Does Off-farm Employment Enhance the Welfare of Rural Households in Indonesia?

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ABSTRACT

This study examines whether taking advantage of off-farm employment as an alternative income source improves the welfare of rural households in Indonesia. Using a panel data set from rural households in Central Sulawesi, the effect of off-farm diversification examines on total household income and economic mobility over time. A fixed effects and random effects model with an instrumental variable are applied in analyzing the causal effects of off-farm employment. The findings confirm substantial growth stemming from work outside of a household's farming, which shown to improve income and economic mobility in rural areas. Off-farm work was found to positively affect total household income, which increased by 63.20% in real Indonesian rupiah (IDR) in conjunction with the number of men in the family and cocoa cultivation. The results also indicated a need for a policy that encourages off-farm employment, particularly for value-added activities that are accessible to lower-income groups, to improve income and reduce poverty among the poor.

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1. Introduction

In developing countries, it has been shown that off-farm work can be a potential alternative source of income that can minimize risks for the community (Haggblade et al., 2010; Himanshu et al., 2013). Engaging in off-farm activities increases a household's ability to generate income, which leads to a reduction in household poverty and an improvement in income and wealth (Reardon, 1998; Lanjouw and Lanjouw, 2001; Davis and Bezemer, 2004; Barrett et al., 2001). Off-farm work, throughout its high returns, has proven to be a mechanism that breaks down long-standing barriers to mobility among the poorest segments of society in rural areas (Himanshu et al., 2013). Off-farm employment has a poverty alleviation effect by providing an opportunity to increase household income (Cherdhuchai and Otsuka, 2006; Escobal, 2001; Himanshu et al., 2013). Between the non-poor and the poor, Sisay (2010) reported that off-farm activities have the potential to reduce poverty and income inequality, as they are relatively beneficial for poorer households.

Moreover, in recent decades it has been proven that off-farm work increases economic activity rapidly and contributes significantly to the growth of employment and income in rural areas. (Haggblade et al., 2010). Off-farm activities contribute 35% - 50% of rural

household income across developing countries (Mduma and Wobst, 2005; Haggblade et al., 2010). The proportion of off-farm income relative to total income varies by region, with Africa, Latin America and Asia seeing it account for 34%, 47%, and 51% of total household income, respectively (Thapa et al., 2013). This indicates that off-farm activities are linked to the concept of structural transformation on income diversity across households and countries (Minot et al., 2006).

Off-farm diversification can be observed in Indonesia's developing economy. Steady economic growth has been seen in the country after the Asian Financial Crisis of 1997-98, while the country also showed a shift in the labor   trend from agriculture to services with large job creation in cities. This trend has helped in halving the poverty rate from 24% in 1999 to 11.4% by early 2013 (World Bank, 2014). Through this labor transformation, Indonesia is on a path to making growth work for the poor by focusing on shifting from rural-based to more urban-based market activities and a marked shift from farm to off-farm activities (World Bank, 2006). As a result, during 1993 – 2015 there was an increase in non-agricultural employment. This can be seen in the manufacturing sector with labor productivity relative to GDP growth, increasing from 0.22 percent to 0.50 percent which created around 1.2 million informal jobs in the 2007-2015 period, and 5.6 million formal jobs between 1993 and 2015 (World Bank, 2016).

It reveals the fact, that the transformation of the employment sector has had a significant impact on off-farm work participation, which is undertaken to mitigate the decline in the agricultural sector's carrying capacity and become an alternative source of income outside of work in the agricultural sector. In this regard, the research explores the contribution of off-farm work to total income and economic mobility in rural areas in Indonesia. Based on employment growth, the potential effect of off-farm activities is examines   on households in   rural areas   in Central Sulawesi, Indonesia.

2.   Materials and Methods

Three panel data (2001, 2006 and 2013) were used in this research based on a sample of households in 13 villages in Central Sulawesi, Indonesia. These samples are farmer households which most of their livelihoods depend on the agricultural sector. Based on household data that could be interviewed throughout the year, the data sample used in this research was 765 households. The impact of off-farm employment is measured through total household income. It highlights the influence of explanatory variables to assess the effect of off-farm activities on total income. It assumed that total household income (Y_{it}) is a function of the control variables (X_{it}: human capital variables, location variables, initial household wealth, financial assets and risk indicators) and the engagement in off-farm activities. The off-farm work effect estimates using a fixed-effects model based on the assumption that unobservable time-invariant household characteristics may relate to one or more of the explanatory variables. Therefore, the household time-invariant effects (a_i) need to be controlled using a fixed-effects model and the underlying model is shown as:

$$Y_{it} = \beta_0 + \beta X_{it} + L_{it} + \alpha_i + \varepsilon_{it}$$

Where Yit denotes total household earnings from farming and non-farming activities, either from wage or self-employment, of household *i* in period *t*. *Xit* refers to the vector of factors that are related to household characteristics, which are expected to influence

the amount of earnings. *Lit* is a binary labor supply variable, taking the value 1 if a household *i* offers labor in period *t* and 0 otherwise, while αi is unobserved individual heterogeneity and εit represents the error terms.

