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**The economic and social weight of small scale agriculture.  
Evidence from the Rural Income Generating Activities survey data.**

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**Abstract**

In current economic reality, there seems to be a clear need to recognize, characterize and place small scale agriculture in a setup which accounts for novel trends in the modes of doing business in the global economy and with respect to the changing role of agriculture along development transition. Providing that ground it will make it possible to design and promote appropriate policy strategies that will best accommodate small scale farmers’ needs and exploit their potential for agricultural development. The present paper employs a multi country household survey database developed from ESA-FAO, and a series of ad hoc land thresholds to categorize rural households as small or large scale farmers and identify some of their key characteristics as well as their economic weight in the rural as well as the national economy.

**Keywords:** Small scale agriculture, household survey data, developing countries

**JEL classification:** Q12

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## **1 Introduction**

It has been estimated that about 70 percent of world's poor are concentrated in rural areas where two out of three billion rural people reside in about 450 million small farms. Furthermore the UN Millennium Project Task Force on Hunger estimates, that in small scale farms reside about half of world's hungry people including three quarters of Africa's malnourished children. Beyond the importance of these numbers in terms of economic, social or even political power, the changing patterns of agricultural production and trade the last decades modify the traditional structural agricultural paradigm into which small scale farmers in the developing world should integrate (Byerlee et. al. 2008, WDR 2008, Hazell et. al. 2007).

Yet, the role of the smallholders, which are the backbone for most of the functions played by agriculture in early stages of development, has not been addressed or analysed in association with these recent challenges in the global economy and with respect to the changing role of agriculture along development transition. There seems to be a clear need to recognise, characterise and place small scale agriculture in this modern setup. Providing that ground it will make it possible to design and promote appropriate policy strategies that will best accommodate their needs and exploit their potential for agricultural development.

FAO, recognising small scale agriculture's challenges in the modern economic reality, is initiating an effort to identify appropriate policy schemes for the management of small scale farmers along development transition. To begin with the project is expected to address issues of identification and characterisation of small scale farmers in order to explore in detail their advantages and constraints. In a second step is expected to address the modern economic challenges and the implications they signify for small scale farmers in developing countries found in different stages of the development path. Lastly the project is expected to provide guidelines and policy advice for the design and implementation of appropriate safety nets and social protection tools that will minimise transition costs.

The present paper is structured on two minor and one major, sections. In the first section, a short overview displays the evolution and the associated policy implications with respect to the role of small scale agriculture in (agricultural) development during post war agricultural economics thinking. This short overview starts with the duality models and the consideration of agriculture as the reserve army for the urban (industrialised) sector. It continues with the agricultural led growth models originating in the aftermath of the Green Revolution experience and is completed with the balanced growth structural models that recognised agriculture's importance in growth and development.

Secondly, contemporaneous challenges for small scale farmers in modern agriculture are described. Globalization of market and production structures along value chains, technological and institutional progress as well as strong environmental concerns, seem to lead to the formation of what some authors call a "New Agricultural Paradigm". A complementary set of issues (in energy markets, health epidemics and elsewhere), create an environment characterised by fierce competition and severe threats, which small scale farmers need to face and adjust in order to either survive or identify the best welfare promoting alternative.

Finally, the paper aims at contributing to the discussion of identifying and characterising small scale farmers in an environment with information available from the Rural Income

Generating Activities database developed by ESA-FAO<sup>2</sup>. The task of categorising small and large scale farmers is quite challenging given that the dimensions of scale are many (capital, inputs, type of output etc.), while other issues such as land fragmentation or land ownership further complicate identification. In most of the cases land is employed as the classifying variable and arbitrary thresholds are used to differentiate small from large scale farmers (2 hectares, mean, median etc.). In the present research we employ a similar arbitrary threshold for operated land being aware of the shortcomings that such a choice imposes in the reliability of the results.

## **2 Small scale farmers in post-war economic thinking<sup>3</sup>**

In classical economic theory, development is seen as the economic growth process which takes place with the appropriate reallocation of production factors from the low productivity rural (agricultural) sector to the urban (industrialised) sector. In this context agriculture supplies with food the urban sector, releasing also savings and labour to enhance industrialisation. Criticism to this passive theory of development refers to the distortions stemming from the impact of high food demand and prices as wages in the urban sector along with the living standards improve (Ricardian trap). On the ground of this criticism, improvements on agricultural productivity are able to overcome the problem as well as constraints imposed from the fixed supply of resources. In this context minimal attention is given to agriculture and no more attention to small scale farmers.

The success of Green Revolution modified classical theory and policy guidelines, assuming a more active role for agriculture in overall development. The models developed to accommodate the change in thinking are referred to as induced innovation models. In particular, technological advances indicated that agriculture could contribute to overall growth, through productivity increases, thus overcoming resource constraints. Technological innovations are often dependent on natural endowments and market forces for inputs and outputs being endogenous to the country's agricultural transformation process. Forward and backward linkages in demand and supply even beyond agriculture, formulate agriculture's role in development.

