

BACKGROUND PAPER

FOR THE WORLD DEVELOPMENT REPORT 2008

**Rural Household Access to Assets and
Agrarian Institutions:
A Cross Country Comparison**

Alberto Zezza, Paul Winters, Benjamin Davis, Gero Carletto, Katia Covarrubias, Esteban Quinones, Kostas Stamoulis, Takis Karfakis, Luca Tasciotti, Stefania DiGiuseppe and Genny Bonomi

The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Development Report 2008 Team, the World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

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Alberto Zezza (FAO), Paul Winters (American University), Benjamin Davis (FAO), Gero Carletto (World Bank), Katia Covarrubias (FAO), Esteban Quinones (FAO), Kostas Stamoulis (FAO), Takis Karfakis (FAO), Luca Tasciotti (FAO), Stefania DiGiuseppe (FAO) and Genny Bonomi (FAO)

Abstract

Access to assets and agrarian institutions is of critical importance to the economic viability of rural households. Understanding the extent of this access and how it links to the ability of rural households to employ different pathways out of poverty is thus vital for designing rural development policies. This paper characterizes household access to assets and agrarian institutions through the comparative analysis of datasets from 15 nationally representative household surveys from four regions of the developing world. We find that the access of rural households to a range of assets (including education, land and livestock) and institutions is in general low, though highly heterogeneous across countries, and by categories of households within countries. A large share of rural agricultural households do not use or have access to basic productive inputs, agricultural support services or output markets, and in general it is the landless and the smallest landowners who suffer significantly more from this lack of access.

June 4, 2007

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I. Introduction¹

The objective of this Background Paper is to describe the asset position of rural households in a sample of developing countries, to document access to agrarian institutions and to characterize the heterogeneity of access to these assets and institutions. Particular attention is paid to the analysis of access to assets and to agrarian institutions by households with lower economic standing and the identification of relevant regional or other patterns. Analysis is based on the Rural Income Generating Activities (RIGA) database. The database consists of data from nationally representative household surveys in 15 countries, from four regions of the developing world. The database was created primarily to construct comparable income aggregates for a range of developing countries, but includes information on agricultural production, market participation and on access to agrarian institutions and various types of assets. It also includes consumption expenditure variables that have been also constructed in a comparable manner and allows for comparisons of variables across socioeconomic status. Although a significant amount of theoretical and empirical work has been devoted to the analysis of assets and agrarian institutions, we are not aware of any cross-country study that has carried out this type of analysis in such a large cross section of countries using internally consistent data.

The remaining sections of the paper are organised as follows. Section 2 describes the RIGA database used for the analysis and discusses the approach taken in using the data for the purposes of the paper. Section 3 then focuses on household ownership of the key assets that are considered most important for escaping poverty: household labour, education, land, livestock and infrastructure. Section 4 begins the examination of agrarian institutions by analyzing the utilization of productive inputs which we consider as reflecting access to and functioning of markets for such inputs. This is followed in section 5 by an examination of the participation of agricultural households in output markets. In section 6 we characterize the support provided to rural households in terms of technology delivery, extension services and credit access, all of which are areas where governments have historically provided support to agricultural households. Section 7 presents some concluding remarks.

II. The RIGA database and the analytical approach

The analysis presented in this background paper utilizes the RIGA database, which is constructed from a pool of several dozen Living Standards Measurement Study (LSMS) and other multi-purpose household surveys made available by the World Bank through a joint project with FAO.² From this pool of possible surveys, the choice of particular countries was guided by the desire to ensure geographic coverage across the four principal development

¹ The views expressed in this paper are those of the authors and should not be attributed to the institutions with which they are affiliated. We would like to thank Karen Macours, Alain de Janvry, Elisabeth Sadoulet, Derek Byerlee and Gustavo Anriquez for constructive suggestions on the analysis of the data. We would also like to thank participants at AES meetings in Reading for comments and discussion.

² Details on the project and the dataset can be found at http://www.fao.org/es/ESA/riga/index_en.htm.

regions – Asia, Africa, Eastern Europe and Latin America, as well as adequate quality and sufficient comparability in codification and nomenclatures. Furthermore, an effort was made to include a number of IDA (International Development Association) countries as these represent developing countries with higher levels of poverty and are therefore of particular interest to the development and poverty reduction debate.

Using these criteria, survey data from the list of countries in Table 1 were utilized. While clearly not representative of all developing countries, the list does represent a significant range of countries and regions and has proved useful in providing insights into the fundamental aspects of livelihood strategies of rural households in the developing world. A more detailed description of the dataset can be found in Table AI.1 in Appendix I.

Table 1. Countries included in the analysis

Eastern Europe	Africa	Latin America	Asia
Albania, 2005	Ghana, 1998	Guatemala, 2000	Bangladesh, 2000
Bulgaria, 2001	Madagascar, 1993	Ecuador, 1995	Indonesia, 2000
	Malawi, 2004	Nicaragua, 2001	Nepal, 1996
	Nigeria, 2004	Panama, 2003	Pakistan, 2001
			Vietnam, 1998

Each survey is representative for both urban and rural areas, and most of the analysis focuses on rural households. Nevertheless, it is important to be clear about what the definition of rural and correspondingly which households are considered rural households for the analysis. Countries generally have their own mechanisms for determining what constitutes rural and urban and these definitions often vary. Differences in results across countries may be driven by the fact that rural is not being defined in the same way. While this potential problem is recognized, the available data do not allow for an alternative definition of rural. Furthermore, it may make sense to use government definitions of rural since presumably this definition reflects local information and also the definition used to administer government programs. Households defined as rural in this analysis are thus those defined as such by each individual government.

Rural households need not be agricultural households,³ and in some cases whether a rural household has access to certain assets or agrarian institutions may not be a relevant consideration. For example, for some analyses, such as the use of agricultural inputs, the interest may only be in examining agricultural households or even those who produce crops or livestock. Thus for each analysis conducted in this paper, we use an appropriate definition of the population included and are careful to note the specific population of households with which we are concerned.

We analyze various dimensions of heterogeneity of access. A first dimension is rural vs. urban, for such assets as education. This allows us to address whether rural households are reaching similar levels of education and have similar degrees of access to education as their

³ Here we define agricultural households as those with non zero income from crop and livestock activities. Urban households with agricultural production are not included.

urban counterparts in a given country, and whether policies reflect an urban bias. A second dimension is across expenditure quintiles which serve as a proxy of well-being of rural households, thus allowing a comparison of access across poorer versus richer households. Comparable expenditure data, constructed using standard LSMS methodology, are available in all of the data sets. A third dimension is by gender, which allows a determination of whether there is systematic differences in ownership of assets such as education between men and women or by male and female headed households. A fourth dimension of comparing households is by examining a particular asset to see if those with greater accumulation of that asset, such as land, have similar access to other assets or agrarian institutions. Finally, by virtue of examining data across a range of countries, we can also assess the heterogeneity of household variables across countries and regions.

In each of these cases, the objective is to identify the existence and degree of heterogeneity of access and establish conditions under which access varies. It should be noted, however, that in all of these comparisons establishing causality is difficult; what we are presenting are associations. Furthermore, it is also difficult to establish the reasons why heterogeneity exists in a particular context. As with any descriptive cross sectional analysis of this type, the inferences made in this paper serve to characterize heterogeneity of access, but cannot identify the factors which generate this heterogeneity.

III. Household access to key assets

In this section, we examine the access of rural households to five key assets: i) household labour, ii) human capital as measured by education levels, iii) land, iv) livestock and v) infrastructure.

i. Household labour

One basic asset to which all households have access for generating income is their own labour. For poor households, this is sometimes their only asset. Given the importance of this asset, we explore the relative availability of household labour for rural households compared to their urban counterparts. We also compare the share of the labour that is female in order to evaluate whether a feminization of rural labour has occurred, due to male out-migration and other factors such as HIV/AIDS. The total size of the household and the number of dependents is also examined to identify the number of people relying on each labour unit for their welfare needs.

As can be seen in Table 2, rural households are larger on average than urban households in all countries, with the exception of Indonesia, but the number of working age adults—defined as between 15-60 years of age—is often smaller (in 9 of 15 countries). As a result, rural dependency shares—defined as the number of dependents divided by total household size—are consistently higher than similar shares for urban households in every country analysed here. Rural labourers support more dependents than their urban counterparts.

We also find evidence of a consistent negative correlation between per capita expenditure and dependency ratios. Poorer rural labourers therefore tend to have to support the highest number of dependents. As can be seen in Table 3, for all countries except Bangladesh the average number of working age adults decreases across expenditure quintiles. At the same time, for all countries the share of dependents declines with wealth status. Taken together the results indicate that poorer households are larger with greater dependency ratios than wealthier households.

Table 2. Household labour, by rural/urban

	Total HH Size			# HH labour (members 15-60 years old)			Share of dependents in HH (%)			Female Labour Share (female/total) (%)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Africa												
Ghana 1998	3.9	4.5	4.3	2.1	2.1	2.1	39.7	49.1	45.7	55.4	52.8	53.7
Madagascar 1993	4.8	4.9	4.9	2.7	2.4	2.4	39.7	46.9	45.6	51.5	50.3	50.5
Malawi 2004	4.2	4.5	4.5	2.4	2.1	2.2	37.0	49.0	47.5	48.3	51.3	50.9
Nigeria 2004	4.7	4.9	4.8	2.9	2.9	2.9	36.0	38.7	37.6	50.3	52.2	51.4
Asia												
Bangladesh 2000	5.1	5.2	5.2	3.0	2.7	2.8	39.3	45.7	44.4	48.8	48.7	48.7
Indonesia 2000	4.2	4.1	4.1	2.7	2.4	2.5	32.4	40.4	36.8	50.7	50.5	50.5
Nepal 1996	5.4	5.7	5.6	3.0	2.9	2.9	40.5	47.3	46.8	50.8	52.7	52.6
Pakistan 2001	6.9	7.0	7.0	3.8	3.4	3.5	42.2	49.4	47.3	49.4	51.5	50.9
Vietnam 1998	4.3	4.8	4.7	2.8	2.6	2.7	37.3	45.1	43.2	52.4	51.7	51.9
Eastern Europe												
Albania 2005	3.8	4.4	4.1	2.4	2.6	2.5	37.9	41.6	39.8	52.7	52.0	52.3
Bulgaria 2001	3.0	3.1	3.0	1.9	1.7	1.9	39.7	52.8	44.1	51.5	49.7	51.0
Latin America												
Ecuador 1995	4.4	5.0	4.6	2.6	2.5	2.6	39.4	48.3	42.7	53.0	48.6	51.2
Guatemala 2000	4.6	5.6	5.2	2.5	2.6	2.6	43.1	51.4	47.8	53.7	51.2	52.1
Nicaragua 2001	5.0	5.7	5.2	2.9	2.9	2.9	40.2	47.5	43.0	53.4	48.7	51.4
Panama 2003	3.8	4.5	4.0	2.3	2.4	2.3	36.8	45.0	39.7	52.9	50.0	51.7

The last columns of Table 2 show the gender composition of rural and urban working age adults which allow a rough, though suggestive, cross country comparison with the literature examining the issue of increasing feminization of agriculture (Lastarria-Cornhiel, 2006; Deere, 2005)⁴. The data in Table 2 show that while in a few cases in Africa and Asia female working age adults are the majority in rural areas, this is far from a generalized phenomenon. Comparing rural and urban figures, in several countries feminization of the working age population seems to be the case in urban areas. This is particularly true in Latin America, but also in Ghana, Vietnam and Albania – possibly due to a male bias in international migration out of urban areas. There is also no clear discernable pattern across expenditure quintiles in Table 3. In only a few cases—Malawi, Bangladesh, and Vietnam—do the poorer quintiles appear to have greater feminization rates. The results, albeit the product of a rough glance, offer little support for a general feminization of agriculture or of rural poverty.

⁴ Our data however refer to the composition of the working age population only. We do not analyse actual participation in the labour force, nor sector of occupation.

Table 3. Rural household labour endowment, female labour share and dependency, by expenditure quintiles

	Household Per Capita Expenditure Quintiles											
	# HH labour (members 15-60 years old)						Female Labour Share (%) (female/total)					
	1	2	3	4	5	All	1	2	3	4	5	All
Africa												
Ghana 1998	2.6	2.4	2.2	2.0	1.4	2.1	52.0	54.1	53.9	52.6	49.6	52.8
Madagascar 1993	2.6	2.5	2.4	2.2	2.1	2.4	50.2	51.5	52.0	49.6	46.8	50.3
Malawi 2004	2.4	2.2	2.1	2.1	1.8	2.1	53.2	52.1	51.7	49.0	48.4	51.3
Nigeria 2004	3.7	3.2	2.9	2.6	1.9	2.9	52.5	51.4	51.9	53.7	51.7	52.2
Asia												
Bangladesh 2000	2.4	2.6	2.8	2.8	2.9	2.7	51.5	50.1	47.9	46.2	48.4	48.7
Indonesia 2000	2.7	2.6	2.4	2.3	2.1	2.4	50.1	50.1	50.9	51.6	49.5	50.5
Nepal 1996	3.0	3.1	2.8	2.8	2.6	2.9	53.2	52.4	52.7	53.4	51.3	52.7
Pakistan 2001	3.6	3.6	3.4	3.3	3.0	3.4	51.6	51.8	51.0	51.8	51.5	51.5
Vietnam 1998	2.7	2.7	2.7	2.6	2.5	2.6	53.0	52.0	51.5	51.3	50.5	51.7
Eastern Europe												
Albania 2005	3.1	2.9	2.7	2.4	2.1	2.6	53.6	51.8	51.3	49.8	53.0	52.0
Bulgaria 2001	2.5	1.9	1.4	1.4	1.3	1.7	48.7	50.1	50.8	49.2	50.4	49.7
Latin America												
Ecuador 1995	2.8	2.9	2.6	2.4	2.0	2.5	50.5	47.4	47.0	49.5	48.0	48.6
Guatemala 2000	3.0	2.7	2.6	2.5	2.2	2.6	52.6	49.8	51.4	50.2	51.5	51.2
Nicaragua 2001	3.3	3.2	2.9	2.7	2.3	2.9	47.2	49.2	50.1	48.6	48.8	48.7
Panama 2003	3.2	2.5	2.4	2.0	1.7	2.4	50.8	48.1	51.8	48.8	49.1	50.0

	Share (%) of Dependents in HH Expenditure Quintiles					
	1	2	3	4	5	All
Africa						
Ghana 1998	56.5	55.3	52.9	44.7	36.2	49.1
Madagascar 1993	55.7	51.8	50.8	42.8	33.7	46.9
Malawi 2004	58.7	54.8	51.1	46.0	34.3	49.0
Nigeria 2004	45.4	41.6	38.3	36.3	32.1	38.7
Asia						
Bangladesh 2000	53.9	48.8	44.1	43.0	38.7	45.7
Indonesia 2000	46.6	42.7	41.9	38.5	32.4	40.4
Nepal 1996	54.1	48.8	47.2	46.8	39.4	47.3
Pakistan 2001	58.7	54.5	50.6	44.8	38.3	49.4
Vietnam 1998	52.1	48.0	45.0	42.8	37.4	45.1
Eastern Europe						
Albania 2005	44.4	41.4	40.3	43.0	39.0	41.6
Bulgaria 2001	49.6	48.5	60.1	53.5	52.1	52.8
Latin America						
Ecuador 1995	55.8	53.3	48.2	45.7	38.5	48.3
Guatemala 2000	59.5	56.2	51.6	47.8	42.0	51.4
Nicaragua 2001	54.4	50.6	47.9	44.1	40.2	47.5
Panama 2003	55.6	47.8	42.7	41.9	36.8	45.0

ii. Education

Education is one of the key components of human capital and provides a ‘quality’ dimension to the simple availability of labour described in the previous subsection. As we show in a companion paper (Davis et al., 2007) and as accounted for in a number of empirical papers, education is a key asset determining household ability to access higher return activities (whether in agriculture or outside) and escape poverty⁵. In this section, we examine information concerning both the educational attainment of adults (who we can assume have completed their years of schooling) and current school attendance of children of school age. The first aspect characterizes the educational stock of households, whereas the second gauges how households are currently building their future stock through educational investment in their children.

