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Can Female Non-Farm Labor Income Reduce Income Inequality? Evidence from Rural Southern Ethiopia

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Abstract

This article examines the importance of non-farm income in reducing per-capita income inequality among agricultural households in southern Ethiopia, with an emphasis on the gender dimension. Using a modified technique of inequality decomposition by income sources applied to household survey data, it was found that female non-farm labor income is the only income source that significantly reduces per-capita income inequality. More precisely, a uniform increase in female non-farm labor income, among households that already have income from this source, reduces inequality. Encouraging women to devote more time to non-farm income-generating activities, and creating market mechanisms that increase earnings in these activities, could potentially lift households out of poverty and at the same time reduce income inequality as a whole. The impact on inequality could be stronger if policies are directed at asset-poor households and less-educated households in particular. One of the policies that could be useful in this regard is female educational enhancements. This could open more opportunities for women in the hired labor market, improve women's position within the household, and promote overall income inequality as well as gender equality.

Introduction

Rural non-farm employment has long been recognized as a channel out of poverty. Many previous empirical studies found that non-farm income reduces poverty and inequality among farm households (see Kimhi, 2007, and references therein). In agricultural societies, considerable gender disparities in access to and utilization of non-farm employment opportunities usually exist. This is due to both supply (push) and demand (pull) factors. On the supply side, gender specialization in both farm production and household activities dictate gender differences in both time constraints and the value of time. On the demand side, gender differences in market-oriented qualifications such as formal education dictate differences between the demand for male labor and the demand for female labor. Both supply and demand could also be subject to considerable gender discrimination in traditional societies. Most of these factors work against women. However, increasing women's position is known to be favorable not only to household income but also to child education, child mortality, and health and nutritional status of all household members (Quisumbing and Maluccio, 2003; Schmeer, 2005; Kurosaki *et al*., 2006; Park, 2007).

In this paper, the gender dimension of non-farm employment is examined from another aspect of rural development, namely income inequality. It is not theoretically clear a-priori whether increasing non-farm employment opportunities for women relative to men increases or decreases income inequality. On one hand, women from disadvantaged households have stronger incentives to engage in non-agricultural activities, which could reduce inequality. On the other hand, there is abundant evidence that women with higher labor market qualifications tend to be married to men with higher qualifications, and these may benefit more from the increased opportunities, thereby increasing inequality (Burtless, 1999). Existing empirical evidence suggests that higher women's income is associated with lower income inequality in many countries, including the U.S. (Cancian and Reed, 1998; Pencavel, 2006), the UK (Harkness, Machin, and Waldfogel, 1997; Davies and Joshi, 1998), Israel (Gronau, 1982; Kimhi, 2008b), Sweden (Björkland, 1992), Italy (Del Boca and Pasqua, 2003), Japan (Abe and Oishi, 2007), and Malaysia (Amin and DaVanzo, 2004). On the other hand, Aslaksen, Wennemo and Aaberge (2005) found evidence for the contrary in Norway.

We examine this issue in the context of a predominantly subsistence agricultural society in Southern Ethiopia, in which considerable gender differences exist in the tasks performed by men and women on the farm and in the household, in the tendency to engage in wage labor and in self-employment activities, and in the amounts earned from these activities, which are strongly biased in favor of men (Loening et al., 2008). Despite a relatively homogeneous production technology and an egalitarian institutional structure, considerable income inequality has been documented in rural Ethiopia (Jayne et al., 2003; van der Berg and Kumbi, 2006), and this inequality has been found to be related to the composition of income (kimhi, 2008a). In particular, it was found that self-employment income decreases inequality. None of the earlier studies has looked at the gender dimension of income inequality in rural Ethiopia.

