

The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide[☆]

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Summary. — Numerous sources provide evidence of trends and patterns in average farm size and farmland distribution worldwide, but they often lack documentation, are in some cases out of date, and do not provide comprehensive global and comparative regional estimates. This article uses agricultural census data (provided at the country level in Web Appendix) to show that there are more than 570 million farms worldwide, most of which are small and family-operated. It shows that small farms (less than 2 ha) operate about 12% and family farms about 75% of the world's agricultural land. It shows that average farm size decreased in most low- and lower-middle-income countries for which data are available from 1960 to 2000, whereas average farm sizes increased from 1960 to 2000 in some upper-middle-income countries and in nearly all high-income countries for which we have information.

Such estimates help inform agricultural development strategies, although the estimates are limited by the data available. Continued efforts to enhance the collection and dissemination of up-to date, comprehensive, and more standardized agricultural census data, including at the farm and national level, are essential to having a more representative picture of the number of farms, small farms, and family farms as well as changes in farm size and farmland distribution worldwide.

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Key words — family farm, small farm, farm size, smallholder, farmland distribution

1. INTRODUCTION

Agricultural economists and other development specialists generally agree that investing in agriculture is an effective strategy for reducing poverty, inequality and hunger, especially in countries where the sector employs a large share of the population (FAO, 2012; World Bank, 2007). There is considerable debate regarding what type or scale of agriculture should be promoted in order to most effectively achieve these goals (Larson, Otsuka, Matsumoto, & Kilic, 2014). Many advocates emphasize the importance of “smallholder farming” or “family farming”, with claims often made that smallholders or family farms are responsible for a large share of the world's food production (e.g., Fairtrade International, 2013)—or that a large share of the food consumed in Africa and Asia is produced by smallholders in those regions (HLPE, 2013; IFAD & UNEP, 2013). The terms smallholder and family farm are often used interchangeably or in combination without clear definitions. Lack of clarity regarding terminology as well as the basic composition and diversity of the agricultural sector is a serious barrier to effective policy dialog.

A 2010 special issue of World Development, devoted to small farms,¹ classified the agricultural development literature on farm size according to one or more of the following topics: scale and efficiency; small farms, and poverty; and changing agrarian structure and the future of small farms (Wiggins, Kirsten, & Lambi, 2010). A number of sources, including articles from the special issue of World Development, state that there are about 500 million farms smaller than 2 ha worldwide, but mostly without providing documentation for the claim. Other work provides evidence of trends and patterns in average or median farm size and/or farmland distribution (see Table 1), but it is often lacking documentation, is in some cases out of date, and does not provide comprehensive global and comparative regional estimates. This article makes use of agricultural census data from 167 countries and territories to

provide comprehensive and well-documented estimates for the number of farms worldwide. It also considers data for more than 100 countries to assess the evolution of average farm size as well as distribution of farms, small farms, and family farms at global and regional levels and by country income groups. All country-level data are provided in Web Appendix. These estimates can inform agricultural development strategies and policy decisions on a wide range of issues.

This article proceeds as follows. Section 2 reviews the available literature on the number of farms, average farm size, and farmland distribution. Section 3 describes the data used for the analysis. Section 4 presents estimates of the total number of farms in the world, as well as by region and income group classification. Section 5 presents trends in average farm size by region and income grouping. Section 6 examines the distribution of farms and farmland at the global and regional level as well as for country income groups. Section 7 presents an estimate of the number of family farms worldwide as well as the

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Table 1. *Published literature on average or median farm size and farmland distribution worldwide, 2010–14*