⁵ See Schultz (1998) for an early review of the main theoretical issues and the empirical evidence.

Figure 1. Educational achievement, urban and rural heads of household

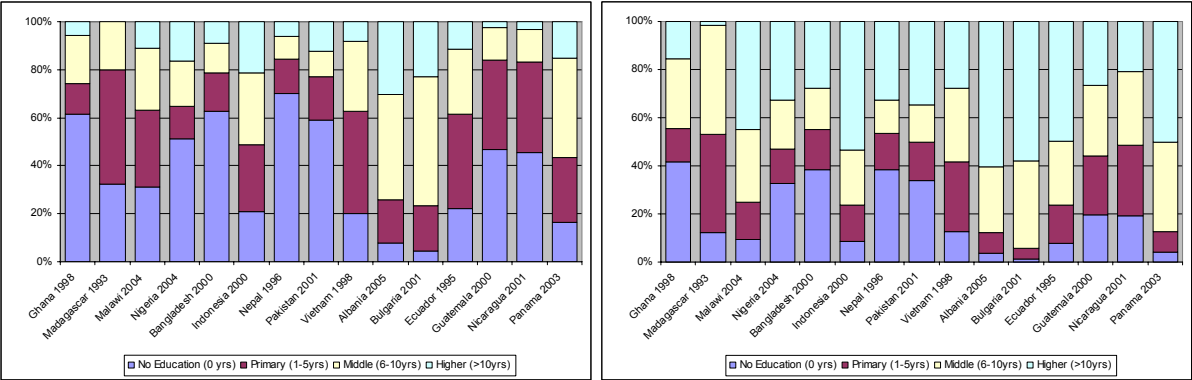


Figure 2. Average years of education, overall and rural heads of households

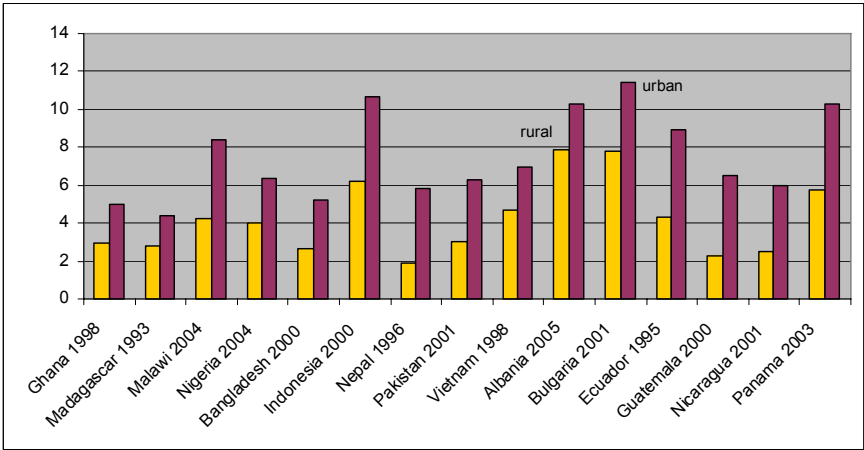


Figure 1 categorises the educational attainment of urban and rural household heads by grouping them into four groups based on the completed number of school years, while Figure 2 reports data on average years of education for household heads in urban and rural areas. A clear picture emerges of low levels of education in rural areas, and striking differences with urban areas. In all the African, Asian and Latin American countries (except Indonesia and Panama) at least 60 percent or more of rural household heads have only completed 5 years of education or less, reaching over 80 percent in Nepal, Guatemala and Nicaragua. In fact, in four countries in our sample, over half of household heads have no education at all. Only in Eastern Europe are education levels reasonably high with approximately 80 percent of the household heads having some post primary education, followed by Panama, Ecuador and Indonesia. The difference in education levels between urban and rural heads of household is particularly evident in Figure 2. Even in rural areas, wide disparities exist by wealth status. As can be seen in Table 4, average years of education for rural heads of household increase substantially over expenditure quintiles.

Table 4. Years of education, rural heads of household, by expenditure quintiles

	Average Household Head Education (Years, Rural Households)					
	Expenditure Quintiles					
	1	2	3	4	5	All
Africa						
Ghana 1998	1.43	2.59	2.86	3.52	4.41	2.96
Madagascar 1993	2.15	2.71	3.03	2.87	3.26	2.80
Malawi 2004	3.00	3.55	4.06	4.64	5.79	4.21
Nigeria 2004	2.59	3.22	3.89	4.73	5.65	4.02
Asia						
Bangladesh 2000	1.17	1.68	2.19	3.23	4.91	2.64
Indonesia 2000	4.43	5.00	5.90	6.98	8.84	6.23
Nepal 1996	0.99	1.23	1.76	2.29	3.20	1.89
Pakistan 2001	1.89	2.37	2.83	3.40	4.53	3.00
Vietnam 1998	3.42	4.28	4.77	5.06	5.88	4.68
Eastern Europe						
Albania 2005	6.63	7.35	8.50	8.13	8.77	7.87
Bulgaria 2001	6.00	7.06	7.89	8.86	9.15	7.79
Latin America						
Ecuador 1995	2.66	3.58	4.40	4.94	5.99	4.31
Guatemala 2000	1.32	1.58	2.03	2.48	3.89	2.26
Nicaragua 2001	1.37	2.03	2.37	2.79	4.03	2.52
Panama 2003	3.36	4.91	5.73	6.41	8.41	5.77
<i>mean</i>	2.83	3.54	4.15	4.69	5.78	4.20
<i>max</i>	6.63	7.35	8.50	8.86	9.15	7.87
<i>min</i>	0.99	1.23	1.76	2.29	3.20	1.89

The education levels of household heads reflect the schooling history of the adults in our sample and suggest past failures in many countries in providing even primary level education. By examining investment in the education of children we can assess whether improvements have been made. This is done by looking at school net attendance rates at the time of each survey.⁶ Table 5 compares net attendance rates across urban and rural areas for the general population and for females. Looking first at the countries with the worse educational record as identified in Figure 1 above, there are some clear cases of improvement, such as in Ghana, Vietnam and Nicaragua where in rural areas 75 to 83 percent of primary school aged children were attending school at the time of the survey. On the other hand several countries show very little sign of improvement. In rural Madagascar still only one in three rural children of primary school age attends primary school. Countries such as Nigeria and Pakistan also show no major sign of improvement with over half of primary school age children in rural areas not attending school. While primary level attendance rates seem to show improvement in some cases, secondary school attendance in rural areas for secondary aged children is low, remaining below 50 percent of the population.

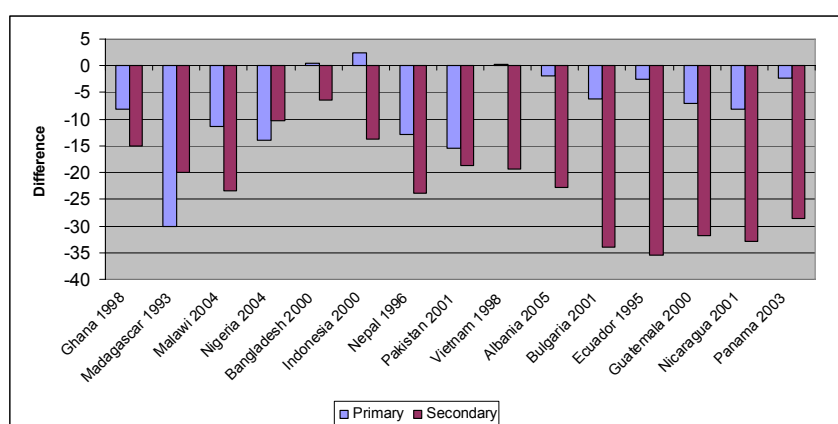
⁶ Net attendance rates measure the number of children in an age category—age 6-11 for primary and 12-17 for secondary—that attend the appropriate level of education over the total population in that age category.

Table 5. Net primary and secondary school attendance rates, by rural/urban and gender

	Primary School				Secondary School			
	Overall Urban	Female Urban	Overall Rural	Female Rural	Overall Urban	Female Urban	Overall Rural	Female Rural
Africa								
Ghana 1998	0.83	0.80	0.75	0.73	0.55	0.53	0.40	0.37
Madagascar 1993	0.63	0.65	0.33	0.34	0.24	0.26	0.04	0.05
Malawi 2004	0.79	0.80	0.68	0.70	0.33	0.35	0.10	0.10
Nigeria 2004	0.51	0.51	0.37	0.37	0.44	0.43	0.34	0.35
Asia								
Bangladesh 2000	0.64	0.64	0.65	0.66	0.45	0.47	0.38	0.42
Indonesia 2000	0.78	0.77	0.81	0.80	0.55	0.54	0.41	0.42
Nepal 1996	0.71	0.76	0.58	0.47	0.54	0.53	0.30	0.23
Pakistan 2001	0.56	0.55	0.41	0.34	0.44	0.45	0.25	0.15
Vietnam 1998	0.83	0.82	0.83	0.82	0.69	0.71	0.50	0.45
Eastern Europe								
Albania 2005	0.91	0.90	0.89	0.89	0.58	0.61	0.35	0.31
Bulgaria 2001	0.92	0.92	0.86	0.84	0.84	0.85	0.50	0.54
Latin America								
Ecuador 1995	0.90	0.91	0.87	0.88	0.63	0.66	0.27	0.29
Guatemala 2000	0.76	0.75	0.69	0.66	0.44	0.42	0.12	0.10
Nicaragua 2001	0.87	0.86	0.79	0.79	0.52	0.55	0.19	0.23
Panama 2003	0.88	0.88	0.85	0.85	0.76	0.79	0.48	0.51

Aggregate national data show substantial levels of inequality in access to education by location (urban-rural), gender and wealth (UNESCO, 2005). Table 5 provides comparisons of urban and rural net attendance rates and the differences between these are shown in Figure 3. As expected, rural areas appear to lag behind urban areas in primary education in 12 of the 15 countries. The differences are greatest in Africa where rural primary school attendance is 8 to 30 percentage points lower than the urban rate. Nepal and Pakistan also exhibit high differences between urban and rural primary school attendance. The difference between rural and urban attendance comes though even more strongly in secondary school. In every country except Bangladesh, the rural-urban secondary school attendance gap is over 13 percentage points, and is particularly high in Latin America (over 25 percentage points) and Eastern Europe (over 20 percentage points).

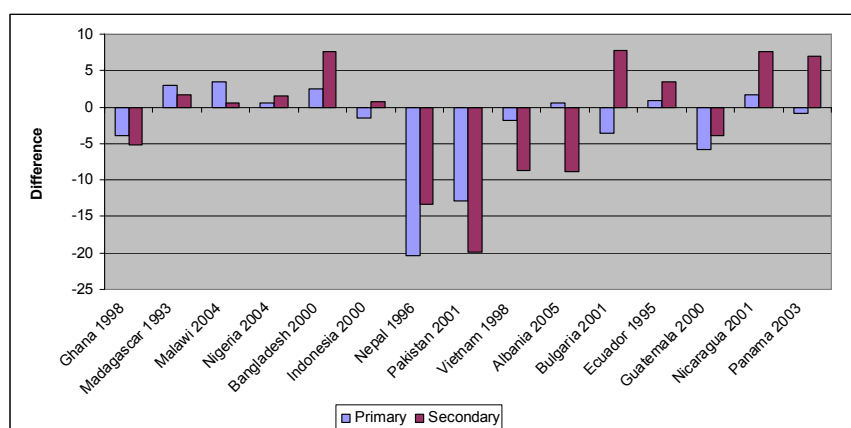
Figure 3. Percentage difference in rural-urban net primary and secondary school attendance rates



In terms of gender, Figure 4 shows the differences in net attendance rates of rural boys and girls at the primary and secondary level of education. Gender differences in attendance rates are notable in some cases but not as widespread as one might have expected. For primary education, most of the differences are minimal (less than 4 percentage points) with the notable

exceptions being Nepal and Pakistan and to a lesser extent Guatemala. In each of these cases girls attend primary school at a lower rate than boys. For secondary education, results are also mixed, with bias against females in Nepal, Pakistan, Vietnam and Albania and against males in Bangladesh, Bulgaria, Nicaragua and Panama. Further study is necessary to understand the determinants of this differential gender bias in attendance rates across countries.