Moreover, to obtain a robust estimation of the off-farm activity   effect, the endogeneity problem has to be solved. This may arise from explanatory variables that may correlate with household-specific time-invariant unobserved effects αi. The endogeneity problem is of concern since data over years were used where off-farm participation could be correlated with one or more of the explanatory variables, which may lead to biased estimation. The Hausman test used to compare the suitability of the model specifications. Since off-farm activity is a binary variable of off-farm labor supplied to the labor market, the endogeneity problem considers as further exacerbated due to reverse causality. The endogeneity problem might appear from the off-farm work decision, which may correlate with the household-specific and time-varying error component (*uit*), where household behavior may influence their decision and lead to potential endogeneity that biases estimations. To address this potential reverse causality problem is by adopting the standard solution of an Instrumental Variable (IV) estimator as proposed by Dimova and Sen (2010) and Prowse (2015).

3.   Results and Discussion

3.1   *Results*

3.1.1   *The linkage between rural off-farm activities and total income*

The impact of off-farm employment is measured through total household income to see the linkage between rural activities and their total income. Table 1 indicates the households' participation in off-farm work during the period, which indicates that the incidence of the participation increased gradually with total household income.

Table 1. Off-farm participation and household income 2001 - 2013

Year	Participation		Income (IDR per capita)		
	(1 = Yes)	(0 = No)	Total Income	Agriculture Income	Non- Agricultural Income
Pooled	304	461	1,489,266	991,443	497,822
	(39.74)	(60.26)	(2,129,631)	(1,582,324)	(1,369,652)
2001	90	165	944,878	599,396	345,481
	(35.29)	(64.71)	(1,381,779)	(1,042,333)	(936,768)
2006	105	150	1,0373,52	628,109	409,242
	(41.18)	(58.82)	(1,319,890)	(765,747)	(1,051,442)
2013	109	146	2,485,568	1,746,825	738,743
	(42.75)	(57.25)	(2,913,965)	2,235,722	(1,889,471)

Source: Author calculation based on income values in real Indonesia rupiah (IDR) with base year 2001 and use provincial CPI for Palu. Percentage and standard deviation are in parenthesis for the participation and total income.

Among rural households, the data indicate different participation rates, which accordingly leads to different outcomes. As presented in Table 1, the agricultural sector remains the main economic activity for 60.26% of households. Nevertheless, the share of households engaged in the agricultural sector has gradually fallen (64.71 to 57.25 percent) during 2001 – 2013, which implies that people are diversifying away from the

agricultural sector or that they are combining both agricultural and non-agricultural activities. It found that the allocation of labor to non-farming activity gradually increased from 90 to 109 households. This indicates that off-farm diversification is undertaken to augment income sources, as off-farm contributions rose from 345,481 to 738,743 IDR in total household income (Table 1).

3.1.2 Total Household Income Based on Source

Furthermore, household activity is classified based on the source of the diversified income. Following Schwarze & Zeller (2005) and Klasen et al (2013) all income is classified based on sector (agriculture and non-agriculture) and its function (income wage and self–employment). Agricultural and non-agricultural wage (AW and NW) income derives from all forms of payment in kind, such as labor   hired that received wage income, the value of pensions, government subsidies, private transfers, and remittances. While agricultural and non-agricultural self-employed (AS and NS) includes incomes from marketing crop production, forest value, as well as net business costs such as expenditures on raw materials, energy, hired labor   and equipment maintenance. Table 2 provides the details of household activity and the share of total income during the years 2001 – 2013.

Table 2. Total household income based on source 2001 – 2013

Year	Income			
	Agriculture		Non-Agriculture	
	Self employed (AS)	Wage employed (AW)	Self employed (NS)	Wage employed (NW)
Pooled	903,685 (1,587,928)	87,757 (202,647)	253,883 (1,078,543)	243,939 (766,645)
2001	508,772 (1,046,127)	90,624 (213,140)	177,020 (807,941)	168,461 (508,120)
2006	553,725 (772,322)	74,383 (151,892)	212,169 (779,574)	197,073 (581,734)
2013	1,648,559 (2,248,776)	98,265 (233,929)	372,459 (1,488,833)	366,283 (1,071,592)

Source: Calculation based on income values in real Indonesia rupiah (IDR) with the base year 2001 using provincial CPI for Palu. NS, NW, AS, and AW stand for off-farm self-employment, off-farm wage employment, agricultural self-employment and agricultural wage employment, respectively.

