

JICA Ogata Research Institute Working Paper

Study on the Promotion of Financial Inclusion: The Case of Cambodia

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The Effects of Formal Credit Usage**

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No. 227

December 2021

JICA Ogata Sadako
Research Institute
for Peace and Development



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Gender Income Gap among Cambodian Farmers: The Effects of Formal Credit Usage

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Abstract

The purpose of this article is to analyze the determinants of the gender income gap among farmers in Cambodia, with a focus on the role of formal credit usage. To decompose the gender income gap, this article applies the Blinder–Oaxaca decomposition technique to the data from the FinScope survey conducted at the end of 2015. First, our findings show that the gender income gap is mainly explained by the gender gap in education levels and farm size. Second, the use of formal credit may contribute to the gender income gap although there is no difference in the level of formal credit usage between male and female farmers. Male farmers with formal credit usage are associated with 8 percentage points higher earnings than female farmers. Further research into the factors to explain why this correlation is higher for male farmers is therefore crucial.

Keywords: Gender income gap, formal credit usage, agriculture, Blinder-Oaxaca decomposition.

JEL codes: J16, J31, J43, J71.

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This research is part of the project “Study on the Promotion of Financial Inclusion: The Case of Cambodia” implemented by JICA Ogata Sadako Research Institute for Peace and Development (JICA Ogata Research Institute). I am solely responsible for any errors that may appear in this paper. Any discussions and interpretations of the results in this study are the author’s and do not reflect the views of our affiliated institutions.

1. Introduction

According to UN WomenWatch (2012), women play a key role in supporting their households and communities to achieve food and nutrition security, generating income, and improving livelihoods or well-being. Nevertheless, it is found that a substantial gender wage gap exists across the world (Ortiz-Ospina and Roser 2018). By definition, the gender wage gap is the average difference between the remuneration received by men and women for their work (ILO 2018). In general, women are paid less than men. Thus, the question that has received attention in numerous literatures is why these gaps exist. The wage disparities may exist due to differences in individual characteristics such as age, education, marital status, or job characteristics such as whether the job is full or part time, the occupation, and the industry (Hertz et al. 2008). After controlling for those characteristics, if the gap still exists, it is attributed to discrimination against women in the labor market (Rozelle et al. 2002).

The literature on the economics of discrimination refers back to Becker's 1957 seminal study, which analyzes the economic effects of discrimination based on race, religion, social class, and gender. Since then, the study of gender wage and income differentials has attracted attention from labor economists as the availability of more microdata allows for a comparison of the wages and incomes of equally productive males and females. Nevertheless, although the literature on gender income differentials is abundant, it mostly focuses on developed countries, although gender gaps are larger in developing countries (Jayachandran 2015). Furthermore, there are few studies that devote attention to gender earnings gaps in the agricultural sector, even though in developing countries this sector employs most of the workforce and income differences between males and females are commonly seen (World Bank 2009; FAO 2011a). For instance, FAO (2011b) estimates show that closing the agricultural productivity gap between women and men could result in an increase in agricultural output in lower-income countries by between 2.5% and

4%, reducing undernourishment by between 12% and 17% or for between 100 million and 150 million individuals.

In Cambodia, a lower-middle income country located in Southeast-Asia, agriculture plays an important role with around 40% of the population working on farms. In fact, the agricultural sector accounted for 22% of the GDP in 2017 (World Bank 2019). Additionally, while agriculture is one of the largest sectors of women's employment in Cambodia, women own less land and receive less agricultural extension training and credit than men (Layton and MacPhail 2013). For instance, a study conducted by the UN Capital Development Fund (UNCDF) in 2017, finds significant gender gaps in average loans in Cambodia. It is argued that women received smaller loans due to a lack of credit history and collateral, and a perceived lack of business skills and experience (UNCDF 2017). In the agriculture sector, a lack of finance may limit access to agricultural inputs or assets, which may affect agricultural output and thus income. Other challenges for women in Cambodia include domestic work and care burdens, limited access to resources, and inadequate education and training programs (Layton and MacPhail 2013). However, despite these facts, none of the existing studies have paid attention to the gender earnings gap among farmers in Cambodia.

