time of their writing, women's LFP in the Philippines was 28 percent, much lower than today, which suggests that both the share and income of women in the workforce have increased in the past two decades.

have young children and might have more time to work outside the house. For the older two age groups, *LessHS* and *HS* are not statistically significant (except for 45-to-65-year-olds' high school degrees at a 10 percent level), demonstrating that only a college degree consistently predicts LFP for older women. And observing *Urban* once more, younger women who live in urban areas are 130 percent more likely to work in paid labor, while it has no effect on 25-to-44-year-olds and has a significant downward effect on the oldest women. This erratic pattern confirms the initial discussion on the varied effects of urban geography on women's employment.

Regression 3: Age Cohorts, Odds Ratio

	Dependent variable:		
	LFP		
	16–24	*25–44*	*45–65*
LessHS	1.415***	0.996	0.957
	(0.166)	(0.0562)	(0.0453)
HS	1.781***	0.982	0.917*
	(0.195)	(0.0523)	(0.0448)
College	3.965***	2.678***	1.813***
	(0.512)	(0.169)	(0.110)
Age	1.886***	1.073**	1.387***
	(0.343)	(0.0369)	(0.0760)
Age2	0.987***	1.000	0.997***
	(0.00440)	(0.000498)	(0.000500)
Married	0.155***	0.339***	0.728***
	(0.00864)	(0.0140)	(0.0280)
Urban	1.295***	0.991	0.673***
	(0.0625)	(0.0305)	(0.0228)
TechGrad	0.825*	0.838**	0.830**
	(0.0936)	(0.0679)	(0.0713)
Constant	0.000668***	0.437	0.00159***
	(0.00123)	(0.254)	(0.00235)
Observations	9,699	23,432	19,180
Wald chi^2	1576.69	1538.95	638.36
Prob > chi^2	0.000	0.000	0.000
Pseudo R^2	0.1621	0.0663	0.0284

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

6. Is a College Degree the Golden Ticket?

The three regressions demonstrate the dynamic relationship between human capital and LFP for women in the Philippines. The big take-away is that regardless of marriage, age, geography, and self-selection into educational programs, women who complete college are always significantly more likely than women without a college degree to participate in the labor force. It is important to encourage education at all levels (for reasons other than producing

skilled workers, such as having a well-informed society), but college helps women enter and remain in the labor market, even when married. And for younger women, all degrees are significant.

It might be the case that women are working more, and the causality of the relationship is reversed—that is, the increase in women working results in their desire to be more educated and become more successful—but the direction of causality does not affect the fact that women at the highest educational levels are associated with higher chances of working. In this paper, I have controlled for variables that would skew the data.

For married women especially, having a college degree could open up their choices within and outside the household. What is key for women's development is not whether women work, but whether women have the choice to work. Education gives women that choice. Parity between men and women in the paid labor force would not necessarily help women if women were forced to work (because of either financial constraints or societal expectations). On the flip side, having more women working at home can benefit society if they want to spend more time with their families and children. Labor market decisions, however interesting and useful for researchers and policymakers, are ultimately a personal choice to be encouraged, not expected. I hope this study sheds light on how women in a developing country make decisions about their time and money.

7. Appendix

Appendix A: Baseline Regression

	Dependent variable:				
	LFP				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
LessHS	-0.0721**	-0.0591*	-0.00236	0.00885	0.00705
	(0.0329)	(0.0328)	(0.0345)	(0.0346)	(0.0346)
HS	-0.0194	0.0298	0.0112	0.0375	0.0252
	(0.0306)	(0.0312)	(0.0328)	(0.0335)	(0.0336)
College	0.972***	1.003***	0.878***	0.913***	0.910***
	(0.0377)	(0.0385)	(0.0398)	(0.0408)	(0.0408)
Age		0.0654***	0.160***	0.160***	0.160***
		(0.00459)	(0.00523)	(0.00523)	(0.00523)
Age^2		-0.000720***	-0.00180***	-0.00180***	-0.00180***
		(5.73e-05)	(6.43e-05)	(6.43e-05)	(6.43e-05)
Married			-1.072***	-1.079***	-1.078***
			(0.0260)	(0.0262)	(0.0262)
Urban				-0.0839***	-0.0857***
				(0.0206)	(0.0206)
TechGrad					-0.184***
					(0.0528)
Constant	0.259***	-1.087***	-2.151***	-2.139***	-1.953***
	(0.0272)	(0.0887)	(0.0942)	(0.0943)	(0.108)
Observations	52,311	52,311	52,311	52,311	52,311
Wald chi^2	1278.03	1501.7	3112.58	3111.7	3116.61
Prob > chi^2	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.0234	0.028	0.0594	0.0597	0.0599