Linkage effects are recognized firstly, from investing to the industrial sector and the potential impact this sector has to the rural economy (for instance in terms of increased demand). Subsequently rural production and consumption linkages are recognized as resulting from the utilization of agricultural output as input to the industrial sector as well as from the demand for inputs generated from agriculture, respectively. In this process, effects from trade depend on the elasticity of substitution between domestic and foreign commodities as well as the existence of non tradable commodities. Nevertheless, serious constraints in rural areas, in terms of imperfect or missing markets, high transaction costs and poor infrastructure, do not permit the exploitation of these sectoral linkages, hindering agricultural transformation and development transition. Development policy objectives, aim at overcoming these constraints in association with promoting industrialisation.

Within the context emerging in the aftermath of the Green Revolution success, small scale agriculture is seen as the backbone of agricultural transformation. Their role is multidimensional, starting primarily from the ample empirical evidence on their efficiency

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<sup>2</sup> [HTTP://WWW.FAO.ORG/ES/ESA/RIGA](http://www.fao.org/es/esa/riga)

<sup>3</sup> A more detailed review can be found in Diao et. al. (2006) and Lipton (2005).

advantage, relative to large scale farming. Other dimensions recognize their contribution to the rural economy and national food security through their favourable expenditure patterns in the local economy as well as through the concentration of agricultural produce to staple food items, respectively. As a result of these functions, small scale agriculture consists for itself and provides to the rural economy a livelihood platform which is able to accommodate poverty reduction and food security along with welfare improvement objectives.

Later advances in the context described above give rise to balanced growth or agriculture-led industrialisation strategies, which stressed the importance of agricultural development, especially in early stages of development transition, in conjunction and not in isolation from industrialisation. Beyond the advantages offered by small scale farmers and presented in the previous paragraph, stabilization of social and economic structures is added as agriculture and small scale farming are able to overcome the impact of food crises. Moreover, the decision process and the management of small scale farms within its most frequent organizational form, the family farm, are supposed to promote learning and innovation. On the other hand, urban biased development processes, are frequently claimed as distorting economic incentives, yielding highly dualistic outcomes, slowing sectoral and aggregate growth rates and promoting non-equitable distribution of resources and returns to development.

Along development transition, poverty reducing channels are identified basically as a result of the economic activities of small scale farmers. It needs not be neglected that these channels reflect mainly from the relationship with overall development growth process rather than agricultural growth in specific. On that ground, empirical evidence is not able to justify the inverse U-hypothesis (Kuznets curve), between poverty and overall growth and much less with agricultural growth. Nevertheless, empirical research, computed growth – poverty elasticities at sectoral level (Ravallion and Datt 1999), which only by far can be assumed to circumscribe causal relationships. Consistent evidence is provided that correlations between poverty and agricultural growth are stronger along early stages of development transition.

The basic channels refer to the limited competition between resources used in agriculture with other sectors, as well as to the high labour demand that agricultural growth generates for all economic sectors. For instance during the Green Revolution, improved seeds assisted in increasing productivity but more labour as well as intermediate inputs were required to fully exploit technological advances. Another channel based on technological progress, refers to the shift from staple to high value or niche product markets. Diversification of small scale farmers to out of farm activities, which are often indirectly farm related, assists in poverty reduction through the generation of output that is often bought by farmers, boosting in that way rural economy. Finally an important contribution to food security and poverty reduction is made, as long as productivity increases are followed by price changes that make food items affordable.

### **3 Challenges for small scale farmers in modern economic reality**

More and more expert views suggest that modern economic reality and the new modes they shape in doing business in agriculture (and other sectors) signify deteriorating prospects for small scale farmers. It is suggested that a new range of conditions and challenges emerge, that go beyond the paradigm of the peasant farm, which dominated the Green revolution. These conditions and challenges can be classified, in general terms, under the headings of globalisation, technological advances, institutional changes and environmental concerns

(Byerlee et al. 2008). Some of these challenges are sketched below drawing from Hazell et al. (2006) and McCullough et al. (2008).

In first, changes in methods of production stemming from technological advances affect scale economies. During the Green Revolution technological progress based primarily on improved seeds was easily adapted from farmers irrespective of operational size. Nowadays, technological advances require investments in human and physical capital, as well as advanced relationships with a wide network of suppliers and traders of inputs (including credit) and services. In this environment small scale farmers are difficult to locate the required financial resources and integrate.

Moreover in modern economic reality the efficiency advantage of small farms seems to reverse. With respect to the efficiency advantage of small farms a wide literature has been developed (Fan and Chan-Kang 2005, provide an informative review). The testable hypothesis emerging from observation of data and analysis is that in small farms output per acre is higher in comparison with larger farms. Greater intensity in the use of inputs (especially labour) is assumed to justify this claim along with a sense of responsibility in farm management as long as the organizational form is the family. Moreover, in large farms transaction costs are higher while imperfect land markets may lead to non-optimal farm sizes. Finally, some authors consider efficiency of small farms an outcome stemming from agro-ecological conditions and the local environment.

Nevertheless further evidence indicates that along transition other factors come into play that reverse the efficiency advantage of small farms; in particular, labour to capital ratios increase along with the importance of managerial quality attributes. These factors seem to favour large scale farming. Finally, after controlling for land quality and irrigation availability the efficiency advantage seems to be analogous to size. In general there exist a range of factors that promote large scale efficiency (lumpy inputs, labour specialization, processing and marketing, capital related transaction costs), and another set that does the opposite (risk considerations and labour related transaction costs). The relative importance of these factors in specific environments may lead to different outcomes.