The main objective of this paper is to quantify the extent to which an increase in female non-farm labor income affects per-capita income inequality among the sample households, and compare it with a similar increase in male non-farm labor income and other income sources. Inequality decomposition techniques are applied to household survey data, and in particular, the well-known technique of decomposing inequality by income sources (Shorrocks, 1982) is used. This technique decomposes a quantitative inequality measure into components, each related to a particular income source. In addition, the decomposition results are used to derive marginal effects of income sources on inequality. These marginal effects measure the impact on inequality of a uniform percentage increase of income from each source. We differentiate between intensive marginal effects, which are the effects of increasing income from each source for those households who already derive income from that source, and extensive marginal effects, which are the effects of increasing the number of households that derive income from each source. We also differentiate the marginal effects by population sub-groups, allowing for non-homogenous increases in income. We compare the results of two decomposition rules, one based on the Gini index of inequality and the other based on the squared coefficient of variation, to verify that they are robust to the choice of decomposition rule.

In the next section we present the inequality decomposition techniques that are applied in this research. After that, we describe the surveyed population and the data used in this research. The following section presents the empirical results, and the final section concludes with some policy implications and suggestions for further research.

Methodology: Inequality decomposition by income sources

Consider an inequality index that can be written as a weighted sum of incomes:

(1) $I(\mathbf{y}) = \Sigma_i a_i(\mathbf{y}) y_i,$

where a_i are the weights, y_i is the income of household i, and $\mathbf{y}$ is the vector of household incomes. Many conventional inequality measures, including the Gini inequality index, the squared coefficient of variation, and Theil's T index can be specified as (1). Shorrocks (1982) showed that if income is observed as the sum of incomes from k different sources, $y_i=\Sigma_k y_i^k$, the inequality measure (1) can be written as the sum of source-specific components S^k:

(2) $I(\mathbf{y}) = \Sigma_i a_i(\mathbf{y}) \Sigma_k y_i^k = \Sigma_k [\Sigma_i a_i(\mathbf{y}) y_i^k] \equiv \Sigma_k S^k.$

Dividing (2) by $I(\mathbf{y})$, one obtains the proportional contribution of income source k to overall inequality as:

(3) $s^k = \Sigma_i a_i(\mathbf{y}) y_i^k / I(\mathbf{y})$.

Choosing the inequality weights $a_i(\mathbf{y})$ may affect the decomposition results. Several authors, including Shorrocks (1983), Morduch and Sicular (2002), and Kimhi (2007), suggested not to rely solely on a single decomposition rule, but rather to compare the results of several different decomposition rules. When the inequality index (1) is the squared coefficient of variation, (3) becomes (see also Fields, 2003):

(4) $s^k = \text{cov}(\mathbf{y}^k, \mathbf{y})/\text{var}(\mathbf{y})$.

Shorrocks (1982) has shown that (4) is equal to the average of two quantities: the inequality that would be observed if $\mathbf{y}^k$ was the only source of inequality, and the amount by which inequality would fall if inequality in $\mathbf{y}^k$ was completely eliminated. Lerman and Yitzhaki (1985) and Podder and Chatterjee (2002) have shown that the proportional contribution of $\mathbf{y}^k$ to the Gini inequality index can be written as a product of its share in total income, the Gini correlation between $\mathbf{y}^k$ and $\mathbf{y}$, and the Gini coefficient of $\mathbf{y}^k$ itself.

The proportional contributions to inequality indicate, therefore, what would be the impact on inequality of an increase in the variability of each income source. A more policy-relevant question is, perhaps, what would be the impact on inequality of a uniform increase in each particular income source. Shorrocks (1983) has noted that comparing s^k, the proportional contribution of income source k to inequality, and μ^k/μ, the income share of source k, is useful for knowing whether an increase in the k^{th} income source is equalizing or disequalizing. Lerman and Yitzhaki (1985) and Podder and Chatterjee (2002) formalized this intuitive result for the case of the Gini inequality index, and showed that the relative change in the Gini index following a uniform percentage change in $\mathbf{y}^k$ is equal to $(s^k - \mu^k/\mu)\text{G}(\mathbf{y})$. Kimhi (2007) suggested using simulations to derive similar "marginal effects" for the case of alternative inequality measures. Note that the marginal effect of increasing income from a certain source by one percent uniformly is conditional on the subset of households that derive positive income from that source. Hence it will be denoted here as the intensive marginal effect. Alternatively, it is possible to simulate the effect on inequality of an increase in the fraction of households that derive income from each source, which is denoted here as the extensive marginal effect. This method is explained in the appendix. One can think of certain policy measures that affect income of those who already derive income from a certain source, and other policy measures that cause households to move into or out of this set of households. In certain cases, the intensive marginal effect can be thought of as a short-run effect, while the extensive marginal effect can be thought of as a long-run effect.