Author, year of publication	Data used	Geographical Coverage	Sample size	Time period	Findings:
Eastwood <i>et al.</i> (2010)	Agricultural censuses	Global	–	1930–90 rounds	The log of average farm size increased from 1950 to 1990 in North America and Europe. It decreased from 1950 to 1990 in Asia and from 1970 to 1990 in Africa. There was no clear long-run trend for South America
Hazell <i>et al.</i> (2010)	Agricultural censuses	Africa, Asia and Latin America	16 countries	1970–2000 rounds	Median farm size decreased in most countries considered
Deininger & Byerlee (2012)	Literature review	Selected land abundant countries in Latin America, Eastern Europe and Central Asia, Southeast Asia and Sub-Saharan Africa	–	1970–2000s	Farmland distribution: In land abundant countries of Latin America and Eastern Europe and Central Asia there has been an increase in large scale farming. In South East Asia the palm oil industry has seen an increase in the number of larger plantations or large firms contracting with outgrowers, but rubber production has shifted from being cultivated mainly by large plantations to production by smallholders. In countries of Sub-Saharan Africa efforts to move toward large-scale agriculture in the 1970s and '80s largely failed and small farming operations have persisted, with an increase in large-scale investments in more recent years.
FAO (2013)	Agricultural censuses	Global	114 countries	1930–2000 rounds	Average farm size: At the global level (106 country sample, with the number of countries varying from year to year) the pooled average of mean farm size and the median of mean farm sizes decreased from 1930 to 2000. This reflects a decrease in average farm size for most regions except Europe. For the African region a decrease in average farm size was registered from 1960 to 1980 followed by a slight increase from 1980 onward. Countries where an increase rather than decrease was observed included Australia, New Zealand, the United States, Canada, Argentina, and Uruguay
HLPE (2013)	Agricultural censuses	Global	81 countries	1930–2000 rounds	Average farm size has decreased for the African region as a whole and it has also decreased in China. Farmland distribution: For a sample of 81 countries, using data from the 2000 round, the HLPE report found that 73% of farms are smaller than 1 ha and 85% are smaller than 2 ha. On average for 14 African countries 80% of holdings are smaller than 2 ha in size; they operate about 25% of the agricultural land. In the European Union 50% of farms are smaller than 2 ha in size and operate only about 2% of the agricultural land
Masters <i>et al.</i> (2013)	Rural and urban population data	Africa and Asia	–	1950–2050	Since 1950 average farm sizes have been decreasing for Africa and Asia as a whole, but in recent years they have begun increasing for Asia as a whole, while they will continue to decrease in Africa for quite some time
Adamopoulos & Restuccia (2014)	Agricultural censuses	Global	63 countries	1990 round	Average farm size is larger in countries with higher average per capita GDP. Farmland distribution: In countries with high average incomes farms larger than 20 Ha operate 70% of land, while in the poorest countries 70% of land is operated by farms smaller than 5 ha
Jayne <i>et al.</i> (2014)	Agricultural censuses/surveys	Africa	12 countries	1980–2010 round	Africa is typically characterized as land abundant (Deininger <i>et al.</i> , 2011), but the majority of the region's uncultivated arable land is concentrated in a few countries. In all land-constrained countries for which data are available, average farm size has decreased. Most but not all land abundant African countries have shown an increase in average farm size

Note: “–” indicates data not available.

share of farmland operated by family farms. In conclusion, Section 8 considers the implications of the findings.

2. LITERATURE REVIEW

Nagayets (2005) used agricultural census data from FAO to estimate that there are about 525 million farms of all sizes in the world. Several other sources maintain that worldwide there are about 500 million farms smaller than 2 ha (see for example Hazell, Poulton, Wiggins, and Dorward (2010), Wiggins *et al.* (2010), IFAD (2011) and HLPE (2013)), many of them refer to Nagayets (2005). Unfortunately, Nagayets' paper is unpublished, and neither it nor any of the other sources provide the information needed to reproduce the estimates.

Table 1 summarizes the results of a literature review on average or median farm size and farmland distribution. We first consider the results on average or median farm size. Eastwood, Lipton, and Newell (2010) considered unweighted averages of the log of mean farm size by region from the 1950 to 1990 rounds of the agricultural census; they found that the average farm size increased and the number of small farms decreased in Europe and North America, while average farm size decreased and the number of farms increased in Asia from 1950 to 1990 and in Africa from 1970 to 1990. They found no clear long-run trend for South America. Hazell *et al.* (2010) report on median farm size for a selection of 16 low- and middle-income countries in Africa, Asia, and Latin America and find that, for most countries considered, median farm size decreased from 1970 to 2000.

A 2013 report by FAO shows that at the global level (106 country sample, with the number of countries varying from year to year) the pooled average of mean farm size and the median of mean farm sizes decreased from 1930 to 2000. This reflects a decrease in average farm size for most regions except Europe. Another report shows that average farm size has decreased for the African region as a whole as well as in China (HLPE, 2013).

Masters *et al.* (2013) argue that there is more of a distinction to be made among regions, based on data and projections on population in urban and rural areas from 1950 through 2050. They show farm sizes decreasing in Africa and Asia from 1950 to 2010. From 2010 onward, they project that average farm size will continue to decrease for Africa as a whole and to increase for Asia as a whole. Adamopoulos and Restuccia (2014) use a sample of data from agricultural censuses for 63 countries to show that average farm size is larger in countries with higher average per capita income.