Therefore, the objective of this paper is to investigate the determinants of the gender income gap among farmers in Cambodia with a focus on the role of credit usage. The paper is structured as follows: Section 2 reviews the relevant literature; section 3 describes the data and methodology used; Section 4 discusses the findings of the study; and section 5 concludes.

2. Literature review

Several theories explain the reasons why people earn differently. First, gender income differences can be due to differences in the qualifications, knowledge, and skills that individuals have gained through education and experiences. In traditional societies, women are more likely to spend more

time on housework; they tend to have lower incentives to invest in education or trainings, and put less effort into the job market, such as their preference for part-time work. As a result, women have a lower level of human capital and earn less than men. Second, gender income differences can also be related to discrimination in the labor market. Discrimination is defined as instances where identical workers receive different wages, although they do the same job and with the same abilities, because they belong to different groups; this can be based on such things as skin color or gender. The economics of discrimination is pioneered by Becker's model (1957), which suggests that society may have a taste for discrimination against women leading to a segregated workforce. For instance, men may prefer to work with women in subordinate positions and dislike when women are in superior positions. Related to the discrimination issue, Phelps (1972) develops a model called "statistical discrimination", to explain that, due to a lack of information, some people judge individuals based on the average characteristics of the group. As women in general have lower levels of human capital than men, they would be more likely to be discriminated against based on the assumption that they are less able than men. This kind of discrimination may also exist in the credit market. For example, a financial institution may have incomplete information on a borrower's creditworthiness. Instead of searching for the needed information, which could be difficult and costly to obtain, financial institutions may infer information from the person's observable demographic characteristics, such as gender and race (Orser et al. 2006).

Several empirical studies have analyzed the gender income gap, but the focus has mostly been on developed countries. Despite some research on this topic in developing nations, the determinants of the gender income gap should merit more attention because the gap is found to differ substantially between countries due to varying social contexts. For example, in the garment industry, the male-female income gap ranges from 10% in Indonesia to 54.7% in Pakistan (Huynh 2016). In addition, few papers analyze the gender gap in the agricultural sector. For instance, using Tobit regression applied to a household survey conducted in rural Zimbabwe in 2001, Horrell et al. (2007) find that female-headed households are poorer than male-headed households

because they lack the assets needed for agricultural production. This lack of assets constrains their ability to diversify the types of crops grown and to take advantage of local labor market opportunities. The discrepancies in resource endowment that leads to the difference in productivity and income between male and female-headed households are also found in Nigeria (Oladeebo and Fajuyigbe 2007) and Benin (Kinkingninhoun-Medagbe et al. 2010). Meanwhile, using Blinder- Oaxaca decomposition technique applied to the National Panel Survey for 2009/10 and 2010/11, the productivity gap is estimated to be 17.5% in Uganda, and is largely explained by women's greater childcare responsibilities and difficulty in accessing input and output markets (Ali et al. 2015). A question that may arise from these papers is why men have greater access to agricultural inputs or assets than women.

According to Dong et al. (2012), agricultural production can be conditioned by the fact that inputs are transformed into outputs with considerable time lags, which may cause farmers to balance their budget during the season when there are high expenditures for input purchases and few revenues. Without adequate access to loans, farmers who face negative shocks can lose some of their assets (Diagne and Zeller 2001). Thus, limited access to credit could be a constraint to agricultural production. Previous studies from Latin America, South Asia, and Sub-Saharan Africa find that women in rural areas have less access to credit than men even though their socioeconomic conditions are the same (Fletschner 2009). FAO (2011a) also mentions that credit markets may treat women and men differently, causing women to have less access to purchased inputs. Moreover, Tran et al. (2018), using the Propensity Score Matching technique applied to a survey conducted in 12 provinces in Vietnam, find that women are less likely to obtain credit and the amount of credit obtained is also lower among rural households. Hence, the gender credit gap can be a significant factor in explaining the earnings gap among farmers in developing countries. However, no previous studies have focused on the role of formal credit in the explanation of gender income gaps.