The data shows a linear correlation between total income and income share in the agricultural and nonagricultural sectors. Though agriculture is the main activity for rural households, the data highlights a potential source of income from non-farming activities in average 253,883 IDR and 243,939 IDR for both self and wage-employment respectively. Off-farm income shows substantial growth during the period, where growth more than doubled compared with the income from agricultural wage employment. This implies a shift of labor allocation away from dependency on the agriculture sector to an alternative income source in off-farm activities, which has a significant share between the years 2006 – 2013 (Table 2).

3.1.3 The effects of off-farm employment on household income

The impact of off-farm employment on total income of the household measures using a fixed-effects model. The results indicate that agricultural transformation positively affects total income through off-farm work participation and the number of men in the family, which increases total household income by 63.20 and 8.98 percent respectively, for every off-farm participation and male in the family. However, these results also highlight the large influence of household size, which tends to be the main factor, reducing total income by 15.58 percent. Moreover, the result has also highlighted the commercialization of subsistence agriculture into cocoa cultivation. It increased total household income by 0.10 percent, and is statistically significant for the improvement of the area of cocoa cultivation (Table 3).

Table 3. Fixed effects model of the off-farm employment effect on total household income

Explanatory variables	Dependent Variable: Log Total Income	
	Coefficient	Std. Err.
	(1)	(2)
Off-farm Participation (1=Yes, 0=otherwise)	0.6320***	(0.0981)
Age (year)	0.0138	(0.0123)
Sex (1=male, 0=female)	- 0.2861	(1.0353)
Household's size (no)	- 0.1558***	(0.0222)
Schooling (year)	- 0.0143	(0.0232)
Number of Men (no)	0.0898**	(0.0459)
Distance to road (minute)	- 0.0003	(0.0004)
Area Rice (acres)	0.0012	(0.0012)
Area Cocoa (acres)	0.0010**	(0.0005)
Access to Credit (IDR)	0.0128	(0.0093)
Year:		
2006	0.4177***	(0.1394)
2013	0.5760***	(0.1841)
Constant	13.5681***	(1.1340)
Observation	765	
No. Group	255	
F (254, 498)	1.54	
Prob > F	0.0000	
R-squared	0.2826	
Within R-squared	0.3470	

Source: Author's calculation. The fixed-effects are both individual (household) level and time fixed. The dependent variable is total real income household both from farming and non-farming activities (transformed into the natural log) and values are in real Indonesia currency in 2001 prices. ***, **, and * are significant at 1%, 5%, and 10% significant levels, respectively.

To examine the income effect of off-farm employment, two linear regressions were used, where the endogenous variables were predicted by regressing them on all of the variables in the system and using their predicted values as instruments. It uses the determinant of household participation in off-farm activities, where a proxy set of independent variables for the age, gender, and education level of the household head and the number of men was used as instruments, with the respective system of external

instruments (household size, cultivation area for cocoa, log asset value and log credit value).

In doing so, the estimation tried to capture the reverse causality problem that may occur due to participation. However, since participation is a decision of whether or not to be involved, relying only on a fixed-effects model will net out all of the unobserved household attitudes that could potentially influence off-farm diversification. Therefore, a random-effects model is applied with an instrumental variable to capture the effect of household characteristics, which are both carried out by the two stages least squares method. The results of the fixed-effects model and random-effects model with the Instrument Variable are presented in Table 4.

Table 4. Fixed-effects (FE) and Random-effects (RE) model of the off-farm employment effect on total income

Explanatory variables	Dependent Variable: Log Total Income	
	FE-IV	RE-IV
	(1)	(2)
Off-farm Participation	5.5731***	1.8606***
(1=Yes, 0=otherwise)	(1.8283)	(0.4282)
HHs size (no)	-0.2145***	-0.1332***
	(0.0495)	(0.0167)
Area Cocoa (acres)	0.0031**	0.0028***
	(0.0013)	(0.0003)
Asset (IDR)	0.0497	0.0337
	(0.0512)	(0.0298)
Access to Credit (IDR)	-0.0019	-0.0222**
	0.0197	0.0077
Observation	765	765
F (5, 505)	6.43	
Wald chi2		186.98
Prob > chi2		0.000

Source: Author's calculation. Standard errors are in parentheses, ***, **, and * are significant at 1%, 5%, and 10% levels respectively. The FE-IV and FE specification instrument of potentially endogenous variable (s= age of HH's age, sex, number of children number of men and max education) with the respective system of external instruments (HHs size, area cocoa, log asset value, log credit value).