Figure 4. Percentage difference in rural female-male net primary and secondary school attendance rates



Finally, the relationship between school attendance of rural children and household expenditures is presented in Tables 6 and 7. The relationship is unequivocally positive in all the countries we analyzed, for both primary and secondary age levels, with the exception of Indonesia and Bulgaria for primary school. The results are much more dramatic for secondary education. For Latin America, children in households in the wealthiest quintile are about four times more likely to attend school than those in the poorest quintile. For the rest of the countries, differences in attendance rates for secondary education between the top and bottom expenditure quintiles are with a few exceptions higher than 20 percentage points, and as high as 40 percentage points in Nigeria, Nepal and Bulgaria. These differences are the same for boys and girls, and are also evident in communist Vietnam and the transition countries. Indonesia has the most equitable access to secondary education, ranging from 30 percent in the bottom quintile to 49 percent in the top quintile. Further, the attendance rates of children in households in the top rural expenditure quintiles are in most countries comparable to the average urban rates.

Table 6. Primary school net attendance rates, by expenditure quintile

	Overall Rural						Female Rural					
	1	2	3	4	5	All	1	2	3	4	5	All
Africa												
Ghana 1998	.65	.78	.81	.80	.78	.75	.62	.76	.76	.81	.76	.73
Madagascar 1993	.23	.33	.42	.36	.44	.33	.24	.35	.44	.38	.44	.34
Malawi 2004	.63	.66	.70	.75	.78	.68	.64	.69	.72	.76	.80	.70
Nigeria 2004	.21	.38	.48	.57	.56	.37	.20	.39	.52	.57	.56	.37
Asia												
Bangladesh 2000	.55	.63	.68	.70	.74	.65	.56	.64	.70	.74	.71	.66
Indonesia 2000	.82	.81	.82	.78	.75	.81	.82	.80	.82	.79	.72	.80
Nepal 1996	.43	.53	.58	.78	.73	.53	.31	.43	.49	.67	.70	.47
Pakistan 2001	.30	.40	.44	.51	.60	.41	.23	.34	.37	.44	.54	.34
Vietnam 1998	.77	.86	.86	.87	.86	.83	.77	.85	.86	.85	.83	.82
Eastern Europe												
Albania 2005	.83	.89	.94	.94	.89	.89	.84	.86	.95	.99	.91	.89
Bulgaria 2001	.79	.91	.88	.90	.91	.86	.77	.87	.92	.89	.88	.84
Latin America												
Ecuador 1995	.84	.89	.90	.88	.94	.87	.86	.88	.89	.89	.93	.88
Guatemala 2000	.57	.71	.75	.77	.84	.69	.52	.67	.73	.80	.86	.66
Nicaragua 2001	.70	.81	.81	.89	.85	.79	.72	.81	.81	.89	.84	.79
Panama 2003	.79	.91	.90	.93	.97	.85	.79	.90	.92	.92	1.00	.85

Table 7. Secondary school net attendance rates, by expenditure quintile

	Overall Rural						Female Rural					
	1	2	3	4	5	All	1	2	3	4	5	All
Africa												
Ghana 1998	.28	.43	.47	.42	.43	.40	.24	.39	.45	.37	.49	.37
Madagascar 1993	.01	.02	.05	.05	.08	.04	.00	.03	.06	.06	.09	.05
Malawi 2004	.03	.07	.10	.16	.25	.10	.04	.06	.09	.17	.28	.10
Nigeria 2004	.19	.34	.41	.48	.50	.34	.18	.36	.41	.47	.49	.35
Asia												
Bangladesh 2000	.19	.27	.31	.48	.59	.38	.22	.30	.37	.53	.64	.42
Indonesia 2000	.30	.39	.47	.47	.49	.41	.33	.41	.48	.45	.45	.42
Nepal 1996	.13	.21	.27	.45	.54	.30	.05	.14	.17	.45	.49	.23
Pakistan 2001	.14	.21	.26	.35	.49	.25	.05	.11	.15	.23	.37	.15
Vietnam 1998	.33	.44	.53	.56	.70	.50	.30	.39	.51	.52	.64	.45
Eastern Europe												
Albania 2005	.21	.28	.38	.53	.57	.35	.16	.20	.42	.44	.57	.31
Bulgaria 2001	.30	.54	.57	.78	.74	.50	.35	.52	.58	.93	.73	.54
Latin America												
Ecuador 1995	.14	.23	.33	.44	.57	.27	.16	.26	.32	.48	.61	.29
Guatemala 2000	.03	.06	.14	.17	.42	.12	.02	.06	.08	.15	.42	.10
Nicaragua 2001	.07	.13	.25	.32	.44	.19	.08	.18	.35	.35	.46	.23
Panama 2003	.24	.52	.72	.80	.91	.48	.25	.58	.78	.80	.88	.51

iii. Land

Land is the asset that has historically been most closely linked to rural development. Policies for promoting rural development have often centred on providing access through a variety of types of land reform, under the assumption that land access is critical for agricultural production and thus food security and income generation for rural households. In this section, we examine land access by looking at ownership, the link between land ownership and expenditure quintile, and alternative mechanisms of access to land.

Most rural households have no land, or only small plots of land, as seen in Figure 5, which presents histograms of the different land ownership categories by country for each region. Landlessness is most prevalent in Latin America and Asia, reaching from 40 to over 60 percent of households, as can also be seen in Table 8. The prevalence in Ghana is also high, though we suspect that these numbers mask collective forms of land access which are not captured in this variable; we follow up on this suspicion below. Landlessness is least

prevalent in Vietnam, Malawi and Albania, at around 10 percent. In some of these countries alternative forms of access to land are common, again which we discuss below.

Table 8. Percentage of rural households owning land, by expenditure quintiles

	Percentage of Land-Owning Households					
	Expenditure Quintiles					
	1	2	3	4	5	All
Africa						
Ghana 1998	30.9	32.4	38.5	37.8	33.6	34.6
Madagascar 1993	73.7	80.9	75.2	72.9	69.8	74.5
Malawi 2004	94.7	94.9	93.4	91.6	82.4	91.4
Nigeria 2004	78.7	73.3	68.5	62.0	55.2	67.5
Asia						
Bangladesh 2000	32.7	40.7	52.5	55.9	63.6	49.1
Indonesia 2000	44.3	48.7	43.5	40.4	37.4	42.8
Nepal 1996	76.0	79.8	79.9	79.1	81.2	79.2
Pakistan 2001	20.2	28.0	35.1	38.0	42.4	32.7
Vietnam 1998	91.8	93.3	90.7	90.8	84.5	90.2
Eastern Europe						
Albania 2005	91.5	91.9	95.8	95.0	95.4	93.9
Bulgaria 2001	34.1	61.7	76.1	78.9	75.4	65.2
Latin America						
Ecuador 1995	63.5	62.5	55.2	55.2	53.3	58.0
Guatemala 2000	62.7	59.9	53.4	44.8	38.0	51.8
Nicaragua 2001	45.8	44.1	45.4	40.4	33.7	41.9
Panama 2003	68.8	54.1	49.4	45.2	36.8	50.9

Not owning agricultural land does not necessarily represent a situation of disadvantage for rural households, as landlessness may signal either transition out of agriculture into higher return activities, or a land-constrained household desirous of producing agricultural output. Indeed, we find in Table 8 that the share of rural households that own land tends to decrease with increasing levels of household wealth. This is true in all four of the Latin American countries, as well as Nigeria and Indonesia. In the other three African countries land ownership is more or less constant across quintiles, as is also the case in Nepal, Vietnam and Albania. Only in Bangladesh, Pakistan and Bulgaria does the share of rural households owning agricultural land increase with expenditure quintile.

Landholdings in most countries are small, with the vast majority less than one hectare in size. A greater number of larger landholdings are found in Latin America and Africa, as reflected in Figure 5 and Table 9, the latter of which provides mean land ownership for all rural households and agricultural households along with a breakdown of ownership by expenditure quintiles. The size of average landholding varies from 0.2 hectares in Vietnam to around 6 hectares in Panama for all rural households and similarly for agricultural households with a higher value of nearly 8 hectares for Panama. Average land holdings are smallest in Asia and Eastern Europe and largest in Latin America most likely reflecting differences in population densities and, for transition countries in Eastern Europe, the specific patterns of decollectivisation followed by these two countries following the collapse of the socialist system.

Table 9. Land ownership (has), by expenditure quintiles

	Average Land Size (has, Rural Households)						Average Land Size (has, Agricultural Households)					
	Expenditure Quintiles						Expenditure Quintiles					
	1	2	3	4	5	All	1	2	3	4	5	All
Africa												
Ghana 1998	0.88	0.92	1.23	1.30	1.34	1.14	0.91	0.97	1.34	1.47	1.82	1.29
Madagascar 1993	0.90	1.19	1.05	1.18	1.40	1.14	0.92	1.21	1.11	1.26	1.51	1.20
Malawi 2004	1.21	1.42	1.57	1.63	1.67	1.50	1.24	1.45	1.62	1.69	1.85	1.57
Nigeria 2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Asia												
Bangladesh 2000	0.12	0.20	0.28	0.44	0.73	0.35	0.15	0.24	0.33	0.54	0.84	0.43
Indonesia 2000	1.09	0.86	0.71	0.80	0.68	0.83	1.51	1.37	1.23	1.56	1.52	1.43
Nepal 1996	0.41	0.61	0.54	0.73	0.70	0.60	0.46	0.65	0.57	0.77	0.75	0.64
Pakistan 2001	0.47	0.57	0.85	1.05	1.55	0.90	0.73	0.84	1.19	1.45	2.11	1.28
Vietnam 1998	0.15	0.19	0.20	0.21	0.27	0.20	0.15	0.19	0.21	0.21	0.27	0.21
Eastern Europe												
Albania 2005	0.68	0.71	0.84	0.85	0.96	0.81	0.72	0.73	0.87	0.88	0.99	0.84
Bulgaria 2001	0.44	0.56	0.75	0.64	0.96	0.67	0.81	0.66	0.74	0.75	1.12	0.82
Latin America												
Ecuador 1995	4.22	3.73	4.10	5.92	10.41	5.67	4.57	3.90	4.42	6.60	9.06	5.62
Guatemala 2000	1.70	1.99	1.61	1.26	2.97	1.91	1.81	2.07	1.77	1.42	3.74	2.12
Nicaragua 2001	3.62	4.77	7.87	5.35	7.52	5.81	3.87	5.16	8.38	5.88	8.51	6.33
Panama 2003	5.66	4.37	5.16	7.16	9.02	6.27	6.24	5.16	6.10	8.80	12.85	7.61
mean	1.54	1.58	1.91	2.04	2.87	1.99	1.72	1.76	2.13	2.38	3.35	2.24
max	5.66	4.77	7.87	7.16	10.41	6.27	6.24	5.16	8.38	8.80	12.85	7.61
min	0.12	0.19	0.20	0.21	0.27	0.20	0.15	0.19	0.21	0.21	0.27	0.21

Landholdings tend to be concentrated, although this varies by country and region. Table 10 presents the share of total land owned by each quintile of land owners (excluding the landless). Landholdings in the Latin American countries are the most concentrated, with between 70 and 80 percent of total land held by the top quintile of land owners. For most of the countries in Asia, around 60 percent of total land is held by the largest quintile (Indonesia is the exception, with 83 percent), while the African countries follow with around 55 percent. Albania is the country where land is most equitably distributed, with only 43 percent held by the top quintile.

Table 10. Percentage of land owned by each quintile of land owners

Percentage of land owned by each quintile of land owners					
	Bottom 20%	2nd Quintile	3rd Quintile	4th Quintile	Top 20%
Africa					
Ghana 1998	1.6	6.1	11.9	20.6	59.8
Madagascar 1993	1.5	6.6	13.5	23.4	55.0
Malawi 2004	3.7	7.8	12.0	19.1	57.4
Nigeria 2004	NA	NA	NA	NA	NA
Asia					
Bangladesh 2000	1.8	5.4	10.7	19.6	62.5
Indonesia 2000	0.3	2.1	4.8	9.7	83.1
Nepal 1996	1.6	5.4	10.8	20.7	61.5
Pakistan 2001	2.3	5.9	10.9	20.5	60.4
Vietnam 1998	2.7	4.9	8.7	20.0	63.6
Eastern Europe					
Albania 2005	3.4	9.6	16.8	26.5	43.6
Bulgaria 2001	0.7	2.1	6.8	19.8	70.6
Latin America					
Ecuador 1995	0.3	1.7	4.4	11.6	82.1
Guatemala 2000	1.0	2.9	5.5	10.8	79.7
Nicaragua 2001	1.3	3.2	7.0	17.0	71.4
Panama 2003	0.1	1.0	3.7	11.7	83.5

Looking back at Table 9, there is generally a positive relationship between average size of land owned and welfare, although in Indonesia the poor own on average larger plots and in other cases it is apparent at the extremes but not in the central part of the welfare distribution (as in the four Latin American countries). This can be read as confirmation that for a number

of these households, even if landed and to some extent involved in agriculture, assets other than land are proving more crucial in determining welfare levels.⁷

To further examine land distribution issues from a similar angle, Figure 6 presents kernel density functions relating size of land owned to expenditure level, limited to agricultural households.⁸ Grouped by region, these figures show the kernel distribution of the mean of average land size across the expenditure tiles (30 bins) for each country. For most countries in Latin America and Asia, households with average sized land holdings (identified by the peaks in the distributions) tend to be concentrated in the lower half of the rural welfare distribution. The exceptions are cases where political events have led to a more egalitarian distribution of land assets (Albania, Bulgaria, Nicaragua and Vietnam⁹), as well as the African countries, where processes of land tenure and distribution have been characterized by traditional forms of land control. The distributions for these countries are characterised by a flatter shape indicating that relatively more average land owners are found in the tails.

The fact that a large share of landowners tends to be in the lower half of the wealth distribution, or that a number of richer households own no land does not necessarily imply that land is principally distributed among the poorer segment of society. To get a sense of who in the distribution owns the greatest share of land in a given country, Figure 7 presents the relationship between expenditures levels and the share of total land owned, smoothed using a Lowess distribution. In all countries, the line is upward sloping indicating that wealthier agricultural households own a greater share of total agricultural land than poorer households. In Asia, for example, the lower expenditure groups each own around 2-3% of total land while the highest groups own twice that amount, with particular concentration in Bangladesh. In Latin America, particularly sharp increases are seen at the higher end of the distribution suggesting greater land concentration among the wealthiest. These results, combined with those from Figure 6 which show that a smaller percentage of wealthy households own land, suggest that the area of total agricultural land owned remains concentrated among wealthier agricultural households.