Globalisation has led to changes in marketing and trading modes the most important manifestation of which are the marketing chains. In developing countries oligopsonistic structures characterise more and more the marketing of agricultural commodities, as chains concentrate increasing market shares. In these structures quality, quantity and timing constraints favour large scale in operations which are able to accommodate for these requirements and adjust if needed more easily. Especially when farming operations are distributed unequally (e.g. bimodal), large farmers are favoured.

Opportunities arise for small farmers if production of staples can be integrated into the values chains, with their integration into the production of high value commodities or if biofuels are proven a viable and profitable solution. Necessary conditions to exploit these opportunities however, are the effective collective action of small scale farmers and the enabling environment in terms of undistorted incentives and sufficient infrastructure.

Post war prices of agricultural commodities along with increasing globalisation are showing declining trends for the most part (with the notable exception of the recent price hike of 2007/08). Declining prices imply income losses for small scale farmers unless productivity increases or the share of costs to the value of output is reduced. Moreover, small scale farmers

can adapt less easily to falling prices given the increasing marginal costs of capital they face as well as higher volatility. On the other hand, is also under question of increasing prices, are able to provide better opportunities for small scale farmers. As was frequently argued during the soaring food prices incidence of 2007/08 a critical condition for small scale farmers to exploit increasing prices is the enabling environment which is inadequate or missing in most of the developing world.

As far as it concerns agricultural research, the past decades is observed a shift from yield creation which was the norm during the Green revolution, to yield protection. Moreover, fewer innovations, declining rates of funding and shifts from public to private spending seem to favour large scale in farming systems.

Increasing environmental concerns along with changes in climate create another challenge for agricultural systems. With respect to this challenge, scale of operations may have significant implications regarding the viability of different types of farmers. The literature suggests that small holders maybe unable to account and adjust to these environmental threats due to the lack of sufficient human, social, financial capital and information. On the other hand some degree of optimism is allowed as long as small scale is able to provide greater flexibility and adaptability.

HIV/AIDS continues to threat and compromise livelihood prospects of wide areas in Sub-Saharan Africa, resulting in human and labour losses, erosion of capital, underutilization of resources (land and inputs), and substitution of crops. Even though along the course of the shock rural areas are affected on a latter stage; after the shock passes through from urban to rural areas, when this happens consequences are devastating in humanitarian and economic terms.

Finally, a major shift is observed the last decades in the policy environment, which no longer accommodates for extensive public intervention and support unlike the Green revolution state of affaires. Costs for this type of policies were proven very high, and not easy to sustain. Moreover, promoting private sector intervention and support may adversely affect small scale farming business as long the latter fail to comply with the quantity, quality and timing constraints that private business require or as long as the enabling environment is still missing.

#### **4 Defining small scale farmers – Evidence from the Rural Income Generating Activities database.**

Limited access to land is the common identification feature, when the term smallholder is mentioned in the literature or elsewhere. The limit, most frequently takes the form of a threshold that is usually selected in an ad hoc basis (2 hectares, mean or median land size). For instance Chamberlin (2008), using survey data from Ghana, employs farm size as the classification variable, and defines small holders as farmers with operated farm size smaller than 10 hectares and greater than 0.1 hectares (“virtually landless”). The multidimensionality is recognized and the analysis further characterizes farmers by farm size quartiles and geographical attributes. Jayne et. al. (2003), define small holders in a similar way in six Sub-Saharan countries. Eastwood et al (2007) and Anriquez and Bonomi (2007), provide useful reviews on the evolution of farm size.

Nevertheless, a range of other dimensions are important attributes of scale in agricultural systems, and this becomes obvious when the term small scale agriculture is used instead of small holders. Among these attributes, access, use and ownership of capital, livestock and inputs (including credit) are crucial. Moreover, other attributes like the fragmentation of farm land or differentiation between land ownership and use are important characteristics that affect scale in agriculture.

Another form of farm typologies reflects on agro-ecological characteristics such as climate, farmland related factors (soil, slope, altitude) and the crop and livestock systems used along with other economic factors. Finally, a set of farm typologies employed by FAO (McConnell and Dillon, 1997)<sup>4</sup>, addresses attributes reflecting on the operational objective of the farm and its degree of independence along with its size. The operational objectives of the farm, stemming from the principal purpose of welfare maximization, are achieved through self-sufficiency and/or the generation of some amount of cash income, while the number and the types of crops are also considered. The degree of independence refers to if basic resources are owned or shared or rented. Finally, size is approximated with land.

In general, even though farm size is poor in capturing the number of dimensions regarding scale in farming systems, is a convenient and easily implemented measure of size. Size of operated farmland is employed in the present stage of the current research to identify small scale farmers in a database that consists of survey data from several countries. In household survey data, operated or owned land size is reported at the household level.

Empirical research employs thresholds at the level of family farm, which, while are able to accommodate for the organizational form of the farm (family in most of the cases), they miss information with respect to production. Because most farms are small but most production occurs on large farms, the typical measure of representative farm size – the average and median- will tend to mask large changes in the concentration of production. Average and median measures of farm size focus on the typical farm, which is small, rather than the typical hectare of farmland, which is associated with a larger operation.