Jayne, Chamberlin, and Headey (2014) note that though Africa is typically characterized as land abundant (e.g., Deininger, Byerlee, Lindsay, Norton, Selod, & Stickler, 2011), the majority of the region's uncultivated arable land is concentrated in a few countries. Using data on average farm size over time from agricultural censuses and surveys for 12 African countries, the authors also show that in all of the land-constrained African countries, average farm size decreased from the 1980s to 2000s and that in some, but not all of the land-abundant African countries, average farm size increased from the 1980s to 2000s.

Several articles have considered farmland distribution and concentration (Table 1). Deininger and Byerlee (2012) conducted a review of literature on farmland concentration over the period 1970–2000 for selected land-abundant countries in Latin America, Eastern Europe and Central Asia, Southeast Asia, and Sub-Saharan Africa. They conclude that in land-

abundant countries of Latin America and in Eastern Europe and Central Asia there has been an increase in large-scale farming. They also find that in South East Asia, the palm oil industry has seen an increase in the number of larger plantations or large firms contracting with out-growers, while rubber production has shifted from being cultivated mainly by large plantations to production by smallholders. In countries of Sub-Saharan Africa, on the other hand, efforts to move toward large-scale agriculture in the 1970s and '80s largely failed and small farming operations have persisted, but with an increase in large-scale investments in more recent years.

For a sample of 81 countries, using data from the 2000 round of the agricultural censuses, a report by the HLPE found that 73% of farms are smaller than 1 ha and 85% are smaller than 2 ha. It also considered farmland distribution in 14 African countries, showing that 80% of holdings are smaller than 2 ha in size and operate about 25% of the agricultural land. The report also found that in the European Union (EU) 50% of farms are smaller than 2 ha in size but operate only about 2.4% of the agricultural land (HLPE, 2013).

Finally, Adamopoulos and Restuccia (2014) look at farmland distribution by country income level. They find that in the richest countries farms larger than 20 ha operate 70% of land, while in the poorest countries 70% of land is operated by farms smaller than 5 ha.

In summary, the literature on farm size generally finds that average farm size has decreased in the developing and increased in the developed world and that farmland distribution is more unequal in high-income countries than in developing regions. However, the literature suffers from some limitations. None of it is replicable, because none of the sources provide full documentation of the methodology as well as the underlying data. Furthermore, since some of these sources were published, more recent information has been made available for some countries. Finally, many of the sources are not comprehensive in their country coverage. This article seeks to address these shortcomings, by providing well-documented, up-to-date, and comprehensive estimates of the number of farms, farm size, and farmland distribution worldwide. This is largely possible due to the country-level estimates made available in international comparison tables in a recent FAO Publication (2013).

3. DATA USED

This article relies on data from numerous agricultural censuses, which are representative of all farms or farm households in a country. The Food and Agriculture Organization of the United Nations (FAO) has promoted the Programme for the World Census of Agriculture (WCA) since 1950 by providing governments with guidance on standard methodology and contents for their agricultural census. The WCA was first conducted in 1930; both the 1930 and 1940 rounds were sponsored by the International Institute of Agriculture (IIA). For the first six rounds (from 1930 to 1980), countries conducted the census in the same year, but for the 1990 census this constraint was relaxed and countries conducted the census during the period 1987–93 (FAO, 2005). The 2000 and 2010 rounds span the periods 1996–2005 and 2006–15, respectively.

FAO recommends that the census considers farms of all types throughout a country. Whereas agricultural censuses are often nationally representative of all farms, some other sources of information often used by the agricultural and development economics profession are not. Household income surveys, such as the Living Standard Measurement Study

(LSMS) surveys (World Bank, 2015), are often used for studying agricultural activities in developing countries. The LSMS and some other household income and expenditure survey data are made widely available and provide a rich source of information at the household level on sources of income and expenditures as well as agriculture for many countries. However, a limitation of household surveys is that they are representative of farm households but not representative of all the farms in a country. Household surveys generally do not include farms that are not family-owned (which are for the most part large farms) and thus underestimate the contribution of large farms. The possible implications are illustrated by the example of Guatemala, shown in Table 2. The agricultural census data reveal that, in Guatemala, a small number of very large farms (from 45.2 to more than 9,000 ha) represent the minority (2%) of holdings, but the majority (57%) of farmland. Non-household farms and thus, most of the country's large farms, are not reported by the household survey data indeed, the largest farm reported by the household survey encompasses 98.8 ha. Clearly the agricultural census is key to our gaining a more comprehensive picture of the agricultural sector in Guatemala.