Data

The data used in this research was collected through a household survey, which was conducted during January-March of 1995 in the Ejana-Wolene, one of the sub-districts of the Guragie administrative zone, in the Southern region of Ethiopia. Ensete (false banana) is the major crop and food source in the region, and is grown by most households on small plots around the house. Its stem, roots and leaves are used for food and fiber. The cultivation of Ensete is highly labor-intensive, with men responsible for transplanting and harvesting, and women responsible for further processing and preparation. A total of 583 households were surveyed, about 31 in each of 19 randomly-chosen peasant associations. The survey questionnaire included questions about personal and family characteristics, food production

and expenditures, income and assets, health, and time allocation. Figure 1 shows that almost a third of adult females in the sample households engage in non-agricultural activities, while only a fifth of males do so. However, men are more likely to engage in wage labor, while women are more likely to engage in self-employment activities, including handicrafts, trade and transport (by animals). Males and females spend roughly equal number of days per year in their non-agricultural activities, 82.5 days for males and 91 days for females). However, men who are engaged in non-farm activities have much higher incomes than women. Kimhi and Sosner (2000) reported that men earned 4.6 birr per day on average, while women earned 1.9 birr on average (the official exchange rate at the time of the survey was roughly 6 birr per $US). Men are also considerably more educated than women, which is consistent with the observed earning differentials (Kimhi, 2006). These gender differences are not unique to the surveyed population. Loening et al. (2008) report similar findings for other parts of rural Ethiopia.

These figures provide the justification for differentiating between male non-farm labor income and female non-farm labor income in the empirical analysis. Unfortunately, other income sources could not be individualized. These are grouped together into two categories: agricultural income (including income from crops and from livestock) and remittances. Agricultural income consists of roughly 50% of household income, and the remaining half is split almost evenly between remittances and non-farm labor income (figure 2). About two thirds of non-farm labor income is contributed my men.

Results

The inequality decomposition results (table 1) reveal that the rankings of the proportional contributions to inequality are similar to the rankings of the importance of the different income sources: agricultural income has the largest proportional contribution to inequality among all income sources, remittances are second in importance, then men's non-farm labor income, and women's non-farm labor income is responsible for the smallest fraction of income inequality, 4.2% under the Gini decomposition rule and 1.7% under the squared coefficient of variation (both fractions are significantly different from zero). As the proportion of inequality contributed by women's non-farm labor income (2%-4%) is lower than its income share (10%), a uniform increase in women's non-farm labor income is expected to decrease household income inequality. This is confirmed by the intensive marginal effects of women's non-farm labor income, which are negative and statistically significant under both decomposition rules. The intensive marginal effects imply that a one percent uniform increase in female non-farm income is expected to reduce the value of the Gini inequality index by 0.6% and the value of the squared coefficient of variation by 0.16%. It should also be noted that men's non-farm labor income has negligible intensive marginal effects that are not statistically significant. The intensive marginal effects of remittances are positive but insignificant, while those of agricultural income are positive and negative under the Gini and squared coefficient of variation decomposition rules, respectively, and hence do not provide consistent information.

The extensive marginal effects of non-farm labor income, men's or women's, are not statistically significant, while those of remittances are positive, but statistically significant only under the Gini decomposition rule. This implies that entry of households into non-farm employment is not expected to have a significant effect on income inequality. The extensive marginal effects of agricultural income cannot be computed because all households in our sample derive income from agriculture.