However, a country's **land median**<sup>5</sup>, suggested by Key and Roberts (2007a and b), may better reflect the size of operations where most production occurs. The **land median** is calculated by ordering farms from smallest to largest and picking the farm size at the middle hectare (the standard median focuses on the middle farm). By use of the measure, half of all land (rather than farms), is on farms smaller than the **land median**, and half of land is on bigger farms, thus capturing the typical acre of farmland.

Two other thresholds were employed, namely the acre weighted mean and acre weighted median, after choosing as threshold the farm sizes, which correspond to the mean and median acre of the cumulative land size variable, respectively. These latter thresholds however, by construction closely correspond to the associated mean and median farm size thresholds and are not considered as having valuable informational content to add in the analysis. Conditional on the land distribution and the typical size of the farms within a country, the

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<sup>4</sup> FAO is employing this type of criteria to classify farms in Asia in six categories: Small subsistence-oriented family farms; Small semi-subsistence or part-commercial family farms; Small independent specialized family farms; Small dependent specialized family farms, often with the family as tenants; Large commercial family farms, usually specialized and operated along modified estate lines; Commercial estates, usually mono-crop and with hired management and absentee ownership.

<sup>5</sup> Key and Roberts (2007a and b), who propose this threshold, name it acre (hectare) weighted median.



land median maybe higher or lower than the 2 hectares threshold, but always equal or higher with respect to the other thresholds used. The replication of the descriptive statistics for the range of thresholds described above provides a robustness check in the discussion of the results.

Doran (1985), suggests a methodology which accounts for the multi-dimensional character of scale, avoiding shortcomings that ad-hoc measures impose. With this methodology, a function  $\Phi(Z)$ , replaces any ad hoc threshold and estimates the cut-off point from the data. Denoting this cut-off point by  $\mu$ , and assuming a cumulative normal distribution for the scale variable then:

$$\Phi(\mu, \sigma) = \Phi[(Z - \mu) / \sigma],$$

where  $Z$  refers to a vector of exogenous characteristics and  $\mu$  and  $\sigma$  to the mean and the standard deviation of  $\Phi$ . At 95 percent confidence interval, small and large farms are those for which holds:

$$Z < \mu - 1.96\sigma \text{ and } Z > \mu + 1.96\sigma, \text{ respectively.}$$

If  $\sigma$  is not statistically significant, then two types of farms can be recognized; small and large, with the cut-off point determined by the data. If  $\sigma$  is significantly different from zero, then there is a third type of farms, in between small and large farms, which maybe thought as farms being in the process of changing technology. This methodology will be implemented in the current dataset in next steps of the research.

Empirical analysis takes place using data from the Rural Income Generating Activities (RIGA), database developed in FAO-ESA the last years. The database consists of a large number of about 25 surveys covering more than 15 developing countries in all continents. A major advantage of the database is the detailed and consistent methodology employed to construct the income sources and the associated aggregates (Davis et. al. 2007)<sup>6</sup>.

In table 1a, the distribution of rural population with respect to the different land thresholds is presented. In table 2 the average land size (in hectares) for each farm type classification and threshold are presented. The proportion of population identified as small scale farmer varies strongly by country and definition. The un-weighted average population of small scale farmers across all countries varies between 35% when the median farm size is used as threshold, to 61% when the land median threshold is employed.

With respect to the average farm size, similar discrepancies are also evident. In the small countries of Albania, Nepal and Tajikistan, the 2 hectares threshold classifies as small scale farmers almost all rural farmers. Inarguably, these wide discrepancies are able to lead to very different results and conclusions regarding the advantages and constraints small scale farmers face. Moreover policy implications will differ as well. The analysis continues from now on only with the land median classification of farmers. Nevertheless, all analysis has been replicated for each one of the thresholds.

Land distribution issues become evident when table 1a is associated with table 1b, which presents the share of rural land operated by each group (across different land thresholds). Focusing only on land median we see that land is distributed unevenly in Bangladesh<sup>7</sup>,

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<sup>6</sup> More information can be found in: [HTTP://WWW.FAO.ORG/ES/ESA/RIGA/](http://www.fao.org/es/esa/riga/)

<sup>7</sup> All results referring to Bangladesh need to be considered with caution as the constructed variables are still under review.

Nicaragua and Guatemala, where about 10 percent of the rural population are large holders operating about 50 percent of the land. In Malawi, small holders being 77% of the rural population operate about 51 percent of the land.

In table 3 some descriptive statistics are presented with respect to the demographic characteristics of the farming households classified by the land median threshold. Average household size of small scale farmers is always smaller than large holders and the differences are significant at 1 percent level in most of the country cases. The smaller size of small holders' households is actually observed irrespective of the threshold employed with a small number of insignificant exceptions when the farms mean or median are used. Finally, landless households are characterized by even smaller household sizes.

With respect to the education of the household head, in small scale farm household heads appear as getting significantly lower education than large holders in most of the cases and across different thresholds employed. The only statistically significant exception, consistent across thresholds, is the case of Vietnam where small farmers stay at school about a year more than large holders. In households without land, education is even lower, with the exception of the two Latin American countries and Malawi. With respect to the gender of the household head, the majority of small scale farms are headed by women but the differences are statistically significant in three countries. Only in Albania the proportion of men headed households is significantly higher in small farms. Again this pattern is similar across different types of thresholds.