The FAO suggests that the census be conducted by using complete enumeration and/or sampling methods. It encourages countries to include a core module on number of holdings and household size and status as well as 12 supplementary themes. The supplementary themes are: agricultural land; irrigation, and water management; crops; livestock; agricultural practices; agricultural services; demographic, and social characteristics; farm labor; household food security; aquaculture; forestry, and management of the holding.

Most of the data used in this article were collected under the agricultural censuses' core module (number of holdings, household size, and status), as well as the agricultural land and farm labor themes. The FAO's theoretical definition of an agricultural holding is:

“an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency”

[FAO, 2005]

The agricultural holder is the person who makes strategic decisions regarding use of the farm resources and who bears all risks associated with the farm. The agricultural holder may undertake all management responsibilities or delegate

day-to-day work management responsibilities to a hired manager. The difference between the hired manager and the agricultural holder (the manager of the holding) is that the former is a hired employee who implements the decisions of the agricultural holder while the latter makes all strategic decisions, takes all economic risks, and has control over all production resulting from the agricultural holding (FAO, 2005).

Agricultural holdings and agricultural area reported by the census include crop and livestock production only; holdings engaged in forestry or fisheries are only included if they are also engaged in crop and livestock production. Communal lands are generally not included in the agricultural census.

As with any data, a number of problems arise when making international comparisons and global estimates using the agricultural census data. First, information is not available for all countries and all decades for each indicator. Second, although the WCA provides a large degree of standardization among countries, there is naturally variation among countries in terms of how indicators are defined or reported. Third, there is variation among agricultural holdings within countries; that is, in most countries a wide range of diverse entities are considered agricultural holdings, making aggregation of them problematic.

In order to address the first problem and ensure the broadest country coverage for each indicator, we combine estimates from numerous census rounds. We use the most recent observation found for each indicator-country combination. Thus, by considering the 1960 round through the 2010 round, we have an estimate of the total number of farms which includes observations for 167 countries and territories. For the number of farms by size, we reach a sample of 111 countries and territories by combining international comparison tables from the 1990 and 2000 census rounds. Country coverage is the least comprehensive for the number of family farms, for which we have a sample of 52 countries taken from an international comparison table from the 2000 round agricultural census. Our approach of combining data from several rounds of the census is by no means without fault, since, as the available data show, the farm sector is dynamic and the number of farms in a country changes over time.

Second, some definitional and methodological variation exists across countries despite the high degree of standardization achieved through the WCA. Despite the recommendation that the agricultural census cover farms of all types, some agricultural censuses survey household farms rather than all farms; see for example, in the 2010 round, Ethiopia, Malawi, and Rwanda (Government of Ethiopia, 2007; Government of Malawi, 2010; Government of Rwanda, 2010). Furthermore, most countries establish a minimum threshold farm size only above which farms

Table 2. *Farmland distribution in Guatemala, agricultural census versus household survey*

Farm size class (ha)	Agricultural census, 2003		Household survey, 2006	
	Holdings (percentage)	Area	Household farms (percentage)	Operated area
<0.7	45	3	50	13
0.7–1.4	22	5	24	19
1.4–3.5	19	8	20	33
3.5–7.1	6	6	5	18
7.1–22.6	5	13	1	13
22.6–45.2	1	9	0	3
>45.2	2	57	0	0

Notes: For the household survey operated area equals land owned and used for crop production plus land share cropped or rented in minus land share cropped or rented out.

Sources: Government of Guatemala (2004) for the agricultural census and Government of Guatemala (2006) for the household survey.

are included in the census; this minimum threshold varies from one country to the next. In China and India, very small farms are included in the census; China reported farms as small as 0.07 ha whereas India did not apply a minimum threshold (Government of India, 2012; Government of the People's Republic of China, 2009). Had those two countries used larger minimum thresholds, similar to those used by other countries (Bangladesh, for example, excluded farms smaller than 0.2 ha (Government of Bangladesh, 2010), fewer total holdings would have been recorded.

There is also variation across countries in what land size classes they use in reporting their agricultural census results and in the smallest land size class reported by FAO in its international comparison tables. The smallest land size class reported by many countries where average farm sizes are large is up to 2 ha; in many cases, farms smaller than one hectare are included in that group. For example, in France there are 111,740 farms smaller than 2 ha in size operating a total of 212,000 ha of agricultural land. Such farms are reported by FAO's international comparison tables in the cohort 1–2 ha, although some of them are in fact smaller than 1 ha (FAO, 2013). A similar limitation applies to the farms in the larger farm size classes, particularly for countries where average farm sizes are relatively small. In the Philippines, for example, the largest farm size class reported is 20–50 ha, where there are a total of 20,666 farms operating 1,072,845 ha of land. The average farm size for this group is thus larger than 50 ha, and we can therefore infer that some of the Filipino farms reported as being between 20 and 50 ha in size actually belong to a larger farm size class (FAO, 2013). For some other countries, similar issues arise; for details refer to FAO (2001, 2013).