Since the intensive marginal effect of women's non-farm labor income is the only marginal effect that is both statistically significant and consistent in sign across the two

decomposition rules, we now differentiate this marginal effect by population sub-groups. In other words, instead of increasing female no-farm income uniformly across the sample, we do it for each population sub-group at a time. This can tell us whether certain population sub-groups are more likely than others to reduce income inequality be increasing their reliance on female non-farm income. We find that even after the differentiation, all intensive marginal effects of women's non-farm labor income are negative and statistically significant. We divide the sample into sub-groups according to marital status, family size, religion, household wealth, age and education. The results are in table 2. We find stronger effects on inequality among smaller households, among asset-poor households and among less-educated households. For example, the impact on inequality of increasing female non-farm labor income by one percent among households with up to one child under the age of six, with up to three children up to the age of 17, or with up to three adults, is more than twice the impact on inequality of doing the same for larger households. This could be due to the fact that the population sub-groups with smaller family size are larger and have higher per-capita incomes, hence the one percent increase in female non-farm income is quantitatively stronger that a similar increase for the population sub-groups with larger family size. The same is true for households with no educated adults, which have lower per-capita income than households with educated adults, but are much larger in number, and for households with per-capita wealth below the sample mean, which have much lower per-capita income than households with per-capita income above the sample mean, and are larger in number. On the other hand, we find weaker intensive marginal effects of female non-farm income on inequality among minority groups of single-parent households and Muslim households. This could be due to the fact that these minority groups represent about 10% of the population only, so the aggregate increase in income implied by the intensive marginal effects are small relative to those of the majority groups. Altogether, we cannot draw a clear-cut conclusion that a uniform increase in women's non-farm labor income among disadvantaged households has a stronger or weaker effect on household income inequality than among other households, but we are confident that the intensive marginal effects are always negative and statistically significant.

It should be noted that regression-based inequality decomposition techniques, suggested by Fields (2003) and by Morduch and Sicular (2002), are preferred for examining the impact of population characteristics on inequality. However, estimating the income-generating equations turned out to be highly unsatisfactory (in particular, household wealth explained almost all of the explained variation in per-capita income) in our case, and therefore we do not present these results.

The robust result that a uniform increase in female non-farm labor income reduces total income inequality is probably due to the fact that female non-farm labor income accounts for a larger share of household income among low-income households. Hence, it identifies a suitable anti-poverty channel of policy intervention. The result that a uniform increase in female non-farm labor income has a stronger negative impact on inequality among non-educated households can be explained by the fact that uneducated adults are less likely to find satisfactory employment in the labor market, and therefore they are more likely to engage in self employment, which is heavily concentrated among females in our sample (figure 1). Altogether, these households have lower per-capita income but their income is more sensitive to changes in female non-farm labor income.

Conclusion

This article deals with the importance of non-farm income to per-capita income inequality among Ensete-growing households in southern Ethiopia, with an emphasis on

the gender dimension. The gender dimension is important in this context because we found gender-specific patterns of engagement in non-farm income-generating activities, with males more likely to engage in wage labor while females more likely to engage in self-employment. This could be because self-employment activities are more flexible in term of timing and hence are better complements to household tasks that are traditionally carried out by females. Men are more likely to be educated, a fact which also contributes to the comparative advantage of males in wage labor.

We found that female non-farm labor income is the only income source that significantly reduces per-capita income inequality. More precisely, a uniform increase in female non-farm labor income, among households that already have income from this source, reduces inequality. This finding has a clear policy implication: encouraging women to devote more time to non-farm income-generating activities, and creating market mechanisms that increase earnings in these activities, could potentially lift households out of poverty and at the same time reduce income inequality as a whole. Moreover, our results show that this conclusion is robust for non-uniform percentage increases in women's non-farm labor income as well. In particular, we still obtained negative and statistically significant effects on inequality when we simulated the percentage increase in female non-farm labor income for particular population sub-groups, although the effects varied in magnitude across the population sub-groups.