⁷ The fact that our land ownership variable does not account for differences in land quality can also be part of the explanation.

⁸ Agricultural households are defined as those with non zero agricultural income.

⁹ In Vietnam we classify as landowners those who have land classified in the survey as owned, allocated, auctioned, private land, or land of long term use.

Figure 5. Land distribution, by region

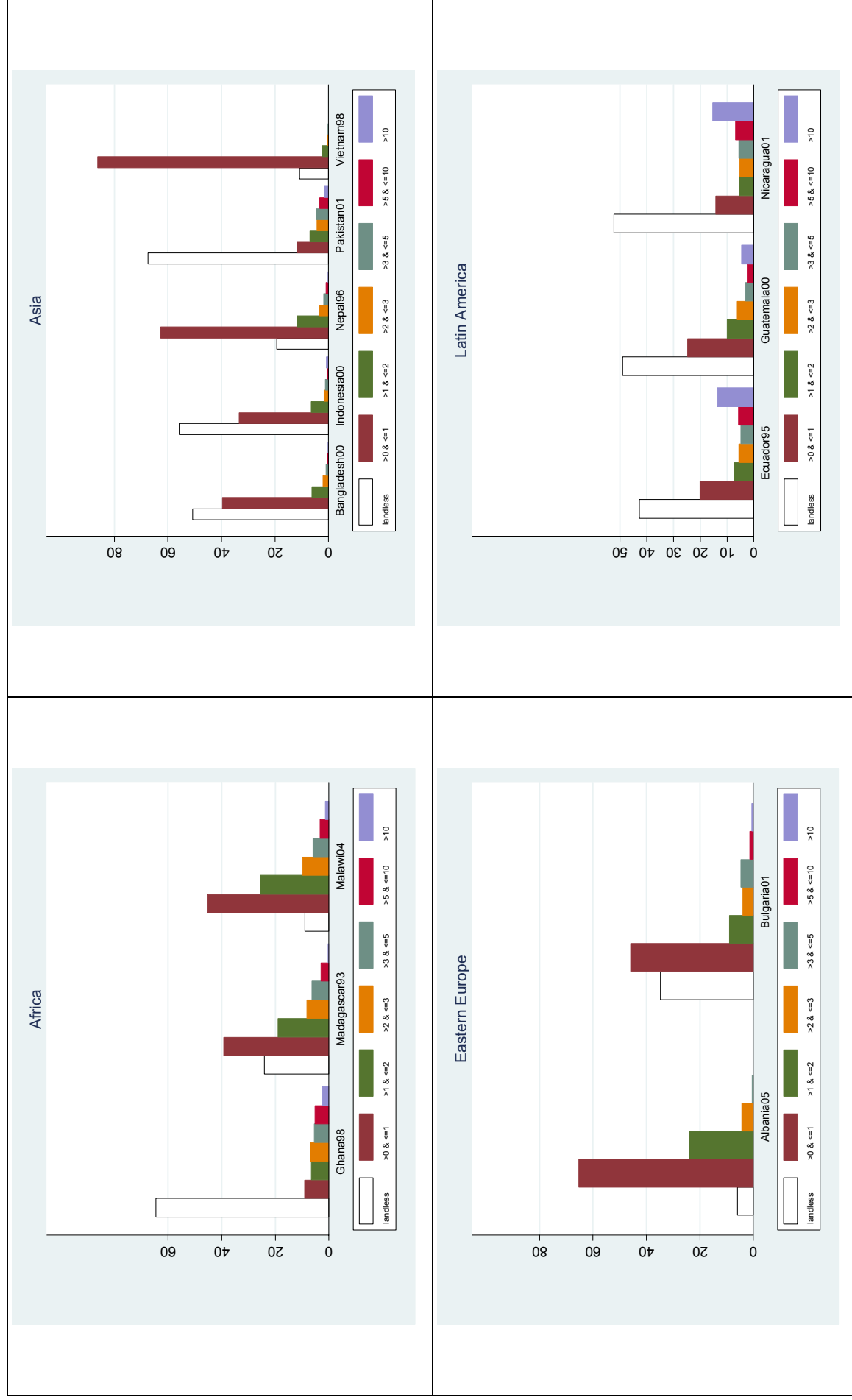


Figure 6. Land ownership across the expenditure distribution (30 bins), by region (kernel density)

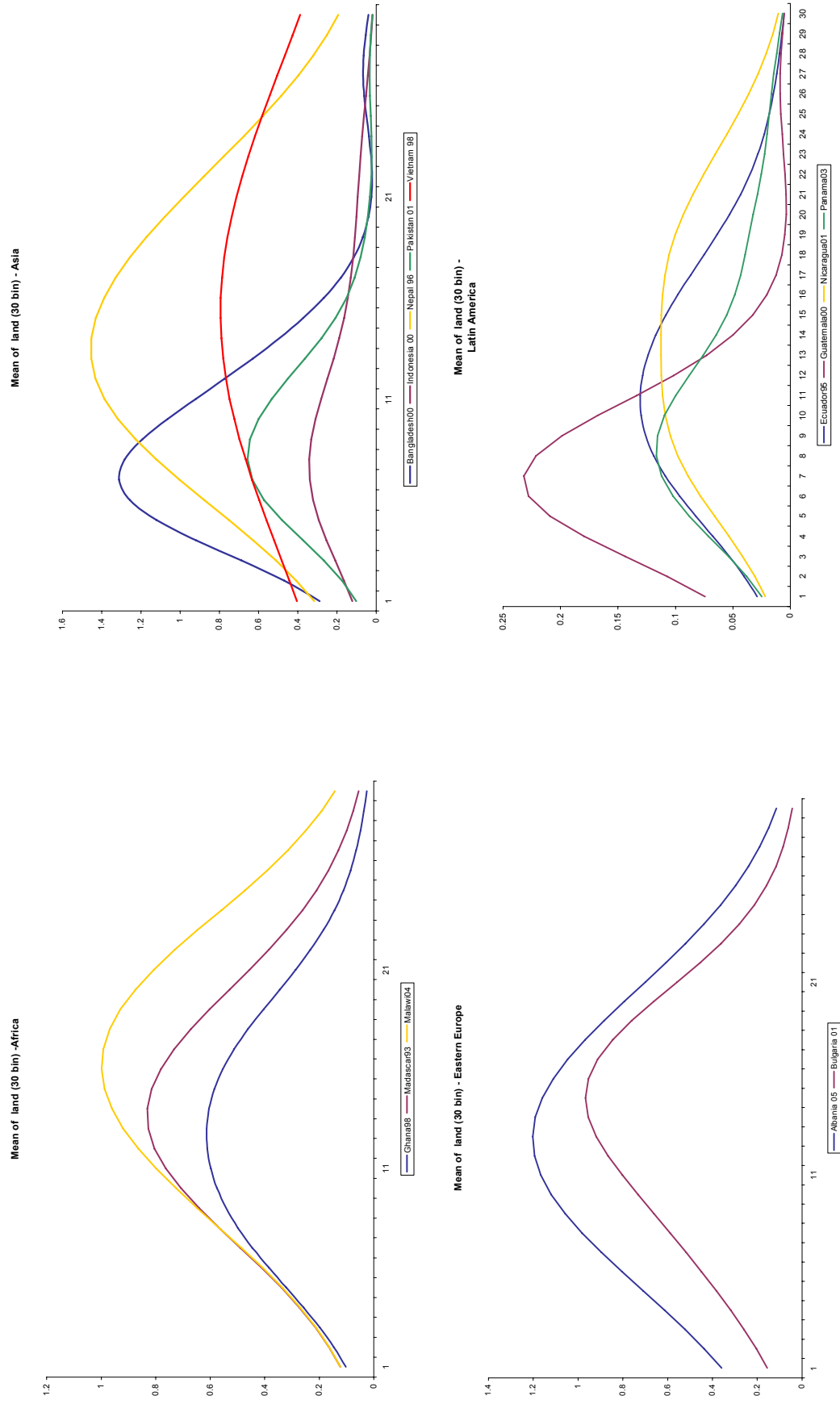
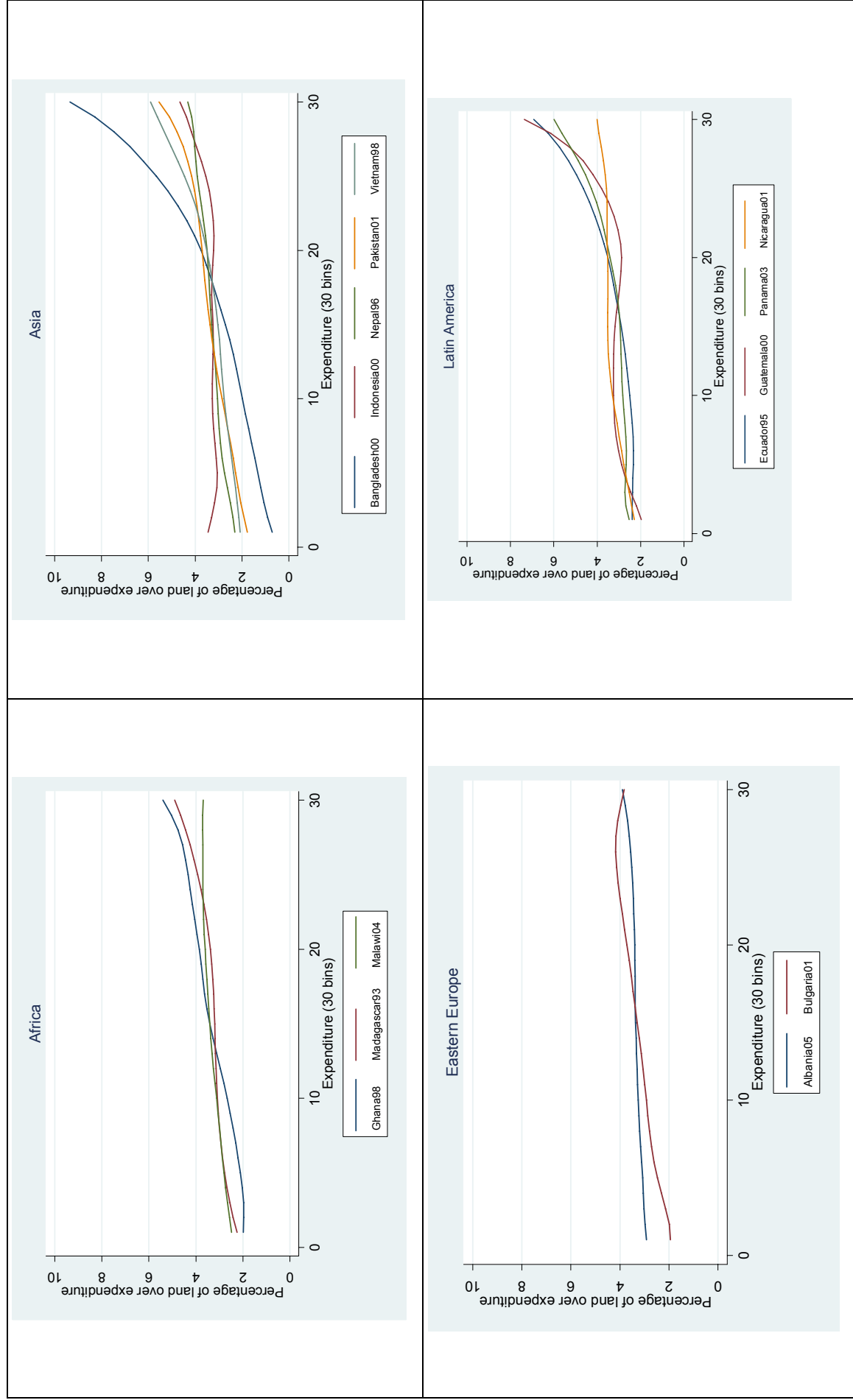


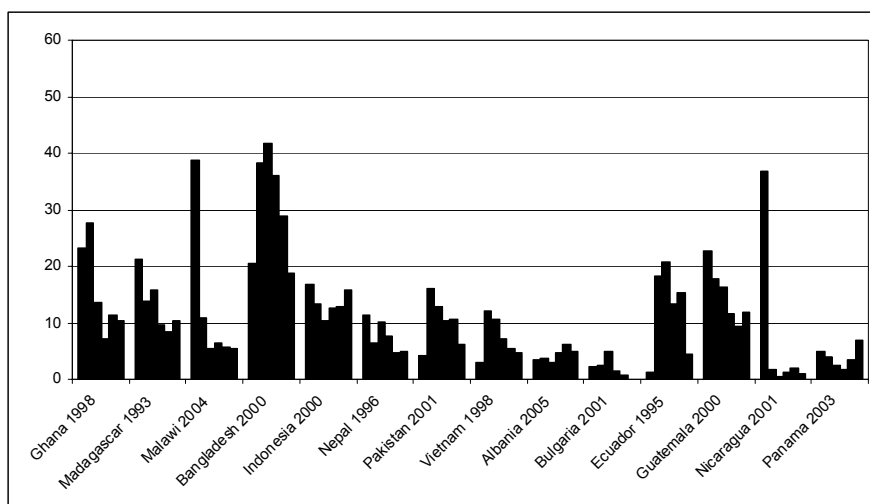
Figure 7. Land concentration by expenditure (30 bins), by region (Lowess distribution)



In addition to ownership, rural households access productive land through other forms of tenancy. These mechanisms may include land in exchange for payment (whether cash or in kind), or through reciprocity or traditional exchanges. We focus first on exchange for payment, which includes rental and sharecropping. Figures 8 and 9 below report the share of households by rural household land ownership quintile that, respectively, rent and sharecrop in and rent and sharecrop out land in the set of countries analyzed. For renting/sharecropping out, the landless category (category 0) is, of course, excluded.

As expected, renting in land and sharecropping are particularly widespread in South Asia, but the phenomenon is also significant in several African and Latin American countries. In Pakistan and Bangladesh, 15 and 27 percent of households, respectively, rent in land. In Africa, the total share is about 20 and 15 percent in Ghana and Malawi, and in Latin America 18 percent in Guatemala and 14 percent in Panama. Not only the landless rent or sharecrop. It is, however, the landless and the smaller land classes in particular that access land through these alternative forms of tenancy, although in some cases (Bangladesh and Nepal) this is more of an option for the households in the middle of the land distribution. Rental markets and sharecropping are thus an important avenue for smallholders to access more land and more income, but, depending on the country, are also used by households in the middle of the distribution.