Based on the above analysis, the objective of this paper is to investigate the determinants of the gender income gap among farmers in Cambodia with a focus on the role of credit usage. To answer this objective, we apply the Blinder-Oaxaca decomposition technique to the FinScope survey data conducted between November 2015 and January 2016. This paper contributes to the literature on two main points. First, we examine whether there is a difference in the correlation between credit usage and earnings among male and female farmers in Cambodia. None of the existing studies have paid attention to this link despite a rapid growth in the use of formal credit in rural areas and the importance of women and agriculture in Cambodia's socio-economic development. Second, the results of the study may help policy-makers design policies to promote gender equality.

3. Data, Variables, and Method

3.1 Data

The FinScope survey in Cambodia was conducted by the National Institute of Statistics (NIS) and the FinMark Trust, which is an independent non-profit trust whose purpose is to promote financial inclusion, especially among the poor. The objective of the FinScope survey is to measure the level of access to and use of financial services by all adults, aged 18 years and older, in relation to four financial products: savings, payments, insurance, and credit. This survey was conducted through face-to-face interviews with 3,150 individuals, nationally representative of the adult population, between November 2015 and January 2016.¹ Among the interviewed adults, 1,693 are involved with farming activities, but only 847 adults declare that their main source of income is from agriculture; the total sample therefore consists of 847 individuals, 526 of whom are female and 321 male. Based on the data, male farmers clearly have a higher total monthly income with an

¹ A more detail on the survey methodology can be found on the FinMark website: <https://www.finmark.org.za/data-for-financial-markets#consumer>

average of 543,159 riels or 136 USD compared to an average income of 428,015 riels or 107 USD amongst females. Thus, on average, the earnings of female farmers are equal to roughly 78% of what male farmers earn. Why does this gap exist?

3.2 Variables

Building upon the theoretical models presented in section 2, variables are mainly chosen based on the human capital theory; and farm characteristics are also included in our empirical model. More educated farmers may possess better knowledge of how to shape the way in which inputs are used and to adapt their practices to a particular situation (Rapsomanikis 2014). In Cambodia, women generally receive less education than men. Regarding experiences, we proxy with individual age because it is expected that older farmers will have spent a longer time engaged in farming activities than young adults. Besides education and experiences, health is also a main component of human capital, while being married is found to provide a wage premium for men (Gilleskie and Hoffman 2014; Chun and Lee 2001). Next, in relation to farm characteristics, we add farm size, source of farm water, and the location of farms. Indeed, farms that have access to irrigation systems and farms located near Tonle Sap Lake region, which is a good area for agricultural production in Cambodia, may affect farmers' incomes. In Cambodia, women are also found to own less farming land than men (Layton and MacPhail 2013). In addition, we add a dummy variable for whether the individual is the main household income earner or not. If a farmer is the main income earner, he/she should spend more hours on his/her farm than a farmer that is not the main income earner. Lastly, as mentioned by FAO (2011a), credit markets may discriminate against women, causing them to have less access to loans for purchasing farm inputs and assets. Hence, we add the "use of formal credit" variable, which is defined as having borrowed from institutions that are regulated or supervised by the National Bank of Cambodia or any other formal regulator/agency within the twelve months prior to the survey, into our empirical model. Table 1 below summarizes the variables used in our analysis:

Table 1: Description of independent variables

Variables	Description
Years of schooling	Continuous variable
Age	Continuous variable
Health	Dummy variable: 1 for good health (self-declaration), 0 otherwise
Marital status	Dummy variable: 1 for married, 0 otherwise
Farm size	Dummy variable: 1 for the size of more than 1ha, 0 otherwise
Source of farm water	Dummy variable: 1 for having access to irrigation systems as the main source of farm water, 0 otherwise
Region	Dummy variable: 1 for Tonle Sap Lake region, 0 otherwise
Main household income earner	Dummy variable: 1 for being the main household income earner, 0 otherwise
Usage of formal credit	Dummy variable: 1 for having used formal credit, 0 otherwise

Source: Author.