Self-employment activities by women in a subsistence economy such as southern Ethiopia serve as a default source of extra income, due to the thin labor market and the comparative advantage of males in the labor market. This is why increasing the opportunities for women to engage in self employment activities is likely to have a larger impact on disadvantaged households and therefore reduce inequality. This conclusion comes with a caveat: our simulations held all other income sources constant while increasing female non-farm labor income. In fact, it could be that better non-farm earning opportunities will draw women out of other income-generating activities such as agricultural production. This calls for an extension of this research in the direction of deriving counterfactual income distributions for hypothetical changes in female non-farm labor opportunities, which take into account resulting changes in other income sources.

In order to maximize the favorable inequality outcomes of policy measures that increase female non-farm labor income, authorities should target specific population groups, in particular asset-poor households and less-educated households, which were found to have quantitatively stronger effects on inequality, when applying such policies. Note that the inequality implications could be even stronger if the outcome of the policy also decreases the variability of female non-farm labor income in the population. In such a case, the positive proportional contribution of female non-farm labor income to inequality and its negative intensive marginal effects work in the same direction, namely to reduce per-capita income inequality. One of the policies that could be useful in this regard is female educational enhancements. This could open more opportunities for women in the hired labor market, improve women's position within the household, and promote overall income inequality as well as gender equality.

Our conclusions could be generalized to other subsistence economies with thin labor markets and gender differences in labor market qualifications. It is not clear to what extent they also apply in other situations. In both cases, there is room for further research into this issue using data sets from other parts of Ethiopia as well as from other countries in Africa and elsewhere.

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Appendix: simulating the extensive marginal effects

Increasing the number of households who have positive income from source *k* by one percent is equivalent to increasing total income of households who have positive income from source *k* by one percent. In addition, the income of households who have zero income from source *k* can be decreased by a certain percentage that is equivalent to the percentage by which the number of households who have zero income from source *k* has to be decreased so as to keep the total number of households constant. The effect of these changes on income inequality is denoted here as the extensive marginal effects.

Specifically, the extensive marginal effects are computed in the following way. First, we partition the inequality index (1) into two portions related to two subsamples, those who have income from a particular source (+) and those who do not (-):

(A.1) $I(\mathbf{y}) = \Sigma_{i+} a_i(\mathbf{y}) y_i + \Sigma_{i-} a_i(\mathbf{y}) y_i$

Then, we simulate a shift of one percent of households from the (-) subsample to the (+) subsample, assuming that once a household moves from (-) to (+), its per-capita income also changes by the same percentage in which the mean income of (+) is larger than the mean income of (-). This means that a household with an average income in the (-) subsample gets the mean income of the (+) subsample. Technically, the simulated level of inequality is

(A.2) $I^*(\mathbf{y}) = I(\mathbf{y}) + 0.01\Sigma_{i+} a_i(\mathbf{y}) y_i - x\Sigma_{i-} a_i(\mathbf{y}) y_i$,

where $x = 0.01\Sigma_{i+} y_i \,/\Sigma_{i-} y_i$. The purpose of x is to keep the total number of households constant.