In table 4, characteristics of the average farmer are presented with respect to their access and use to farm capital, inputs and infrastructure. Livestock, in tropical units, is always less in small relative to large farms. Bangladesh is the only exception so far, where the outcome is threshold sensitive. When land median and the 2 hectares threshold are used, small farmers appear owning more livestock and the difference in the average number of units is significant at 5 percent level, in the latter case. When information is available, use of motorized machinery in farming, is always smaller (irrespective of threshold) in small scale farms.

The infrastructure index tries to capture a range of associated services (education, health and other public facilities), onto which households have or do not have access. The index has been computed for the RIGA data from Zezza et. al. (2007). In Bangladesh, Malawi and Nepal, small holders, have significantly less access to infrastructure services relative to large holders. The contrary happens for Guatemala and Vietnam.

In landless households, access to infrastructure services is always higher, signifying maybe that they live in better equipped areas (rural towns). This pattern is observed across the different thresholds employed, though with varying degrees of significance. In the bottom panel of table 4, data on the average use of organic, inorganic fertilizers as well as herbicides and insecticides, are presented. In most of the cases a smaller proportion of small scale farmers use some kind of the inputs irrespective of the threshold. Only in Vietnam the pattern is reversed for the use of chemical fertilizer; nevertheless this latter observation is absent of implications as almost all farming households use this type of fertilizer.

In table 5, the importance of the different sources on the yearly income flow, for the average household are presented. In the upper panel the crop and livestock average shares while in the lower panel the average farm and off-farm income shares are shown. The use of the land median, which, as discussed earlier, is the higher land threshold of the ones used in the

analysis, is associated with the highest average contribution of farm income and its components (livestock and crop), to total household income. Nevertheless, the differences are in the range of some percentage points for all thresholds, but the 2 hectares one, where differences may be even above 20 percentage points.

In two countries (Malawi and Tajikistan), the average contribution of farm to total yearly income of small holders, exceeds 50 percent. In all other countries average farm income contributes about 30 - 40 percent, to yearly income, the lowest being in Guatemala (26 percent). These proportions are always lower in comparison with large holders and across different thresholds (with the exception of Bangladesh). Such a pattern seems to imply a positive correlation between land holdings and specialization in farm related income generating activities.

Table 6, presents the distribution of the different sources of income within the rural population. In association with the population statistics from table 1, some observations on the degree of equity can be drawn regarding the distribution of the income sources in the rural economy between landless, small holders and large holders. With respect to crop income, it is observed that in three countries, namely Vietnam, Nicaragua and Guatemala, while small holders constitute 73, 41 and 46 percent of the rural population; they generate 93, 67 and 62 percent of crop income, respectively. In these three countries crop income contributes to about 1/5 to 1/3 on average, on household income.

In the rest of the countries, generated crop income is more or less in the same range with the proportion of small scale farmers in the rural population. The pattern for Vietnam, Nicaragua and Guatemala is partly reversed when livestock income is considered, giving at last a relatively equal distribution of farm income in general, within the rural population. Again, this pattern is observed across the different thresholds employed in the current analysis.

In tables 7a and 7b, the contribution of income sources to the total income generated in the rural and the national economy, respectively, are presented. In Malawi and Tajikistan about 40 and 30 percent of rural income comes from small holders' crop income. When livestock income is added then in these two countries small holders' farm income contribution to total rural income approaches 50 percent.

Moreover a second group of countries (Albania, Nepal, Nicaragua and Vietnam), this contribution is around 20 percent of rural income. Only in Bangladesh and Guatemala, small holder's farm income contribution hardly approaches 10 percent. The projections to national income are similar as again in Malawi and Tajikistan rural farm income from small holders is about 50 percent of national income, while the rest of the countries follow, with smaller but significant proportional contributions of small holders' farm and off farm income in national income.

Finally, in table 8 the share of expenditures spent on food is presented. The evidence can be judged as mixed given that in Albania, Nepal and Vietnam, small holders spend significantly more on food on average, while on the other hand in Guatemala and Tajikistan, the opposite happens (but the differences are insignificant). The associated poverty rates are presented in table 9. In Guatemala and Tajikistan poverty rates for small farmers are lower but only in the former country the difference is significant. In all other countries poverty rates among small holders are higher relative to large holders.

With respect to the landless households the evidence is mixed across countries. In some cases poverty rates are highest for this group (Albania and Bangladesh), but in other cases the rates are lowest or between small holders and large holders. The patterns described above for food consumption and poverty rates are consistent in most cases across the different thresholds used in the analysis.

## **5 Conclusions**

The present paper is one of the few attempts in the literature that try to directly identify and characterize small scale farmers in developing countries. Ad hoc measures are applied to household survey data from several developing countries to categorize rural households as landless, small holders and large holders using a one-dimensional proxy variable to account for size (land). Following research steps will try to address the issue of dimensions in characterizing small scale farmers, trying to take into account a series of characteristics which will provide more reliable classification outcomes.

Nevertheless, results so far provide some preliminary evidence regarding the characteristics of the average small farmer in the selected countries. Lower average education of the household head but also lower number of individuals resides in a typical small farming household relative to a large farm. Farm income highly contributes to yearly income flows of small holders especially in poorer countries (Malawi and Tajikistan). With respect to the farming characteristics, lower proportion of input and capital use as well as lower access to infrastructure services characterize small farmers. Lower access and use of inputs and services seems to be manifested in greater poverty rates among small holders.