3.3 Method

We use the Blinder-Oaxaca decomposition technique (Blinder 1973; Oaxaca 1973) that is a methodology widely used in the literature to study the differences in labor market outcomes (e.g., income) by different groups of people (e.g., by gender). This technique divides the income difference between two groups into one part that is “explained” by differences in group characteristics such as education or work experience, called “the endowment or quantity effect”, and a residual part that is “unexplained” by such differences, called the “discrimination effect”. Given that the objective of this article is to investigate the determinants of income differential between male and female farmers in Cambodia, we also adopt the Blinder-Oaxaca decomposition technique that is widely used in the literature and fits to our research study.

In this model, first, male and female income equations are estimated. The logarithm of the income is denoted by "Y". The equation can be written as:

$$(1) \quad Y_i^g = \beta_0^g + \beta_i^g X_i^g + \varepsilon_0^g \quad \text{where } i = 1, \dots, N^g; g = M, F$$

Superscripts “ g ” indicate gender, and the subscript “ i ” indicates individuals. The vector of explanatory variables is X_i^g (years of schooling, age, health, marital status, farm size, source of farm water, region, main household income earner, and usage of formal credit). The parameter vectors are β_i^g .

Assuming that there is a nondiscriminatory coefficient² vector β^* , we can write:

$$(2) \quad E(Y^M) - E(Y^F) = \underbrace{\{E(X^M) - E(X^F)\}}_q \beta^* + \underbrace{\{E(X^M)(\beta^M - \beta^*) + E(X^F)(\beta^* - \beta^F)\}}_d$$

The first term “ q ” is the part of the gender income gap which is explained by differences in qualifications, and the second term “ d ” is the part of the gender income gap which is unexplained by such differences.

The next step in a detailed decomposition of the income gap is to attribute “ q ” and “ d ” to the specific explanatory variables. For instance, our main variable of interest is “usage of formal credit”, denoted by “ fc ”, thus, the contribution to “ q ” from the “ fc ” variable can be written as:

$$(3) \quad q_{fc} = \{E(X_{fc}^M) - E(X_{fc}^F)\} \beta^*$$

Given that the proportion of male and female farmers who have used “formal credit” within the last 12 months is almost the same, we expect that $E(X_{fc}^M) = E(X_{fc}^F)$, thus, $q_{fc} = 0$.

Meanwhile, the specific contribution to the “ d ” from the “ fc ” parameter can be computed as:

$$(4) \quad d_{fc} = E(X_{fc}^M)(\beta_{fc}^M - \beta^*) + E(X_{fc}^F)(\beta^* - \beta_{fc}^F)$$

Given that male farmers possess more years of schooling, which might have a positive effect on the earnings associated with formal credit usage, we suspect that $\beta_{fc}^M > \beta^* > \beta_{fc}^F$, and thus, $d_{fc} > 0$.

² We use the coefficients from a pooled regression over both groups as an estimate for β^* .

4. Results and Discussion

Table 2 below presents the descriptive statistics of variables used in the analysis:

Table 2: Descriptive statistics

Variables	Total			Male			Female		
	Mean	Std. dev.	Average income	Mean	Std. dev.	Average income	Mean	Std. dev.	Average income
<u>Dependent variable</u>									
Income (log)	4.25	0.91		4.40	0.86		4.16	0.91	
<u>Human capital components:</u>									
Years of schooling	3.87	3.31	4.30	4.60	3.35	4.42	3.42	3.21	4.20
Age	43.95	13.78	4.21	44.80	14.34	4.41	43.44	13.42	4.09
Good health	0.27	0.44	4.41	0.32	0.46	4.57	0.23	0.42	4.26
Married	0.82	0.38	4.32	0.90	0.29	4.42	0.76	0.42	4.24
<u>Characteristics of farms:</u>									
More than 1 ha of farmland	0.43	0.49	4.46	0.49	0.50	4.57	0.39	0.48	4.37
Irrigation as main source of water	0.04	0.19	4.86	0.02	0.15	5.33	0.04	0.20	4.70
Tonle Sap region	0.40	0.49	4.35	0.36	0.48	4.64	0.42	0.49	4.19
<u>Other variables</u>									
Main household income earner	0.46	0.49	4.66	0.56	0.49	4.66	0.40	0.49	4.67
Formal credit usage	0.33	0.47	4.42	0.33	0.47	4.59	0.33	0.47	4.31
Observations		847			321			526	

Source: Author.