Similar results were found for the fixed and random effects model using an instrument variable. The results of the Wald Chi2 analysis of 186.98 with prob >Chi2 0.000 show that all independent variables used are collectively significant for the fixed and random effects model using an instrument variable used. This is shown by the results of the F test where together the five independent variables used (number of family dependents, cocoa area, assets and access to credit) have a significant effect on respondents' participation in working outside of farming. The results show that the engagement off-farm work which respondents did such as working as a construction worker, as a public transport driver, or selling services as a motorbike taxi driver found to positively increase total household income at the 1% level of significance for every increment in off-farm work participation (Table 4). This is in line with cocoa cultivation, which has a statistically significant effect on raising total household income by 0,31% and 0,28% for

every increasing of cocoa cultivation. Cocoa is by far the main cash crop in the research area, covering 28 percent of the total cultivation area (Asih and Klasen, 2017). In contrast, the results show that household size is the main factor that reduces total income. This has a linear correlation with total household expenditure, which renders dependency on the family. The evidence indicates that the average household size is larger than five family members. This household size reduces total household income by 21.45 and 13.32 percent for every individual increase in the number of family members. Additionally, the random-effects model reveals a negative effect of credit on total income. Access to a credit market reduced total household income by 2.22 percent due to the responsibility of loan repayment (Table 4).

3.2. *Discussion*

The research indicates that an economic transformation of significant scale is occurring as a result of the allocation of labor and sources of income outside the agricultural subsystem in rural areas in Central Sulawesi, Indonesia. As shown by the agricultural transformation in the research area, it has positively affected total income through off-farm work participation, coupled with the number of men in the family and cocoa cultivation. These variables have increased total household income for every off-farm participation, the number of males in the family, and the cocoa cultivation area. As reported by Bruness et al. (2016) that off-farm activities play an important role in rural incomes that lead to poverty alleviation in Central Sulawesi, Indonesia. Similarly, Himanshu et al., (2013) found that off-farm employment leads to increased income and poverty reduction in India. Mat et al. (2012) reported that one-third of the income from an off-farm income source, has a poverty-reducing effect on farming households in Kedah, Malaysia, while in China similar conditions reduced rural poverty and income inequality (de Janvry et al., 2005). Moreover, Bezu and Barrett (2012) reported that both poor and well-off households show expenditure growth from an increase in income from non-farming sources in Ethiopia, although the wealthier households benefited more than the poor. Therefore, off-farm employment can be viewed as a strategy to sustain income and stabilize consumption during shortages by diversifying a household earnings portfolio (Reardon, 1997; Ellis, 1998).

The research also found out that engaging off-farm work and the number of men in the family is associated. The number of men in the family has a positive effect on the total household's income for every male in the family. This condition shows that human resources play an important role as the main asset for entering the non-agricultural labor market. The number of men by far represents a larger proportion of the labor force in a household, which has a linear correlation with off-farm participation. As reported by Corral and Reardon (2001) and Reardon (1997), the number of family members means more labor, which can be interpreted as having more hands available for off-farm earnings. Moreover, the research reveals an important role of cocoa cultivation, which is contributing to raising the total household income. As reported by Asih and Klasen, (2017) cocoa cultivated by 28% of the farmers as the main cash crop that is contributing the biggest share to the total crop production and income of the household in the research area.

Furthermore, the research also reveals evidence that household size and credit are the main factors that reduce total income. The household's size has a linear correlation with total household expenditure that tends to be the main factor reducing total income,

which renders dependency on the family, while access to a credit market reduces total household income due to the responsibility of loan repayment. As stated by Reardon (1997), one of the reasons to allocate labor off-farm is to earn cash to finance farm investment due to credit market failure. This result also indicates that credit and households' size were "*push*" factors for the households to engage in off-farm work. However, these findings suggest that future research should evaluate the centralization policy effect on off-farm employment, as well as the policy implications for encouraging off-farm work. Emphasis should be placed on value-added activities that improve the accessibility of lower-income groups and thereby improve total household income and reduce poverty among the poor.

4.   Conclusion

The research shows the important role of off-farm diversification on total income and economic mobility and that it is welfare enhancing for rural households in Indonesia. Off-farm work was found to significantly increase total household income, coupled with the number of men in the family and cocoa cultivation. It increases total household income by 63.20 percent for every engaging off-farm work, while the number of males in the family indicates that human capital plays important role of as the main asset for entering the off-farm labor market, which represents a larger proportion of the labor force in a household. On the other hand, the cocoa cultivation area shows the important role in contributing to raising the total household income. This off-farm diversification found to influence the change in income over the entire period, as well as indicating agricultural transformation in the research area through labor supply mobilization, which positively affects total household income.

Statements

The research has no conflict of interest and uses three waves of panel data from the STORMA (Stability of Rain Forest Marginal) project for the period 2001 – 2006 and the data from the EFForTS (Ecological and Socio-Economic Functions of Tropical Lowland Rainforest Transformation Systems) project in 2013 based on a sample of households across 13 villages in Central Sulawesi, Indonesia.

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