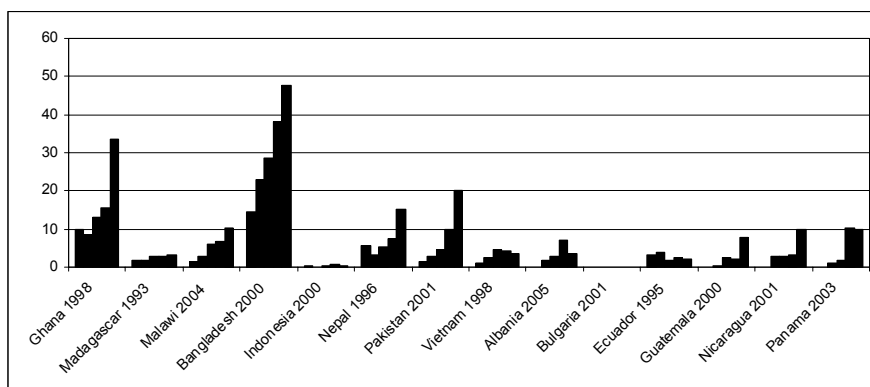
Figure 8. Percentage of agricultural households that rent and/or sharecrop in land, by land ownership quintile



Renting and/or sharecropping land out, on the other hand, is generally associated with larger landholdings. There are, however, a few cases in which there appears to be more renting out among the smallest category than in the middle of the distribution. This may reflect an inability to gain economies of scale in production that push smallholders to rent out land, or if land is fragmented it may suggest some land is rented out while other is rented in. Taken together, this again suggests that land rental markets play an important role in reallocating land use towards smaller landholdings and may be allowing poorer farming households to put together more economically viable farm units.¹⁰

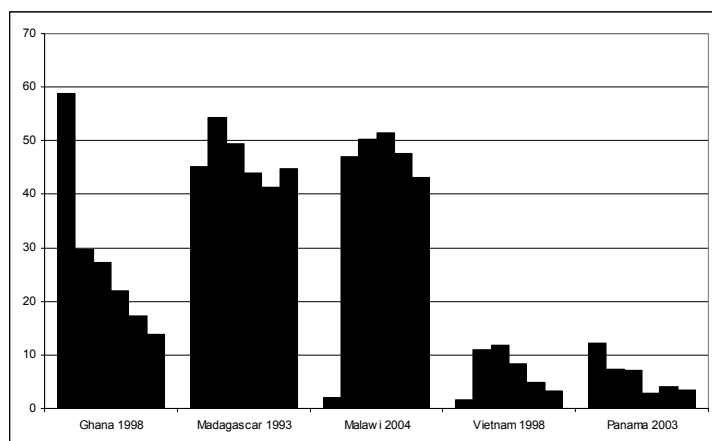
¹⁰ And, to the extent that an inverse farm size-productivity relationship holds, this may also be contributing to improving the productivity of the farm sector.

Figure 9. Percentage of agricultural households that rent and/or sharecrop out land, by land ownership quintile



Mechanisms via reciprocity or traditional exchanges which do not involve payment, such as communal or village land or free exchanges from family or friends are also important. Figure 10 below reports the share of households by land ownership quintile that access land via non payment mechanisms. As was expected, these forms of access are particularly important in the African countries. In the case of Ghana, almost 60 percent of landless households had access to communal land, explaining, as we hypothesized earlier, the high share of landless among rural households in that country. Access via reciprocal or traditional exchange is also important for households in all land categories in Madagascar and Malawi.

Figure 10. Percentage of agricultural households that access land via reciprocal or traditional means, by land ownership quintile



iv. Livestock

Livestock constitutes an asset that is widely owned by rural households in developing countries and performs a crucial role as a saving and risk management instrument, while at the same time contributing to the generation of income and to food security. Despite its importance, issues of access to livestock have not been quite as extensively researched as issues related to land and human capital, and there is a tendency to consider them important solely for particular population subgroups (herders and pastoralists), while focusing most of the analysis of agricultural livelihoods on crop activities.

Table 11. Livestock holdings (TLU)

	Households owning livestock (%)	Livestock holdings (TLU)	Households owning cattle (%)	Cattle owned (#)	Among owners, livestock holdings (TLU)
Africa					
Ghana 1998	50.1	0.67	7.2	0.46	1.34
Madagascar 1993	76.7	1.56	33.4	2.34	2.04
Malawi 2004	62.8	0.32	4.9	0.21	0.51
Nigeria 2004	46.4	0.71	9.4	0.60	1.54
Asia					
Bangladesh 2000	61.7	0.53	36.8	0.89	0.86
Nepal 1996	88.4	1.73	80.1	2.97	1.96
Pakistan 2001	47.0	N/A	44.0	N/A	N/A
Vietnam 1998	82.1	1.09	34.2	0.60	1.33
Eastern Europe					
Albania 2005	84.1	1.52	65.7	1.17	1.81
Bulgaria 2001	68.2	0.51	20.6	0.31	0.75
Latin America					
Ecuador 1995	84.4	2.77	31.1	2.44	3.29
Guatemala 2000	70.2	0.93	11.0	0.75	1.32
Nicaragua 2001	55.3	2.18	22.9	2.45	3.95
Panama 2003	60.8	1.98	13.0	2.50	3.25

The data in Table 11 confirm the widespread ownership of livestock in the developing world. Between 46 and 85 percent of the rural households in the analyzed countries own some livestock such as cattle, horses, mules, goats, sheep or chickens. The type of livestock owned is however much more context specific; while in some countries (Nepal, Pakistan and to some extent Albania) most livestock owners own some cattle, in other countries (and notably in all our African countries) the bulk of herds are formed of smaller animals. To get a sense of overall ownership, we aggregate livestock into tropical livestock units (TLU), based on region-specific weights. Cattle, for example, have a value of around 0.7 compared to sheep and goats at 0.1 and chickens at 0.01.¹¹ As is the case for land holdings, livestock holdings on average tend to be small in size, ranging from .32 in Malawi to 2.77 in Ecuador. Even among livestock owners, holdings range from .51 in Malawi to almost 4 in Nicaragua. By region, they tend to be smaller in Africa and Asia, and larger in Latin America.

To get a sense of the distribution of livestock by wealth categories, Table 12 shows livestock ownership and holdings by expenditure quintile. As was the case with agricultural land, the share of households that own livestock is not necessarily positively related to well-being as measured by consumption expenditure. This is true only in Bangladesh, Pakistan and Bulgaria. In Latin America as well as Ghana and Nigeria, wealthier households are less likely than poorer households to own livestock. As also shown in the table, however, average holdings tend to increase with wealth, with the exception of Ghana, Nigeria, Vietnam and Albania.

While ownership of livestock is relatively evenly distributed, total livestock holdings are concentrated, both over livestock owners and wealth, and particularly in Latin America. Among the countries in this region, the top quintile of livestock owners (in terms of size of holdings) hold between 70 and 90 percent of total livestock, followed by the African countries, with between 65 and 75 percent. Herds are relatively less concentrated in the Asian and Eastern European countries, with around 50 percent. The particular concentration of livestock in Latin America is most evident in Figure 11, which presents the relationship between expenditure levels and the share of total livestock owned, using a Lowess distribution. Wealthier agricultural households also own a greater share of total livestock in

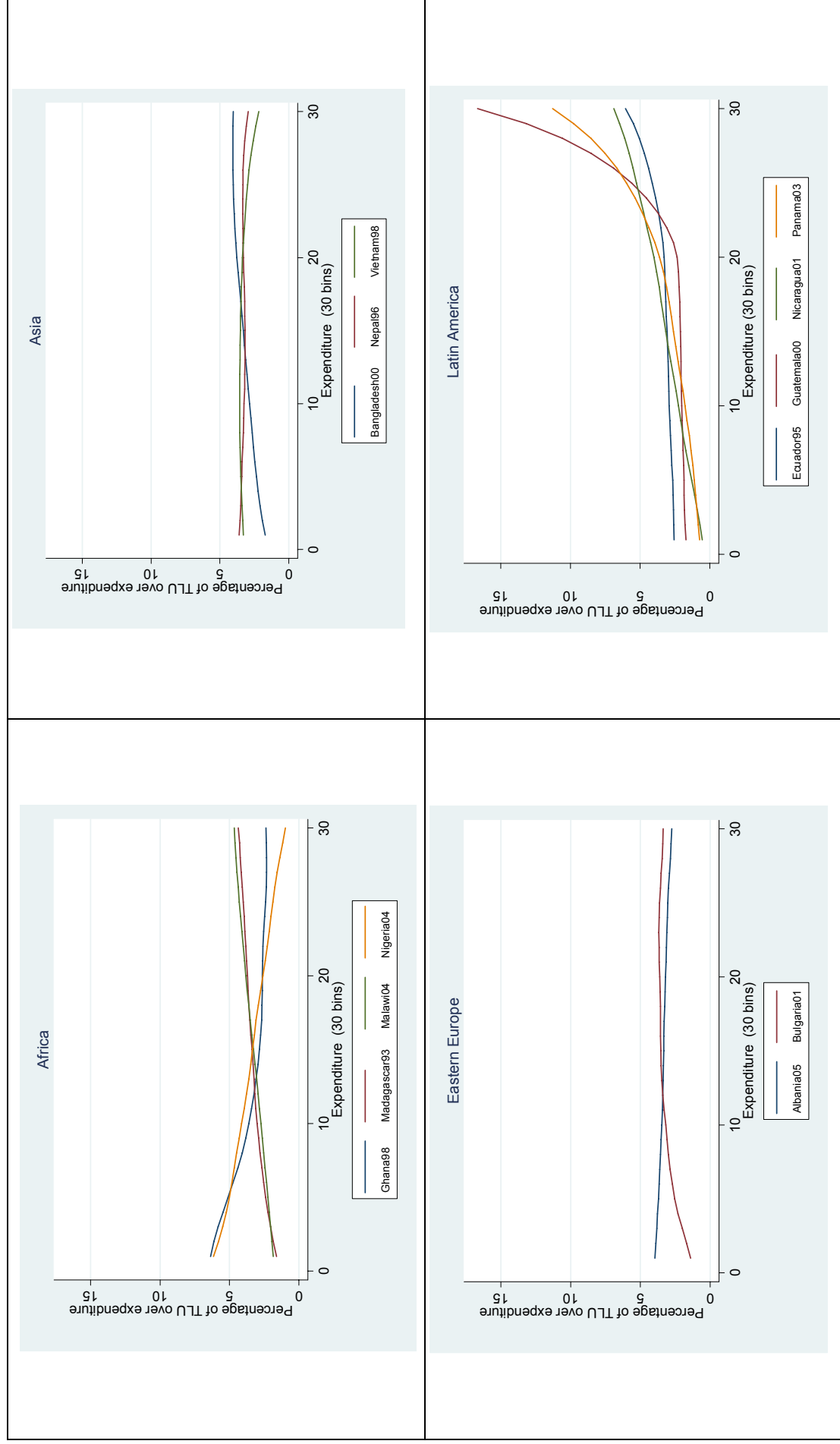
¹¹ The regionally differentiated weights can be found in Table AII.1 in Appendix II.

Malawi, Madagascar and Bangladesh. Contrary to the land distribution by wealth in Figure 7, however, livestock are progressively distributed in a number of countries, including Ghana, Nigeria, Albania, Nepal and Vietnam.

Table 12. Percentage of households with livestock holdings, and size of holdings (TLU), by expenditure quintile

	Household Per Capita Expenditure Quintiles										Percentage of livestock owned by top 20% of livestock holders
	Rural HH with livestock (%)					Livestock holdings (TLU)					
	1	2	3	4	5	1	2	3	4	5	
Africa											
Ghana 1998	64.6	55.3	51.4	43.5	36.0	1.25	0.63	0.65	0.41	0.41	69.5
Madagascar 1993	73.7	81.0	79.3	76.5	73.2	1.09	1.41	1.62	1.85	1.84	73.9
Malawi 2004	56.6	62.1	67.3	67.1	61.1	0.21	0.25	0.34	0.40	0.40	74.5
Nigeria 2004	58.3	53.9	46.7	39.0	33.9	1.23	0.94	0.62	0.51	0.25	66.6
Asia											
Bangladesh 2000	55.1	57.7	64.6	64.3	66.5	0.34	0.43	0.55	0.66	0.67	51.9
Nepal 1996	89.0	90.9	88.3	87.8	86.1	1.74	1.82	1.60	1.82	1.69	42.3
Pakistan 2001	40.7	45.3	47.4	49.6	51.7	N/A	N/A	N/A	N/A	N/A	N/A
Vietnam 1998	85.3	87.0	83.1	81.6	73.5	1.12	1.22	1.13	1.12	0.86	50.9
Eastern Europe											
Albania 2005	85.3	84.9	82.9	85.1	82.4	1.67	1.62	1.52	1.51	1.30	49.2
Bulgaria 2001	39.2	68.0	78.4	77.7	77.7	0.20	0.48	0.61	0.67	0.60	51.2
Latin America											
Ecuador 1995	86.9	88.2	86.6	87.2	73.0	2.30	2.60	2.50	2.85	3.62	71.4
Guatemala 2000	74.4	76.9	71.1	69.8	58.9	0.54	0.58	0.65	0.59	2.28	78.3
Nicaragua 2001	58.6	60.6	60.9	53.5	42.8	0.67	1.54	2.00	2.84	3.87	77.6
Panama 2003	74.1	65.5	62.7	56.5	44.9	0.65	1.03	1.71	2.01	4.30	92.9

Figure 11. Livestock concentration across the expenditure distribution (30 bins), by region (Lowess distribution)



v. Infrastructure

Greater access to infrastructure is assumed to imply reduced time and distance to urban centers and facilitated access to markets. Households with greater access to electricity, water, communication, roads and other forms of infrastructure will have a broader range of economic opportunities compared to those with less access, who may be limited to agricultural activities for subsistence or near subsistence. Access to infrastructure, as a proxy for access to input and product markets, may also positively influence the type of agricultural activity towards more remunerative production technologies.