Finally, the paper assesses on the economic weight of small farmers in the rural and the national economy of the countries analyzed in the survey. Farm income (crops plus livestock), is the major income source in poorer countries. In Malawi and Tajikistan about 45 percent of total rural income comes from the farm income of small scale farmers. In the whole sample of countries, the associated share is about 25 percent (un-weighted average). In the national economy the contribution of off-farm income generating activities from small farmers is about 20 percent (un-weighted average across countries). The contribution of large holders appears to be for all thresholds employed in the current analysis much smaller.

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## 7 Appendix of tables

Table 1a. Distribution of rural population by farm size threshold (% of population to rural population)

	2 hectares			Mean			Median			Share of rural in total population
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder	
Albania	6%	88%	6%	6%	51%	44%	6%	43%	51%	56%
Bangladesh <sup>10</sup>	45%	52%	4%	45%	37%	19%	45%	28%	28%	75%
Guatemala	44%	13%	43%	44%	34%	22%	44%	24%	32%	52%
Malawi	8%	69%	24%	8%	64%	28%	8%	42%	51%	89%
Nepal	14%	78%	9%	14%	53%	33%	14%	38%	49%	88%
Nicaragua	54%	10%	36%	54%	35%	11%	54%	23%	23%	45%
Tajikistan	10%	90%	0%	10%	59%	30%	10%	44%	46%	73%
Vietnam	15%	77%	8%	15%	60%	25%	15%	40%	45%	77%

	Land Median			Hectare weighted Mean			Hectare weighted Median		
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder
Albania	6%	69%	25%	6%	49%	45%	6%	43%	52%
Bangladesh	45%	46%	9%	45%	34%	22%	39%	29%	32%
Guatemala	44%	46%	10%	44%	31%	25%	44%	24%	32%
Malawi	8%	77%	16%	8%	52%	41%	8%	41%	51%
Nepal	14%	69%	18%	14%	47%	39%	14%	38%	49%
Nicaragua	54%	41%	5%	54%	33%	13%	54%	23%	23%
Tajikistan	10%	69%	20%	10%	50%	39%	10%	43%	47%
Vietnam	15%	73%	12%	15%	54%	31%	15%	40%	45%

<sup>10</sup> All results referring to Bangladesh need to be considered with caution as the constructed variables are still under review.

Table 1b. Distribution of rural land by farm size threshold

	2 hectares			Mean			Median		
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder
Albania	0%	83%	17%	0%	23%	77%	0%	17%	83%
Bangladesh	0%	68%	32%	0%	26%	74%	0%	14%	86%
Guatemala	0%	4%	96%	0%	27%	73%	0%	14%	86%
Malawi	0%	41%	59%	0%	35%	65%	0%	17%	83%
Nepal	0%	66%	34%	0%	29%	71%	0%	15%	85%
Nicaragua	0%	2%	98%	0%	23%	77%	0%	8%	92%
Tajikistan	0%	100%	0%	0%	39%	61%	0%	24%	76%
Vietnam	0%	65%	35%	0%	32%	68%	0%	16%	84%

  

	Land Median			Hectare weighted Mean			Hectare weighted Median		
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder
Albania	0%	46%	54%	0%	24%	76%	0%	17%	83%
Bangladesh	0%	50%	50%	0%	22%	78%	0%	13%	87%
Guatemala	0%	53%	47%	0%	23%	77%	0%	13%	87%
Malawi	0%	51%	49%	0%	24%	76%	0%	17%	83%
Nepal	0%	49%	51%	0%	23%	77%	0%	15%	85%
Nicaragua	0%	50%	50%	0%	19%	81%	0%	8%	92%
Tajikistan	0%	53%	47%	0%	30%	70%	0%	23%	77%
Vietnam	0%	55%	45%	0%	26%	74%	0%	16%	84%



Table 2. Average farm size (hectares)

	2 hectares			Mean			Median		
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder
Albania	0	0.76***	2.40***	0	0.37***	1.41***	0	0.32***	1.31***
Bangladesh	0	0.51***	3.08***	0	0.27***	1.58***	0	0.19***	1.26***
Guatemala	0	0.95***	9.23***	0	2.64***	15.60***	0	1.74***	11.99***
Malawi	0	0.58**	16.79***	0	0.79***	4.04***	0	0.55***	2.74***
Nepal	0	0.61***	3.47***	0	0.37***	1.79***	0	0.27***	1.40***
Nicaragua	0	1.02***	18.21***	0	4.16***	44.75***	0	2.13***	26.81***
Tajikistan	0	0.16		0	0.09***	0.32***	0	0.07***	0.26***
Vietnam	0	0.47***	3.27***	0	0.29***	1.82***	0	0.20***	1.22***

  