Figure 1. Percentage of adults in non-agricultural activities

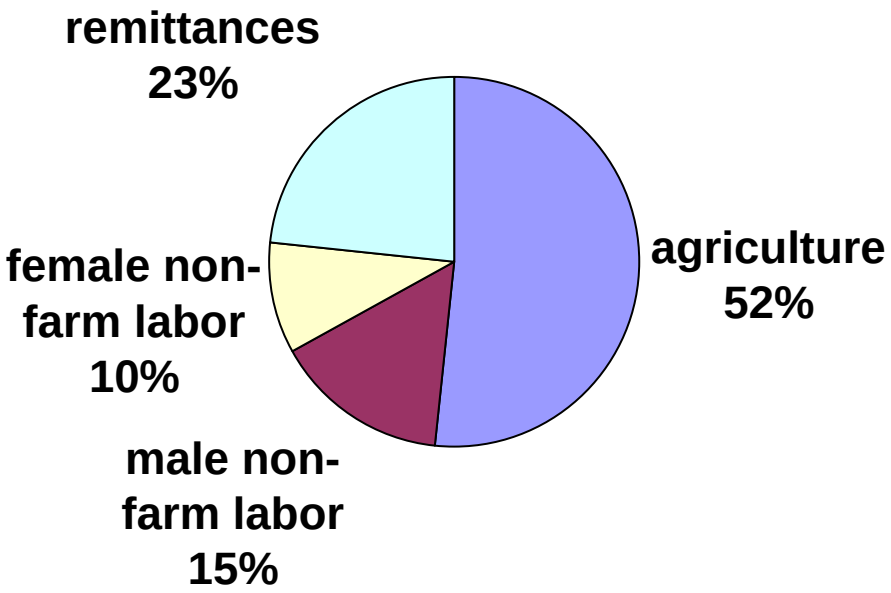

Figure 2. Sources of per-capita income

Table 1. Inequality decomposition by income source

	Share of source-specific per-capita income	Inequality measures	
		Gini	Squared CV
Inequality index		0.5306	1.5535
Proportional contributions			
Agricultural income	52%	0.5786 (11.9)	0.3997 (3.95)
Male non-farm labor income	15%	0.1490 (4.04)	0.1918 (2.32)
Female non-farm income	10%	0.0422 (3.79)	0.0173 (1.92)
Remittances	23%	0.2302 (4.48)	0.3911 (2.76)
Total	*100%*	*1.00*	*1.00*
Intensive marginal effects			
Agricultural income		0.0616% (2.32)	-0.2585% (-1.30)
Male non-farm labor income		-0.0054% (-0.28)	0.0576% (0.54)
Female non-farm income		-0.0567% (-6.70)	-0.1598% (-4.56)
Remittances		0.0016% (0.03)	0.3684% (1.28)
Extensive marginal effects			
Male non-farm labor income		-0.0029% (-0.13)	-0.1621% (-0.59)
Female non-farm income		0.0143% (0.16)	0.2647% (0.53)
Remittances		0.1444% (2.57)	0.5913% (1.30)

Note: bootstrapped t-statistics in parentheses.

Table 2. Marginal effects of female non-farm income by population sub-groups

Population sub-group	Sample size	Mean income (birr)	Marginal effects (%)	
			Gini	Squared CV
Marital status of household head				
Single	63	123.2	-0.0114 (-3.22)	-0.0260 (-3.28)
Not single	508	138.6	-0.0456 (-6.66)	-0.1369 (-4.61)
Number of children up to 6				
Up to one	388	146.1	-0.0360 (-5.86)	-0.1148 (-4.34)
More than one	183	117.3	-0.0210 (-5.26)	-0.0481 (-4.61)
Number of children 7-17				
Up to three	405	141.4	-0.0453 (-6.78)	-0.1152 (-4.80)
More than three	166	125.9	-0.0116 (-3.05)	-0.0478 (3.77)
Number of adults				
Up to three	380	140.0	-0.0444 (-7.12)	-0.1117 (-5.30)
More than three	191	130.8	-0.0125 (-2.77)	-0.0513 (-3.06)
Religion				
Muslim	59	124.3	-0.0046 (-2.26)	-0.0150 (-2.91)
Not Muslim	512	138.4	-0.0523 (-7.66)	-0.1479 (-4.73)
Household wealth				
Up to 1800 birr/person	353	92.2	-0.0480 (-7.36)	-0.1253 (-4.72)
Over 1800 birr/person	218	209.4	-0.0089 (-2.62)	-0.0377 (-3.64)

Continued on next page

Table 2 (continued)

Population sub-group	Sample size	Mean income (birr)	Marginal effects (%)	
			Gini	Squared CV
Age of household head				
Up to 48	344	141.1	-0.0374 (-7.01)	-0.0935 (-5.25)
More than 48	227	130.6	-0.0195 (-3.61)	-0.0694 (-3.56)
Educated adult in the household				
Yes	184	163.2	-0.0183 (-3.86)	-0.0482 (-3.75)
No	387	124.4	-0.0386 (-6.87)	-0.1148 (-4.57)
Total (from table 1)	571	136.9	-0.0567 (-6.70)	-0.1598 (-4.56)

Note: bootstrapped t-statistics in parentheses.