Table 13. Infrastructure index

	Infrastructure Index					
	Expenditure Quintiles					
	1	2	3	4	5	All
Africa						
Ghana 1998	-0.56	-0.22	0.01	0.30	0.46	0.00
Madagascar 1993	-0.20	-0.17	0.02	0.09	0.26	0.00
Malawi 2004	-0.18	-0.16	-0.11	0.00	0.45	0.00
Nigeria 2004	-0.06	-0.03	-0.01	0.03	0.07	0.00
Asia						
Bangladesh 2000	-0.33	-0.23	-0.08	0.07	0.57	0.00
Indonesia 2000	-0.35	-0.15	0.01	0.11	0.38	0.00
Nepal 1996	-0.30	-0.27	-0.19	0.12	0.64	0.00
Pakistan 2001	-0.25	-0.15	-0.04	0.08	0.36	0.00
Vietnam 1998	-0.42	-0.12	-0.05	0.18	0.41	0.00
Eastern Europe						
Albania 2005	-0.41	-0.18	0.01	0.19	0.40	0.00
Bulgaria 2001	-0.59	-0.08	0.07	0.21	0.40	0.00
Latin America						
Ecuador 1995	-0.04	-0.03	0.01	0.04	0.03	0.00
Guatemala 2000	-0.40	-0.22	0.00	0.06	0.57	0.00
Nicaragua 2001	-0.35	-0.11	-0.08	0.10	0.43	0.00
Panama 2003	-0.91	-0.41	0.08	0.32	0.93	0.00

The difficulty in examining infrastructure is in identifying a measure comparable across countries. While most surveys include questions on infrastructure and distances to urban areas and key services, few of the variables are comparable. To address this issue, an infrastructure access index, including both public goods (electricity, telephone, etc.) and distance to infrastructure (schools, health centres, towns, etc.) was created using principal components analysis (following Filmer and Pritchett, 2001). The variables included in the index vary by country depending on data availability. Since infrastructure is generally linked to proximity to urban areas, the measure captures both jointly. In Table 13, the infrastructure index, which is normalized to have a mean zero in all cases, is presented for each country, by expenditure quintile. The higher the value of the index, the greater is the access to infrastructure. As can be seen in the table, not surprisingly, access to infrastructure increases with wealth, illustrating the constraints in terms of opportunities and services for the poor in all of the countries of the RIGA dataset.

IV. The utilization of productive inputs

Access to both input and output markets, and the economic opportunities they offer, is a key factor for households which depend on agricultural and other self employment activities for their livelihoods. Ideally one would hope to have information on access to markets, exogenous to the household decision to participate in a given market. This decision is typically influenced by household characteristics, such as its asset position, as well as the

economic context. Unfortunately, such a measure is not available, so the best proxy is whether they actually did purchase and sell in input and output markets. This presumes that non use implies non access which is not necessarily the case. It does, however, provide a reasonable approximation for access, and comparison across land ownership quintile allows an assessment of how access varies with farm size.

In this section, we focus on looking at access to input markets for agricultural households. Four inputs in particular are considered: i) fertilizer, ii) pesticides, iii) mechanisation, and iv) hiring of labour. For agricultural households in each country, Tables 14 and 15 present data on the share of households that use the four inputs, both overall and by land ownership category. These categories include the landless (category 0) that own no land but do earn income from some agricultural activity and then the five quintiles of land ownership (categories 1-5) with 1 being the smallest landholding category and 5 the largest. Note that we only have information on whether fertilizers were used, and not how much was used, which could lead to an underestimation in terms of differences in actual fertilizer use among households.

Overall the results suggest a wide range of access to inputs across the countries studied. For fertiliser use, we see generally lower prevalence of use in Africa compared to Asia and Eastern Europe, except in Malawi where the Starter Pack program and tobacco production led to raised input use. Similarly, the countries of Latin America have lower use, with the exception of Guatemala where the production of non-traditional exports may have influenced results. Fertilizer use is highest in Albania and Vietnam, covering almost 90 percent of households. Few significant differences are evident in the use of fertilizers between the smallest and largest landholders, not surprisingly since no distinction is made between organic and inorganic sources of fertilizer. A lower share of landless agricultural households, however, in most countries used fertilizers.

Pesticide use appears generally lower than fertiliser use but varies widely by country and within regions, responding to climate, policy and the nature of pesticide products. Vietnam and Albania again have the highest prevalence of use, with 81 and 51 percent of agricultural households, respectively, while only 3 percent of agricultural households in Malawi used pesticides. A consistent one third of the agricultural households in each of the Latin American countries also used pesticides. Much larger variation among small and larger landholders is evident for almost all of the countries, however, then in the case of fertilizer. Again this is not surprising, since pesticides nearly always involve a monetary payment. One exception is Vietnam, where use is over 80 percent in all categories, suggesting that government policy may be playing a role. Finally, with the exception of Latin America, very few landless agricultural households used pesticides.

Table 14. Utilization of productive inputs: fertilizer and pesticides, by land quintiles

	Share (%) of agricultural households using fertiliser						
	Land Quintiles						All
	0	1	2	3	4	5	
Africa							
Ghana 1998	20.6	24.9	18.8	23.0	24.8	23.1	21.6
Madagascar 1993	12.7	24.6	19.0	13.0	11.1	13.1	15.5
Malawi 2004	51.1	56.7	63.5	71.0	73.1	78.9	67.6
Asia							
Bangladesh 2000	29.1	73.3	86.4	88.3	88.2	89.0	62.2
Indonesia 2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nepal 1996	30.2	49.6	56.3	59.5	65.6	65.4	55.2
Pakistan 2001	27.0	77.9	84.4	86.9	88.1	88.6	54.1
Vietnam 1998	12.9	96.6	96.8	95.1	95.4	96.3	89.1
Eastern Europe							
Albania 2005	20.5	79.1	85.0	92.1	91.1	95.2	87.7
Bulgaria 2001	7.0	58.1	65.7	69.1	64.5	55.2	53.4
Latin America							
Ecuador 1995	19.4	16.6	37.0	44.9	33.1	26.7	27.9
Guatemala 2000	39.1	85.9	87.8	85.7	86.2	71.1	64.6
Nicaragua 2001	23.4	40.6	36.8	40.2	36.8	39.6	30.3
Panama 2003	30.2	20.5	30.9	31.3	30.2	34.4	29.4

	Share (%) of agricultural households using pesticides						
	Land Quintiles						All
	0	1	2	3	4	5	
Africa							
Ghana 1998	12.9	18.4	18.5	21.4	30.8	46.2	18.0
Madagascar 1993	12.4	9.0	11.1	13.0	10.3	12.8	11.5
Malawi 2004	2.4	0.7	2.1	3.2	3.7	7.4	3.3
Asia							
Bangladesh 2000	16.6	44.6	54.4	62.2	63.5	71.5	41.8
Indonesia 2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nepal 1996	0.9	3.4	4.1	8.3	13.1	15.2	7.8
Pakistan 2001	15.8	33.6	43.8	54.6	62.4	66.5	32.7
Vietnam 1998	7.5	85.2	87.6	88.4	87.3	91.9	81.1
Eastern Europe							
Albania 2005	5.1	33.0	38.2	47.1	57.5	71.8	50.9
Bulgaria 2001	1.8	12.0	26.5	27.6	31.5	24.1	20.5
Latin America							
Ecuador 1995	22.4	20.6	39.8	48.2	46.8	39.7	33.5
Guatemala 2000	28.4	22.2	30.1	31.1	50.0	59.8	34.2
Nicaragua 2001	23.5	38.0	42.3	51.3	43.5	65.2	34.1
Panama 2003	30.9	12.4	24.7	25.8	34.7	40.6	27.3

Mechanization—which is defined as using an input that uses a motor of some form—is limited among the agricultural households in the countries of the RIGA dataset, reaching over 20 percent in only 5 countries (Bulgaria, Nicaragua, Ecuador, Vietnam and Panama). The use of mechanisation, however, shows the clearest influence of land size on input use. In every country greater land size is associated with greater mechanisation. These general results, of course, may be due to the fact that larger farms substitute capital for labour since they are likely to have lower labour to land ratios. Alternatively, it could indicate a lack of access of smallholders who cannot afford to pay for access to mechanical inputs or lack access to necessary credit, as mechanization typically requires a monetary payment.

The share of households that hire in agricultural labour is more evenly distributed across countries, ranging from around 20 to 40 percent of agricultural households in most countries, with the exception of Ghana, where two-thirds of households hired in labour. As expected, the hiring in of agricultural labour increases with land size in most countries. This is particularly true in the Latin American and Asian countries, while in the Eastern European countries agricultural labour markets are practically non-existent.

Table 15. Utilization of productive inputs: mechanisation and hired labour, by land quintiles

	Share (%) of agricultural households using mechanisation						
	Land Quintiles						
	0	1	2	3	4	5	All
Africa							
Ghana 1998	2.2	3.4	2.3	3.4	6.1	13.8	3.5
Madagascar 1993	9.1	10.2	14.4	18.6	27.6	32.0	17.5
Malawi 2004	6.4	1.2	1.2	2.4	4.5	6.8	3.3
Asia							
Bangladesh 2000	0.8	1.0	4.5	4.7	10.0	20.0	5.1
Indonesia 2000	0.5	2.7	4.0	4.2	4.2	10.9	2.4
Nepal 1996	0.5	1.6	1.9	3.9	8.2	28.7	7.9
Pakistan 2001	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vietnam 1998	1.6	16.2	23.4	21.5	23.7	33.5	21.3
Eastern Europe							
Albania 2005	8.6	6.2	17.1	16.4	24.7	29.4	19.8
Bulgaria 2001	17.5	16.2	30.4	40.7	46.8	51.7	33.4
Latin America							
Ecuador 1995	10.9	11.9	23.2	31.7	38.7	59.3	24.3
Guatemala 2000	4.5	13.4	8.3	13.1	13.3	17.6	9.4
Nicaragua 2001	14.6	35.5	41.0	55.8	56.0	71.8	30.9
Panama 2003	6.7	10.7	20.8	28.2	39.5	62.4	21.1

	Share (%) of agricultural households hiring labour						
	Land Quintiles						
	0	1	2	3	4	5	All
Africa							
Ghana 1998	64.0	68.2	61.4	70.8	78.5	88.2	67.5
Madagascar 1993	32.8	41.1	39.7	34.9	34.9	45.2	37.6
Malawi 2004	34.7	15.4	18.1	20.7	26.4	31.6	23.0
Asia							
Bangladesh 2000	18.6	38.6	59.6	69.4	73.8	74.9	44.9
Indonesia 2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nepal 1996	22.7	21.9	32.2	34.1	45.4	60.3	37.5
Pakistan 2001	15.4	16.8	27.7	46.1	62.3	67.2	28.6
Vietnam 1998	1.6	16.2	23.4	21.5	23.7	33.5	21.3
Eastern Europe							
Albania 2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria 2001	1.8	0.0	2.0	0.8	1.6	4.6	1.6
Latin America							
Ecuador 1995	29.9	10.9	19.4	33.9	44.7	50.5	30.8
Guatemala 2000	18.7	33.0	43.3	40.2	45.8	55.1	32.8
Nicaragua 2001	6.4	8.8	13.8	22.6	24.8	26.8	12.0
Panama 2003	N/A	N/A	N/A	N/A	N/A	N/A	N/A

V. Access to product markets

Moving from input to output markets, ideally we would identify a measure that indicates the degree of access to output markets—that is, outlets for selling production—and analyze the factors that influence such access. As a first step towards this, in Table 16 the share of agricultural households having made any sale of an agricultural (crop or livestock) product is presented both overall and across expenditure quintiles. The results show that in general about 70 percent of rural households participate in some sort of market for agricultural output. This varies though across countries, with lower rates for countries where non-agricultural activities may dominate. In many cases, particularly in Africa (Ghana, Madagascar and Nigeria) and Latin America (Ecuador, Guatemala and Panama) the poorest quintile tends to participate more in output markets suggesting that even the poor have access to output markets. In Asia and Eastern Europe, the poor seem to have less access except in Vietnam. Overall, the results do not show dramatic differences between the different categories. The results may be deceptive, however, since it may be the case that those with higher income have chosen not to produce for the market since there are better opportunities for them, such as non-agricultural

activities, while those at the bottom of the distribution are excluded because of production or market constraints.

Table 16. Output market participation, by expenditure quintile

	Percentage of HHs Selling Any Agricultural Production					
	Expenditure Quintiles					
	1	2	3	4	5	All
Africa						
Ghana 1998	81.0	76.7	73.5	66.1	55.6	70.6
Madagascar 1993	95.6	98.1	94.1	93.6	89.9	94.3
Malawi 2004	63.7	71.0	74.0	73.7	69.2	70.3
Nigeria 2004	73.5	72.3	71.4	70.7	62.9	70.2
Asia						
Bangladesh 2000	65.3	74.1	79.9	77.8	80.5	75.5
Indonesia 2000	N/A	N/A	N/A	N/A	N/A	N/A
Nepal 1996	59.4	69.7	71.9	76.1	68.5	69.1
Pakistan 2001	45.7	50.8	53.2	54.5	56.6	52.1
Vietnam 1998	93.3	93.7	92.4	92.8	87.0	91.8
Eastern Europe						
Albania 2005	74.0	79.1	80.1	81.2	78.2	78.5
Bulgaria 2001	11.4	30.9	32.4	32.6	34.3	28.3
Latin America						
Ecuador 1995	62.0	68.0	65.1	60.0	52.9	61.6
Guatemala 2000	58.6	67.3	58.5	53.5	44.8	56.5
Nicaragua 2001	79.5	82.2	84.3	77.5	77.1	80.1
Panama 2003	57.5	49.0	47.2	48.1	43.0	49.0

In Figure 12, we look more closely at the ‘depth’ of this participation, by plotting kernel densities of the share of agricultural output sold by agricultural households. The focus is on agricultural households in the different land categories, including the top quintile of land owners the bottom quintile, and when relevant, the landless. These categories are included to get a sense of whether market integration is linked to land ownership. In general, a very mixed picture emerges. In some countries (Ghana and Panama) most farmers appear to be concentrated at the left hand of the distribution, selling little or none of their produce, while a very limited number appears to be outright commercial farmers whose production is largely for sale. In other countries such as such as Pakistan, Vietnam and Nicaragua, on the other hand, most of farm output seems to be sold through the market, even though there is still a large share of households that sell only 50 percent or less of their produce. Between these two are those with a more uniform distribution of sellers (Bangladesh and Bulgaria) and one in which most tend to sell about half of their produce (Albania and Madagascar). In terms of land categories, the distributions across categories tend to mirror each other, although in almost all countries agricultural households with larger land holdings sell a greater share of agricultural output (the curve is shifted to the right) than those in the bottom land quintile and the landless. Considering by expenditure quintile (Figure 13), the poorest and wealthiest agricultural households still tend to mirror each other. However, in the case of greater wealth, only the Latin American countries and Vietnam show a shift to the right of greater market participation.