	Land Median			Hectare weighted Mean			Hectare weighted Median		
	Landless	Small holder	Large holder	Landless	Small holder	Large holder	Landless	Small holder	Large holder
Albania	0	0.54***	1.73***	0	0.39***	1.43***	0	0.32***	1.31***
Bangladesh	0	0.41***	2.32***	0	0.25***	1.47***	0	0.18***	1.21***
Guatemala	0	4.08***	23.83***	0	2.39***	14.57***	0	1.73***	11.98***
Malawi	0	0.97***	5.78***	0	0.65***	3.18***	0	0.55***	2.73***
Nepal	0	0.50***	2.48***	0	0.33***	1.62***	0	0.27***	1.40***
Nicaragua	0	7.77***	73.94***	0	3.65***	40.12***	0	2.13***	26.81***
Tajikistan	0	0.10***	0.39***	0	0.08***	0.28***	0	0.07***	0.26***
Vietnam	0	0.42***	2.73***	0	0.26***	1.58***	0	0.20***	1.22***

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

Table 3<sup>11</sup>. Demographic characteristics of rural households

	Household size				Education				Male headed households			
	Landless	Smallholder	Large holder	Total	Landless	Smallholder	Large holder	Total	Landless	Smallholder	Large holder	Total
Albania	4.27	4.44	4.5	4.44	6.38	6.91*	7.35***	6.99	0.47	0.50***	0.49***	0.5
Bangladesh	4.55	5.10***	5.78***	4.89	1.71	2.97***	4.83***	2.51	0.48	0.5	0.51	0.49
Guatemala	5.11	5.48	8.07***	5.49	2.90	2.19*	2.36*	2.54	0.48	0.48**	0.50**	0.48
Malawi	3.97	4.39***	5.54***	4.5	5.19	3.30***	4.09***	3.56	0.53	0.48***	0.50***	0.49
Nepal	4.74	5.21***	6.37***	5.31	1.67	2.54***	4.07***	2.63	0.48	0.46	0.47	0.47
Nicaragua	5.35	6.34	6.88	5.78	3.19	2.55*	2.98*	2.94	0.50	0.52	0.55	0.51
Tajikistan	6.34	6.85***	8.42***	7.06	6.18	6.75	6.72	6.68	0.49	0.49	0.49	0.49
Vietnam	3.99	4.46***	5.68***	4.49	5.28	5.78***	4.80***	5.58	0.49	0.49***	0.52***	0.49

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

<sup>11</sup> The land median threshold is used in all tables hereafter.

**Table 4a. Farming characteristics of rural households**

	TLU		Mechanisation		Infrastructure access index	
	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder
Albania	1.22	1.50***	1.92***	0.04	0.17***	0.28***
Bangladesh	0.73	0.74	0.71			
Guatemala	1.26	1.16***	2.23***			
Malawi	0.15	0.26***	0.73***	0.04	0.02 ***	0.08 ***
Nepal	0.94	1.87***	2.59***			
Nicaragua	1.65	3.78***	14.73***	0.13	0.48 ***	0.76 ***
Tajikistan				0	0.04	0.05
Vietnam	14.01	51.41***	62.80***	0.23	0.45***	0.46***
Tests in average differences refer to small holders relative to large holders. ***, ** and * correspond to 1%, 5% and 10% levels of significance.						
				0.47	-0.01	-0.08
				0.03	-0.04*	0.04*
				0.08	-0.04***	-0.30***
				0.76	-0.09***	0.00***
				0.06	-0.03***	0.12***
				0.11	-0.16	-0.18
				0.19	-0.03	-0.01
				0.47	-0.00***	-0.51***

**Table 4b. Farming characteristics of rural households**

	Chemical Fertiliser		Organic Fertiliser		Herbicides-Pesticides	
	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder
Albania	0.09	0.87***	0.93***	0.09	0.86 ***	0.93***
Bangladesh						
Guatemala						
Malawi	0.28	0.66***	0.79***	0.26	0.59 ***	0.72***
Nepal						
Nicaragua	0.2	0.39	0.38	0.04	0.07	0.07
Tajikistan	0.12	0.27***	0.49***	0.15	0.23 ***	0.33***
Vietnam	0.86	0.99***	0.96***	0.32	0.91***	0.83***
Tests in average differences refer to small holders relative to large holders. ***, ** and * correspond to 1%, 5% and 10% levels of significance.						
				0.02	0.45 ***	0.70 ***
				0.01	0.03 ***	0.08 ***
				0.2	0.45 ***	0.63 ***
				0	0.02**	0.04**
				0.32	0.91***	0.83***

**Table 5a. Contribution of income sources to yearly income flow (average proportion)**

	Share from crop income (average)			Share from livestock income (average)		
	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder
Albania	0.05	0.19**	0.16**	0.02	0.23	0.30***
Bangladesh	0.17	0.29	0.21	0.15	0.17	0.16
Guatemala	0.09	0.32***	0.43***	0.02	0.04***	0.06***
Malawi	0.27	0.59***	0.67***	0.05	0.08***	0.13***
Nepal	0.00	0.20***	0.30***	0.05	0.18***	0.22***
Nicaragua	0.10	0.39	0.35	0.07	0.20***	0.33***
Tajikistan	0.28	0.4	0.42	0.11	0.13***	0.19***
Vietnam	0.02	0.41***	0.70***	0.07	0.05***	0.08***