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

Appendix B: Single and Married Women

	Dependent variable:	
	LFP	
	Single	*Married*
LessHS	0.829***	-0.155***
	(0.0962)	(0.0391)
HS	1.069***	-0.190***
	(0.0851)	(0.0384)
College	1.931***	0.713***
	(0.0950)	(0.0481)
Age	0.112***	0.210***
	(0.0126)	(0.00696)
Age^2	-0.00157***	-0.00222***
	(0.000173)	(8.25e-05)
Urban	0.398***	-0.195***
	(0.0462)	(0.0246)
TechGrad	-0.247**	-0.198***
	(0.113)	(0.0659)
Constant	-1.880***	-4.060***
	(0.243)	(0.157)
Observations	11,517	35,985
Wald chi^2	778.3	1967.49
Prob > chi^2	0.000	0.000
Pseudo R^2	0.0691	0.0541

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

Appendix C: Age Cohorts

	Dependent variable:		
	LFP		
	16–24	*25–44*	*45–65*
LessHS	0.347***	-0.00432	-0.0442
	(0.117)	(0.0564)	(0.0474)
HS	0.577***	-0.0178	-0.0861*
	(0.110)	(0.0532)	(0.0488)
College	1.378***	0.985***	0.595***
	(0.129)	(0.0629)	(0.0606)
Age	0.634***	0.0703**	0.327***
	(0.182)	(0.0344)	(0.0548)
Age^2	-0.0126***	-0.000262	-0.00344***
	(0.00446)	(0.000499)	(0.000501)
Married	-1.862***	-1.083***	-0.318***
	(0.0556)	(0.0413)	(0.0385)
Urban	0.259***	-0.00896	-0.396***
	(0.0483)	(0.0308)	(0.0338)
TechGrad	-0.193*	-0.177**	-0.187**
	(0.113)	(0.0811)	(0.0859)
Constant	-7.312***	-0.827	-6.447***
	(1.841)	(0.581)	(1.484)
Observations	9,699	23,432	19,180
Wald chi^2	1576.69	1538.95	638.36
Prob > chi^2	0.000	0.000	0.000
Pseudo R^2	0.1621	0.0663	0.0284

Notes: HS = high school; LFP = labor force participation. Robust standard errors are in parentheses.
*** p <0.01; ** p <0.05; * p <0.1.

8. References

Akbulut, Rahsan. 2011. "Sectoral Changes and the Increase in Women's Labor Force Participation." *Macroeconomic Dynamics* 15 (2): 240–64

Alonzo, Rupert, Susan Horton, and Reema Nayar. 1996. "Women in the Labour Market in the Philippines." In *Women and Industrialization in Asia*, edited by Susan Horton, 244–73. New York: Routledge.

Becker, Gary S. 1965. "A Theory of the Allocation of Time." *The Economic Journal* 75 (299): 493–517.

———.1974. "A Theory of Social Interactions." *Journal of Political Economy* 82 (6): 1063–93.

———.1975. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, 2nd ed. New York: Columbia University Press.

Cameron, Lisa A., J. Malcolm Dowling, and Christopher Worswick. 2001. "Education and Labor Market Participation of Women in Asia: Evidence from Five Countries." *Economic Development and Cultural Change* 49 (3): 459–77.

Eckstein, Zvi, and Osnat Lifshitz. 2011. "Dynamic Female Labor Supply." *Econometrica* 79 (6): 1675–726.

Goldin, Claudia. 1990. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press.

Heckman, James J., and Thomas E. Macurdy. 1980. "A Life Cycle Model of Female Labour Supply." *Review of Economic Studies* 47 (1): 47–74.

IDRE (Institute for Digital Research and Education). n.d. "Introduction to Logistic Regression with Stata." Los Angeles: University of California, Los Angeles, IDRE.

Mincer, Jacob. 1994. *Investment in US Education and Training*. Working Paper 4844. Cambridge, MA: National Bureau of Economic Research.

Murray, John E., and Kristen Keith. 2003. "Male-Female Earnings Differentials in Early 20th Century Manila." *Explorations in Economic History* 41 (4): 361–75.

Population Reference Bureau. 2017. "2017 World Population Data Sheet with a Special Focus on Youth." Washington, DC: Population Reference Bureau.

Raymo, James M., and Jennifer C. Cornman. 1999. "Labor Force Status Transitions at Older Ages in the Philipines, Singapore, Taiwan, and Thailand, 1970–1990." *Journal of Cross-Cultural Gerontology* 14 (3): 221–44.

Schultz, Theodore W. 1961. "Investment in Human Capital." *American Economic Review* 51 (1): 1–17.

Tomoda, Shizue. 1985. "Measuring Female Labour Activities in Asian Developing Countries: A Time-Allocation Approach." *International Labour Review* 124 (6): 661–76.

Yamauchi, Futoshi, and Marites Tiongco. 2013. "Why Women Are Progressive in Education? Gender Disparities in Human Capital, Labor Markets, and Family Arrangement in the Philippines." *Economics of Education Review* 32:196–206.