Figure 12. Distribution of share of agricultural production sold, by 1st and 5th land ownership quintiles and landless (kernel density)

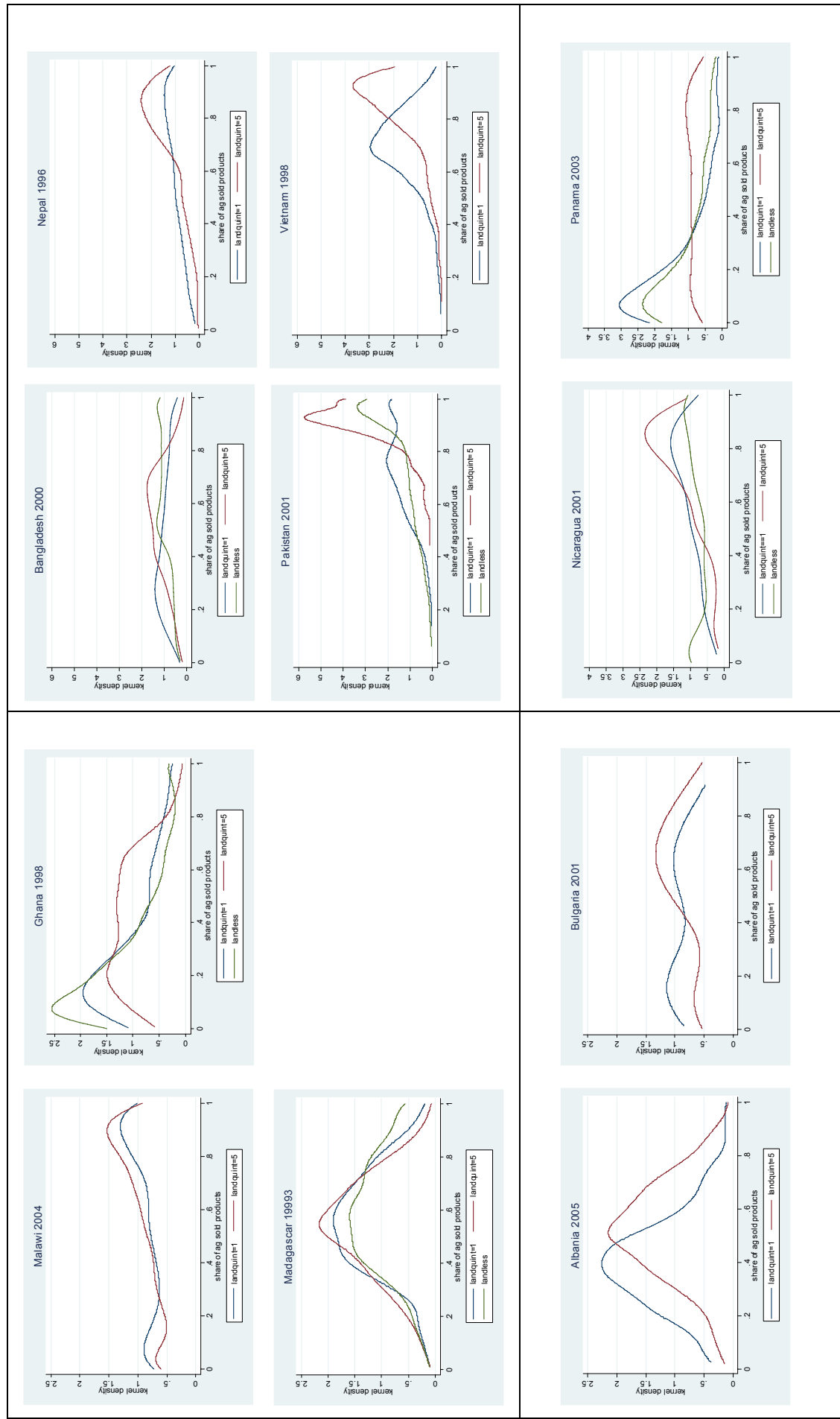
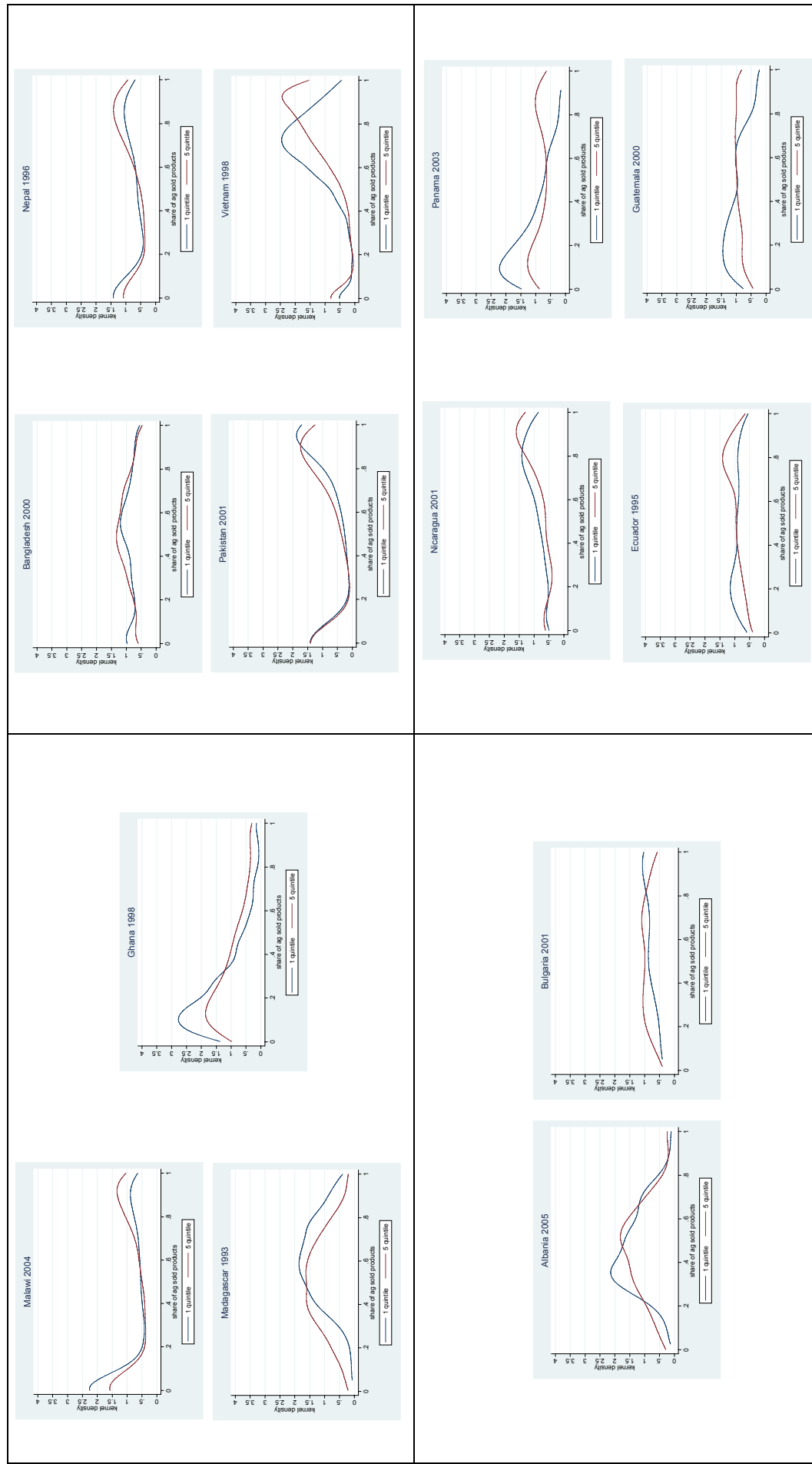


Figure 13. Distribution of share of agricultural production sold, by 1st and 5th expenditure quintiles (kernel density)



Looking at the concentration of volume of sales among households that participate in agricultural output markets, we find concentration among the largest sellers. Table 17 identifies the share of the total value of marketed agricultural production which corresponds to quintiles of sellers, that is, quintiles based on a ranking of agricultural households by value of production sold. With exception of Madagascar, Pakistan and Albania, more than 50 percent of the value of total marketed production corresponds to the top quintile of sellers. The value of sales are particularly concentrated among the Latin American countries, and Bulgaria has the highest concentration overall, at 90 percent.

Table 17. Concentration of value of marketed production, by quintile of value

Percentage of value of total marketed of agricultural production, by quintile of value sold					
	Bottom Quintile of Sellers	2nd Quintile of Sellers	3rd Quintile of Sellers	4th Quintile of Sellers	Top Quintile of Sellers
Africa					
Ghana 1998	1.2	4.2	9.2	19.3	66.2
Madagascar 1993	4.5	10.7	16.0	24.3	44.4
Malawi 2004	0.9	3.7	9.0	19.8	66.5
Nigeria 2004	1.6	5.4	11.6	22.7	58.7
Asia					
Bangladesh 2000	1.0	4.6	11.1	22.2	61.1
Indonesia 2000	2.3	6.7	12.4	22.5	56.1
Nepal 1996	1.7	6.1	13.0	24.3	55.0
Pakistan 2001	2.7	7.6	14.4	25.3	49.9
Vietnam 1998	3.3	8.8	14.7	22.8	50.3
Eastern Europe					
Albania 2005	4.1	9.6	15.9	25.0	45.4
Bulgaria 2001	0.2	1.3	2.7	5.2	90.6
Latin America					
Ecuador 1995	0.8	3.9	9.7	21.9	63.8
Guatemala 2000	0.9	3.7	8.6	19.0	67.8
Nicaragua 2001	0.0	1.7	6.9	18.6	72.8
Panama 2003	0.3	1.3	3.8	12.2	82.4

The total value of sales is not concentrated by size of land holdings, however. Table 18 shows the percentage of total value of agricultural sales, as well as the total value of all agricultural production, by land quintile. Here, the largest quintile of landholders accounts for between 17 and 45 percent of the total value of production, with the largest concentration in Panama. The value of total agricultural production is even less concentrated; in most countries the largest quintile of landholders accounts for between 20 and 29 percent of the total value of agricultural production. On the other hand, landless households contribute an important share of the value of marketed and overall agricultural production in a number of countries, and in particular Ghana, Pakistan and Guatemala.

Table 18. Concentration of value of marketed and total production, by land quintile

	Percentage of total value of marketed agricultural production						Percentage of total value of agricultural production					
	Land Quintiles						Land Quintiles					
	Landless	1	2	3	4	5	Landless	1	2	3	4	5
Africa												
Ghana 1998	46.5	10.6	6.2	7.5	12.0	17.2	52.9	9.4	6.1	7.6	10.7	13.2
Madagascar 1993	15.2	13.8	16.1	18.3	17.8	18.8	21.4	12.4	18.9	15.3	14.7	17.3
Malawi 2004	3.9	5.0	12.4	15.1	25.4	38.2	4.3	12.4	15.3	17.2	23.2	27.6
Asia												
Bangladesh 2000	17.6	7.6	11.2	13.8	21.2	28.6	17.7	8.1	12.1	14.8	21.1	26.3
Indonesia 2000	15.7	8.4	11.6	19.9	20.5	23.9	15.7	8.4	11.6	19.9	20.5	23.9
Nepal 1996	7.0	8.7	12.8	14.9	25.7	31.0	7.1	9.6	13.9	15.8	24.7	29.0
Pakistan 2001	36.3	4.6	7.1	13.8	16.2	22.0	37.2	5.6	7.5	13.7	15.5	20.5
Vietnam 1998	1.9	10.9	16.1	17.2	21.9	31.9	2.1	12.1	17.0	18.2	21.2	29.3
Eastern Europe												
Albania 2005	0.7	9.2	12.1	20.9	23.0	34.1	1.1	12.5	14.5	21.0	21.9	29.0
Bulgaria 2001	2.7	1.0	1.7	22.7	42.3	29.5	4.0	3.1	3.9	23.6	38.6	26.8
Latin America												
Ecuador 1995	17.3	4.8	11.1	16.0	21.6	29.1	17.2	6.7	14.1	15.6	20.8	25.6
Guatemala 2000	24.6	5.4	8.1	11.1	19.8	31.0	26.7	6.1	9.4	12.8	19.0	25.9
Nicaragua 2001	19.6	7.5	11.7	15.5	20.8	25.0	21.3	8.2	12.0	14.9	20.4	23.2
Panama 2003	14.4	2.4	4.7	14.4	19.5	44.7	21.5	5.9	9.1	16.5	18.4	28.7

Similarly, the total value of sales is not concentrated by the wealth status of agricultural households. Table 19 shows the percentage of total value of marketed and overall agricultural production by expenditure quintile. With the exception of Bulgaria, the wealthiest 20 percent of agricultural households accounts for only 20 to 30 percent of the value of marketed production, and with the additional exception of Madagascar, for only 15 to 30 percent of overall agricultural production. Conversely, again with the exception of Bulgaria, the bottom 20 percent of households account for approximately 10 to 20 percent of the value of overall agricultural production. Clearly, the poor are responsible for an important part of agricultural production in these countries.