Based on these descriptive statistics, we observe that men benefit from more years of schooling and better health. Thus, a part of the observed income disparities can be due to differences in levels of human capital. Regarding the characteristics of farms, men tend to own farms that are more than 1 ha larger than those owned by women, but they have less access to irrigation systems. Looking at our main variable, there is no gap observed in terms of formal credit usage as one-third of both male and female farmers used formal credit within the 12 months prior to the survey. However, given that male farmers possess more years of schooling, they may

use credit better than female farmers. Thus, it is worth examining whether formal credit usage contributes to the gender-income gap.

To see how each variable contributes towards explaining the gender income gap, the next table presents results from the Blinder-Oaxaca decomposition results.³

Table 3: Blinder-Oaxaca decomposition results

VARIABLES	Differential	Explained	Unexplained
<u>Human capital components:</u>			
Years of schooling		0.049*** (0.014)	0.046 (0.072)
Age		0.054 (0.043)	-1.645 (1.118)
Square of age		-0.060 (0.043)	1.022* (0.601)
Good health		0.014* (0.007)	0.046 (0.036)
Married		0.019* (0.010)	0.060* (0.148)
<u>Characteristics of farms:</u>			
More than 1 ha of farmland		0.022** (0.010)	0.003* (0.054)
Irrigation as main source of water		-0.012 (0.008)	0.011 (0.009)
Tonle Sap region		-0.006 (0.005)	0.040 (0.044)
<u>Other variables</u>			
Main household income earner		0.111*** (0.026)	-0.089 (0.057)
Formal credit usage		-0.000 (0.005)	0.080** (0.040)
Total		0.190*** (0.037)	0.040 (0.057)
Prediction_1	4.399***		

³ The multicollinearity test is reported in the appendix.

	(0.048)		
Prediction_2	4.168*** (0.040)		
Difference	0.231*** (0.063)		
Constant			0.468 (0.528)
Observations	847	847	847

Source: Author.

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Based on the Blinder-Oaxaca decomposition results, we find that on average, male farmers earn 23% higher than female farmers in which 19 percentage points are explained by the difference in resource endowments between male and female farmers, which is statistically significant at the 1% level. For example, if women have the same amount of schooling as men, the gap could be reduced by 4.9 percentage points. The remaining 4 percentage points are due to the unexplained component, meaning that the return to the same level of resource endowments is higher for men than for women.

Even though this component is not statistically significant, when we break down the contribution by variables, we observe that unexplained component by access to formal credit was statistically significant, and amounted to 8 percentage point. This result suggests that formal credit access contributes to 8 percentage points of the unexplained gender earnings gap. Although our analysis does not reveal the reason why there is such difference, one of the possible explanations could be that due to a gender gap in education, financial literacy, or other economic/social dimensions.

This result implies that in order to reduce the gender earnings gap among farmers in Cambodia, closing the gap in education, financial literacy, and other economic/social dimensions is vital. In fact, the National Bank of Cambodia (NBC) has recently taken some important steps toward improving financial education among women. For example, in January 2020, the NBC cooperated with the Ministry of Women’s Affairs (MOWA), and Visa, a company specializing in

digital payments, to launch a year-long program aimed at improving the financial literacy of Cambodian women via digital platforms. Some additional actions are proposed below:

First, farmers, particularly women, should be encouraged to utilize formal savings mechanisms. Only 3.6% of female farmers save formally, while 38.4% save informally.⁴ Understanding the reasons why they prefer to save informally is crucial to the promotion of formal saving, which is one of the main factors that may affect access to formal credit and the amount of credit obtained. The FinScope survey data (2015) provides information regarding barriers to financial services among those who do not use them, yet the questionnaire should be extended to capture the preferences for choosing informal channels over the formal ones. Meanwhile, the recent advance in digital development in Cambodia, which can lead to a substitution of formal for informal savings, is promising. Nonetheless, this development also requires a fair distribution network with affordable cost, and some fundamental skills for digital transformation in rural areas where people have poor basic knowledge, not to mention the English and internet skills necessary to utilize digital services. Second, the Credit Bureau Cambodia (CBC), the Cambodia Microfinance Association (CMA), and the National Bank of Cambodia (NBC) are encouraged to collaborate in the collection and analysis of gender-disaggregated data. This is important for assessing the barriers to formal financial services among women clients, particularly farmers who are likely to suffer more disadvantages. Being able to address their needs will make financial services work better for low-income consumers with more gender parity. Third, as mentioned by Japhta et al., (2019), financial institutions should train their staff about gender awareness to offer a more tailored approach to female clients. According to CMA, 80% of microfinance institution clients live in rural areas and 80% of them are women. Thus, it is worthwhile paying more attention to the needs of female clients. Fourth, the potential returns to credit usage can also be a function of human capital and local market opportunities. These require the development of more infrastructure in rural areas and more policies addressing the gender gap in other dimensions such

⁴ The rate of formal savings among male farmers is also low (4.7%), and the informal saving rate is 34.3%.

as education, asset ownership, decision-making, and cultural norms, while engaging men and boys to actively support the shift in social norms and break the gender stereotypes that prevent women from reaching their full potential.

5. Conclusion

Using the FinScope survey data and Blinder-Oaxaca decomposition technique, this research aims at examining the determinants of the gender income gap among farmers in Cambodia, with a focus on the role of formal credit usage. Male farmers are found to earn on average 23% higher than female farmers and most of this gap is explained by the endowment effect on factors such as years of schooling and farm size. Even though there is no gender gap in the use of formal credit, there is an unexplained gap in earnings by 8% in favor of male farmers. A possible explanation for this may be that the effectiveness of credit usage depends on other factors such as education and financial literacy.

Therefore, the expansion of access to financial services for women, and particularly female farmers, must also address the gaps in other economic and social dimensions. Indeed, people with a higher level of education and financial literacy may be more likely to reap the potential benefits of using financial services than less educated people. Thus, closing the gap in urban-rural development with more policies reducing the gender gap in terms of education, asset ownership, decision-making, and cultural norms are strongly recommended.

It should be noted that this paper faces two significant challenges. First, the correlation between formal credit and earnings might be subject to reverse causality problem because individuals with higher income could be more likely to have access to formal credit. Second, we cannot explore whether discrimination against female farmers exists in terms of loan amounts, which may affect the potential returns to credit usage. Further exploration on these issues would be appreciated.

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Appendix

Table 4: Multicollinearity test

Variable	VIF
Age	43.62
Square of age	43.02
Years of schooling	1.23
Married	1.09
Tonle Sap region	1.08
Good health	1.07
More than 1 ha of farm land	1.07
Main household income earner	1.04
Formal credit usage	1.04
Irrigation as main source of water	1.02
Mean VIF	9.53

Source: Author.

Abstract (in Japanese)

要約

本研究では、フォーマルな金融機関からの借入の役割に注目し、カンボジアの農家におけるジェンダー間の収入の差の決定要因を実証的に分析した。特に、本研究ではカンボジアで行われた Finscope 調査によるデータを用い、Blinder-Oaxaca 分解を行い、ジェンダー間の収入の差がどの要因によって説明できるのかを分析した。分析の結果、第一に、ジェンダー間の収入の差のほとんどは、男性の教育水準が比較的高いことや男性の所有する農場規模が比較的大きいことで説明されることが示された。第二に、フォーマルな金融機関の借入の利用率にジェンダー間の差はないものの、フォーマルな金融機関から借入を行っている男性は同じく借入を行っている女性よりも8%ポイント収入が高く、フォーマルな金融機関の借入の利用の仕方が男女の収入の差に影響をあたえている可能性が示された。今後の研究では、フォーマルな金融機関の借入を利用している男女の間でなぜ収入に差が生まれたのかを分析することが求められる。

キーワード: ジェンダー間の収入差、フォーマルな金融機関からの借入、農家、Blinder-Oaxaca 分解

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