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

**Table 5b. Contribution of income sources to yearly income flow (average proportion)**

	Share from on-farm income (average)			Share from off-farm income (average)		
	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder
Albania	0.07	0.42**	0.46**	0.93	0.58**	0.54**
Bangladesh	0.32	0.46	0.38	0.74	0.54	0.62
Guatemala	0.11	0.37***	0.49***	0.89	0.63***	0.51***
Malawi	0.32	0.68***	0.80***	0.68	0.32***	0.20***
Nepal	0.05	0.38***	0.53***	0.95	0.62***	0.47***
Nicaragua	0.18	0.59*	0.68*	0.82	0.41*	0.32*
Tajikistan	0.39	0.53***	0.61***	0.61	0.47***	0.39***
Vietnam	0.09	0.46***	0.78***	0.91	0.54***	0.22***

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

**Table 6. Distribution of income sources in the rural economy.**

	Rural crop income distribution			Rural livestock income distribution			Rural income distribution		
	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder	Landless	Smallholder	Large holder
Albania	1%	70%	28%	1%	63%	37%	8%	65%	27%
Bangladesh	42%	49%	9%	45%	47%	8%	50%	42%	7%
Guatemala	21%	62%	17%	29%	54%	17%	54%	39%	7%
Malawi	4%	76%	20%	5%	70%	25%	10%	72%	17%
Nepal	0%	71%	29%	5%	73%	23%	13%	67%	20%
Nicaragua	26%	67%	7%	30%	57%	13%	60%	35%	5%
Tajikistan	5%	71%	23%	6%	69%	25%	7%	71%	22%
Vietnam	1%	93%	6%	18%	64%	18%	25%	69%	6%

**Table 7a. Contribution of income sources to the rural income (aggregate)**

	Proportion of crop to total rural income			Total	Proportion of farm to total rural income			Total
	Landless	Smallholder	Large holder		Landless	Smallholder	Large holder	
Albania	0%	10%	4%	14%	0%	19%	10%	14%
Bangladesh	3%	3%	1%	6%	7%	7%	1%	6%
Guatemala	3%	9%	2%	14%	4%	10%	3%	14%
Malawi	2%	41%	11%	54%	3%	48%	13%	54%
Nepal	0%	10%	4%	15%	1%	22%	8%	15%
Nicaragua	4%	11%	1%	16%	8%	18%	3%	16%
Tajikistan	2%	28%	9%	40%	4%	43%	15%	40%
Vietnam	0%	18%	1%	19%	2%	22%	3%	19%

**Table 7b. Contribution of income sources to the national income (aggregate)**

	Rural farm income as a proportion of national income				Rural off-farm income as a proportion of national income			
	Landless	Smallholder	Large holder	Total	Landless	Smallholder	Large holder	Total
Albania	0%	8%	4%	12%	3%	19%	7%	30%
Bangladesh	4%	4%	1%	9%	25%	20%	4%	49%
Guatemala	1%	3%	1%	6%	17%	10%	1%	29%
Malawi	2%	39%	11%	52%	6%	20%	3%	30%
Nepal	1%	17%	6%	23%	10%	34%	9%	53%
Nicaragua	2%	5%	1%	8%	15%	5%	1%	20%
Tajikistan	3%	33%	11%	47%	3%	22%	6%	30%
Vietnam	1%	13%	2%	16%	14%	28%	2%	43%

**Table 8. Proportion of expenditures spent on food (average)**

	Share of expenditures spent on food (average)		
	Landless	Smallholder	Large holder
Albania	59%	64%**	61%**
Bangladesh			
Guatemala	39%	43%	46%
Malawi	57%	61%*	60%
Nepal	55%	56%***	50%***
Nicaragua			
Tajikistan	67%	68	70
Vietnam	47%	52%***	51%***

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

**Table 9. Proportion of expenditures spent on food (average)**

	Poverty headcount		
	Landless	Smallholder	Large holder
Albania	0.28	0.2*	0.16*
Bangladesh	0.44	0.42*	0.38*
Guatemala	0.43	0.51	0.56
Malawi	0.27	0.50 ***	0.39 ***
Nepal	0.35	0.31 ***	0.14 ***
Nicaragua	0.56	0.65**	0.53**
Tajikistan	0.69	0.67**	0.72**
Vietnam			

Tests in average differences refer to small holders relative to large holders. \*\*\*, \*\* and \* correspond to 1%, 5% and 10% levels of significance.

**Table 10. GDP PC in PPP, Sample information and thresholds.**

Survey year	GDP PC, 2005 PPP (\$)	Observations	2 hectares	Mean	Median	Thresholds (Ha)			
						Land Median * Equivalent	Farm Median * Equivalent	Acre- weighted Mean * Equivalent	Farm Median * Equivalent
Malawi	650	11102	2	1.66	1.00	7357.00	2.63	3454.00	2426.00
Nepal	926	5000	2	0.82	0.53	1263.00	1.30	614.91	407.90
Bangladesh	1068	10080	2	0.70	0.40	1169.00	1.30	520.00	302.00
Tajikistan	1283	4146	2	0.17	0.13	190.73	0.21	107.72	80.13
Vietnam	1780	29530	2	0.76	0.37	7042.00	1.51	3072.50	1882.89
Nicaragua	2145	4151	2	14.90	5.00	6319.50	41.27	2117.00	917.40
Guatemala	3963	13683	2	7.08	4.01	12976.00	13.03	5650.00	3199.00
Albania	6079	3635	2	0.79	0.62	607.60	1.20	348.00	236.00

Source: World Bank

\* Threshold refers to cumulative land operated