Table 19. Concentration of value of marketed and total production, by expenditure quintile

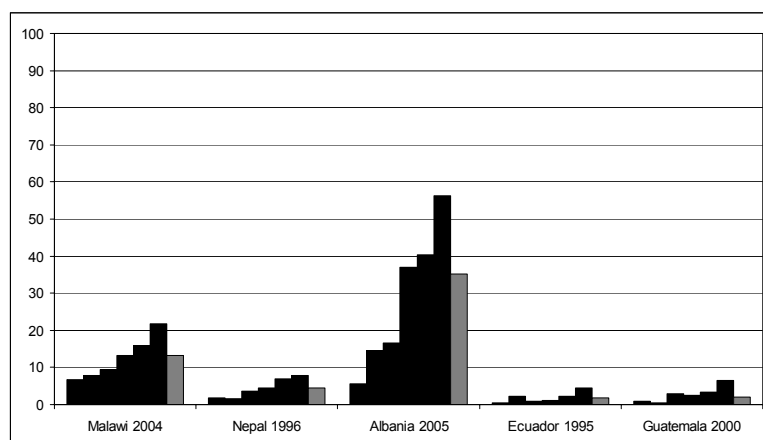
	Percentage of total value of marketed agricultural production					Percentage of total value of agricultural production				
	Expenditure Quintiles					Expenditure Quintiles				
	1	2	3	4	5	1	2	3	4	5
Africa										
Ghana 1998	13.5	22.6	23.7	21.9	18.4	18.3	22.0	22.9	20.3	16.5
Madagascar 1993	14.8	19.5	21.3	21.3	23.2	10.7	15.1	17.4	17.8	39.0
Malawi 2004	11.9	16.8	20.1	25.6	25.6	13.7	20.6	19.2	23.3	23.3
Nigeria 2004	17.7	20.8	22.2	21.4	18.1	20.7	23.3	22.6	19.5	13.8
Asia										
Bangladesh 2000	10.8	16.2	21.7	25.2	26.1	11.3	16.5	21.6	25.0	25.6
Indonesia 2000	14.7	20.2	21.6	22.0	21.4	14.7	20.2	21.6	22.0	21.4
Nepal 1996	12.5	18.4	18.4	24.9	25.8	13.1	18.7	18.7	24.1	25.5
Pakistan 2001	16.7	18.9	21.3	20.7	22.3	16.0	18.9	21.2	21.1	22.8
Vietnam 1998	10.2	15.8	20.0	23.5	30.5	11.4	16.6	20.4	23.1	28.5
Eastern Europe										
Albania 2005	18.9	19.6	21.4	20.9	19.2	18.3	19.9	21.1	20.9	19.9
Bulgaria 2001	3.6	23.8	6.5	5.5	60.6	4.2	22.5	11.7	9.7	51.8
Latin America										
Ecuador 1995	13.1	16.8	18.7	27.2	24.2	14.8	17.7	18.6	25.3	23.7
Guatemala 2000	14.9	21.0	22.0	20.2	21.9	17.9	22.0	21.7	20.6	17.8
Nicaragua 2001	10.5	19.7	21.5	22.4	25.9	11.9	19.6	21.5	22.6	24.5
Panama 2003	9.3	12.7	17.5	22.6	37.9	19.8	17.5	19.5	19.7	23.5

VI. Agrarian support for producers

Given the pervasiveness of incomplete markets in rural areas, the ability of agricultural households to use assets efficiently is linked to the support available to them as producers. Two key types of support are examined in this section: technical assistance and credit. Historically, both have often been provided by governments through agricultural extension agencies and government supported agrarian development banks. More recently, there has been a withdrawal of the state from providing this type of support, particularly credit which

along with being burdensome on budgets has also been plagued with inefficiency and management problems.

Figure 14. Technical assistance to agricultural households, by land category



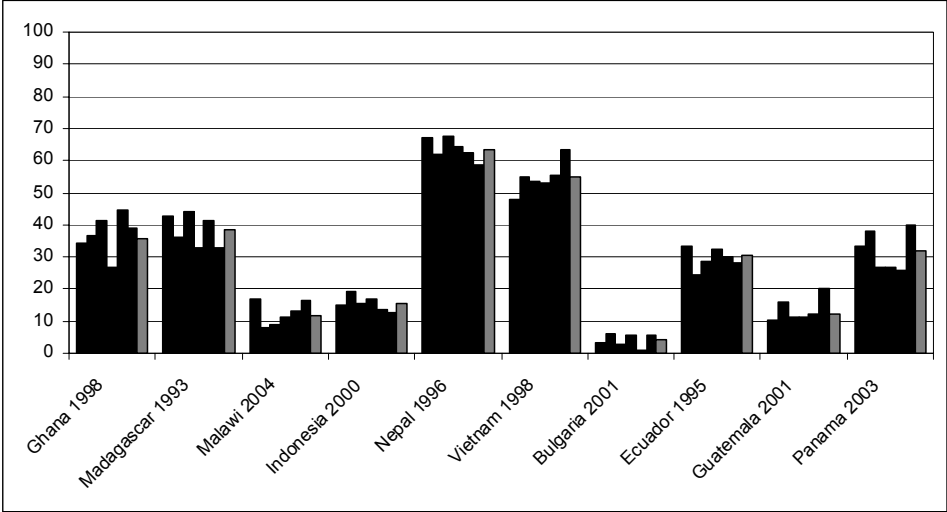
Note: Black represents the six land categories (from left to right landless and the five land quintiles) while grey represents overall access.

Data on technical assistance are limited to only five countries, presented in Figure 14. The dark bars represent the land categories noted in the previous section and the grey bar overall access. In general, technical assistance levels are low with no more than a third of households receiving assistance, and for Nepal, Guatemala and Ecuador less than five percent of households received technical assistance. The probability of receiving technical assistance is significantly higher among large landholders, in all countries. The results, while limited to five countries, suggest a critical lack of technical assistance, and that in particular public and private providers of technical assistance are failing to cater to poorer, smaller farmers.

Ideally, to get a sense of credit access, data on whether households demanded credit, or an additional amount of credit under the same terms and conditions, would be used.

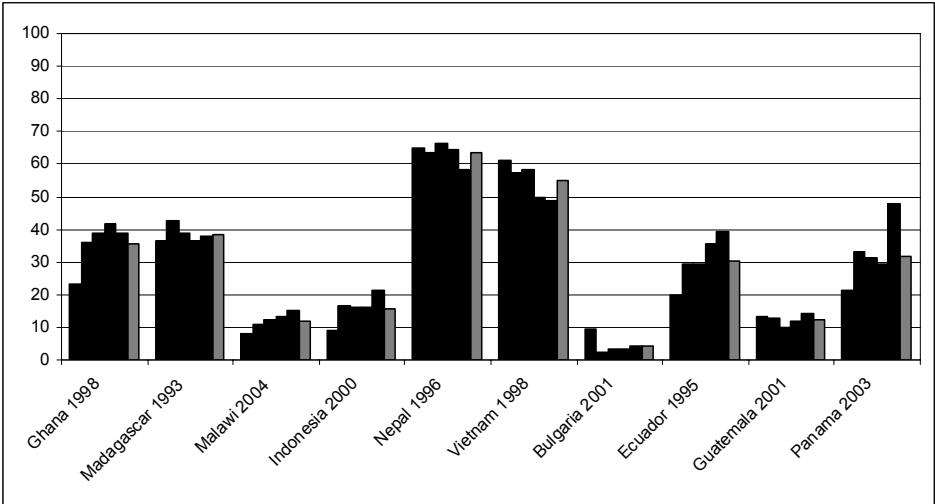
Unfortunately, only in a small subset of surveys are such detailed questions available. For reasons of comparability, therefore, the simple question of whether households receive credit from any source is used in this analysis. This at least provides a sense of the variation in access across countries and land/expenditure categories. Both land and expenditure categories are considered since credit can be considered a function of each. The use of credit (including loans from family members and relatives), is on average no more than 40 percent of agricultural households and in most countries no more than about one in ten agricultural households have access to credit (Figures 15 and 16). In several countries the use of credit appears to be more strongly related to the income level than to land ownership.

Figure 15. Credit use agricultural households, by land category



Note: Black represents the six land categories (from left to right landless and the five land quintiles) while grey represents overall access.

Figure 16. Credit use agricultural households, by expenditure quintile



Note: Black represents the six land categories (from left to right landless and the five land quintiles) while grey represents overall access.

VII. Conclusions

This paper set out to identify the asset position of rural households, to document access to agrarian institutions and to characterise heterogeneity in access to basic assets and agrarian institutions in a sample of developing and transition countries in four continents with special attention to households in the lower socioeconomic categories. From the results of the analysis a picture clearly emerges of a rural space in which small land and livestock holders lack access to key assets, inputs, markets and basic services—the very instruments that are necessary for rural households engaged in farming to achieve an agricultural-led path out of poverty. The overall results also point to a large degree of heterogeneity both within and across countries in terms of access by rural households to essential assets and services. The results in this paper complement and corroborate the findings of a study which uses the same

database to look at sources of rural income. In that study (Davis, et al 2007) the main finding was that poorer rural households lack access to those sources of non-farm income sources which would enable them to escape poverty.

Demographic characteristics of rural households make them more vulnerable to poverty than their urban counterparts: the demographic structure found in all the countries in our sample is such that the working age adults in rural areas need to support more dependents than those in urban areas. Poorer households are also those that tend to be less endowed with working age individuals, often in a proportion of one to two or less when compared to households at the top of the welfare distribution. This means that a significant proportion of the population of developing countries, and in particular the poorer part of the population, is relying on relatively fewer workers to meet their basic needs. This problem is compounded by the fact, noted in the rest of the paper, that those very households tend to have less access to other assets, such as education, and to key inputs such as fertiliser and mechanisation which could substitute for the relative lack of access to the appropriate quantity and quality of labour.

Education levels are low and unequally distributed among rural households. The majority of the heads of rural households have less than a primary school education. Further, rural household heads generally receive less education than their urban counterparts, and the poorest rural households are lagging further behind. While in some cases relatively high net attendance rates for children suggest that the next generation of adults may have a greater chance of exiting poverty, large disparities exist among poor and rich households in primary and particularly secondary net attendance rates. Children in wealthy households in rural areas have higher net attendance rates than those of poor rural households and similar or higher to attendance rates of urban children. The existence of such disparities has serious consequences in terms of the persistence of poverty in the next generation. Unequal access to education means that inequalities will persist into the future, limiting the transition or diversification into higher return activities.

While education is a crucial asset for all households, agricultural land, the classic asset of rural areas of the developing world, appears less so. The correlation between land ownership and welfare is not strong—especially in countries where the rural economy has diversified more out of agriculture. Indeed, although agriculture is a key part of rural livelihood strategies in most parts of the developing world, most rural households do not rely exclusively on agricultural activities but instead have diversified income generating strategies (Davis, et al., 2007). Further, for those households involved in agriculture, but not land owners, alternative forms of access other than ownership (such as rentals or sharecropping) play an important role in most places in facilitating access by poorer households to land.

Agricultural households in the developing countries covered by the data have limited access to most modern productive inputs and to technical assistance and credit, all key features of a functioning agricultural economy. Most agricultural households lack access to inputs which require monetary payment, such as pesticides, mechanization and hired labour. Given this picture, it is not surprising that in a number of countries we find a large number of smallholder farming families with insufficient land, deficient market access and rudimentary technology. Given the pervasiveness of agriculture as a livelihood strategy (especially for the poor) in rural areas, it is hard to see how poorer households can get onto an agricultural based path out of poverty when their condition regarding access to inputs, services and institutions are those described by our data. Clearly, interventions in the agricultural sector should form part of an overall rural poverty reduction strategy.

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Appendix I

Table AI.1. Countries and data sources for analysis

Country	Name of Survey	Year Collected	Number of Observations		
			Total	Rural	Urban
Albania	Living Standards Measurement Study Survey	2005	3,640	1,640	2,000
Bangladesh	Household Income-Expenditure Survey	2000	7,440	5,040	2,400
Bulgaria	Integrated Household Survey	2001	2,633	877	1,756
Ecuador	Estudio de Condiciones de Vida	1995	5,810	2,532	3, 278
Ghana	Ghana Living Standards Survey Round Three	1998	5,998	3,799	2,199
Guatemala	Encuesta de Condiciones de Vida	2000	7,276	3,852	3,424
Indonesia	Family Life Survey- Wave 3	2000	7,216	3,786	3,430
Madagascar	Enquête Permanente Auprès des Ménages	1993-1994	4,505	2,653	1,852
Malawi	Integrated Household Survey-2	2004-2005	11,280	9,840	1,440
Nepal	Living Standards Survey I	1995-1996	3,370	2,655	715
Nicaragua	Encuesta de Medición de Niveles de Vida	2001	4,191	1,839	2,352
Nigeria	Living Standards Survey	2004	3,373	2,657	716
Pakistan	Integrated Household Survey	2001	15,927	9,978	5,949
Panama	Encuesta de Niveles de Vida	2003	6,363	2,945	3,418
Vietnam	Living Standards Survey	1997-1998	6,002	4,272	1,730

Appendix II

Table AII.1. Regional weights, tropical livestock units

Region	Cattle	Buffalo	Sheep	Goats	Pigs	Llamas	Alpaca	Asses	Horses	Mules	Camels	Chickens	Poultry
Near East North Africa	0.70	0.70	0.10	0.10	0.20			0.50	0.40	0.60	0.75	0.01	0.01
North America	1.00	0.00	0.15	0.10	0.25			0.50	0.80	0.60		0.01	0.01
Africa South of Sahara	0.50	0.00	0.10	0.10	0.20			0.30	0.50	0.40	0.70	0.01	0.01
Central America	0.70	0.00	0.10	0.10	0.25			0.50	0.50	0.60		0.01	0.01
South America	0.70	0.70	0.10	0.10	0.25	0.20	0.20	0.50	0.65	0.60		0.01	0.01
South Africa	0.70	0.00	0.10	0.10	0.20			0.50	0.65	0.60		0.01	0.01
OECD	0.90	0.70	0.10	0.10	0.25			0.50	0.65	0.60	0.90	0.01	0.01
East & South East Asia	0.65	0.70	0.10	0.10	0.25			0.50	0.65	0.40	0.80	0.01	0.01
South Asia	0.50	0.50	0.10	0.10	0.20			0.50	0.65	0.40		0.01	0.01
Transition Markets	0.60	0.70	0.10	0.10	0.25			0.50	0.65	0.40		0.01	0.01
Caribbean	0.60	0.60	0.10	0.10	0.20			0.50	0.65	0.40		0.01	0.01
Near East	0.55	0.60	0.10	0.10	0.25			0.50	0.56	0.40	0.70	0.01	0.01
Other	0.60	0.60	0.10	0.10	0.20			0.50	0.65	0.40		0.01	0.01

Source: FAO GLI