Our third challenge is the diversity of agricultural holdings within countries. Perhaps the most extreme example is that of Russia. For its 2006 agricultural census, the Russian Federation reports several different types of agricultural holdings (Government of the Russian Federation, 2006). The vast majority of holdings (about 98%) are owned by private households and other individual operators; they represent only about 2% of the farmland in the country. Farms in the other categories of agricultural holdings (small and large agricultural enterprises, institutional farms, private farms, individual entrepreneurs, and non-profit citizen associations) represent only about 2% of the holdings in Russia but about 98% of the farmland. The average farm size for the farms in the private-household and other individual-operator category is about 0.4 ha whereas it is far larger for the other categories. The Russian census recognizes this heterogeneity, and, because the various entities are so different, it does not provide a total number of agricultural units for the country; rather, it reports separate subtotals for the different types of agricultural holdings. For our total number of farms, we have chosen to consider and aggregate all agricultural units enumerated by each country, including all the different categories in the Russian census.

For all these reasons, it is important to stress that, when we report a total number of farms or family farms, we are reporting a very rough estimate of the total number of very diverse entities; they are diverse in terms of scale, livelihood strategy, and socio-economic status. Throughout the world, farms and family farms include large-scale industrial ventures as well as small and medium-sized operations. The holders may be specialized in agriculture, with farm income and production providing a substantial share of their income and/or food consumption. Alternatively, the holder may have diverse sources of income or may be specialized in off-farm income sources. The holder may or may not have adequate income to provide for his family. Given this diversity, we therefore

strongly caution the reader that when we refer to a total number of farms in the world we are describing entities which vary greatly from one country to another as well as within each country. Despite its limitations, we have nevertheless chosen to use the agricultural holding as reported by the census as a proxy for the total number of farms.

4. THE NUMBER OF FARMS IN THE WORLD

We produce an estimate of the total number of farms in the world for the widest possible country coverage by using information from six different WCA rounds dating back to 1960. We recorded the most recent estimate of the number of agricultural holdings for each country or territory for which an agricultural census has been carried out and for which a report was available. Because we are interested in the number of farms worldwide, we consider estimates of farms in all geographical entities, whether recognized as sovereign states or not. For ease of communication, from this point forward the article refers to number of “countries” used in various calculations without drawing the distinction among actual geographic areas that are widely recognized as sovereign states and those that might be considered as territories of sovereign states.

Estimates are available for 167 countries which represent 96% of the world's population, 97% of the population active in agriculture, and 90% of agricultural land worldwide. The resultant estimate of the total number of farms in the 167 countries comes to nearly 570 million. For country-level estimates and sources, see [Web Appendix Table 1](#).

For numerous reasons, we may expect that the actual number of farms in the world is larger than this 570 million estimate. First, no estimates were available for about 40 smaller countries; including estimates from those countries would increase the total but probably only slightly. Second, although the vast majority of agricultural holdings were reported from fairly recent agricultural census rounds (1990, 2000 or 2010), data for some low- and middle-income countries are from older agricultural census rounds. For example, the last census for three of the countries (Brunei Darussalam, Nigeria, and Zimbabwe) was conducted in 1960. The number of farms in many low- and middle-income countries has increased since 1960 (see [Section 5](#) on average farm size), and it is likely to have done so in many of the countries for which we used data from older census rounds. For these reasons, our estimate of 570 million farms worldwide probably represents a lower-bound estimate.

Of the estimated 570 million farms in the world, 74% are located in Asia ([Figure 1](#)). China alone represents 35% and India 24% of the 570 million farms. Nine percent of the farms are found in Sub-Saharan Africa and 7% in Europe and Central Asia. Farms in Latin America and the Caribbean represent 4% of farm holdings worldwide. Only 3% of the world's farms are located in the Middle East and North Africa.

The majority of farms are found in lower- or upper-middle-income countries (representing respectively 36% and 47% of the 570 million farms worldwide), this largely results from the classification of India as belonging to the former and China the latter group ([Figure 1](#)). Thirteen percent of farms are in low-income countries. Farms in high-income countries represent 4% of the world's farms.

5. AVERAGE FARM SIZE

Average farm size is generally thought to have increased in the developed world, while it has decreased in the developing

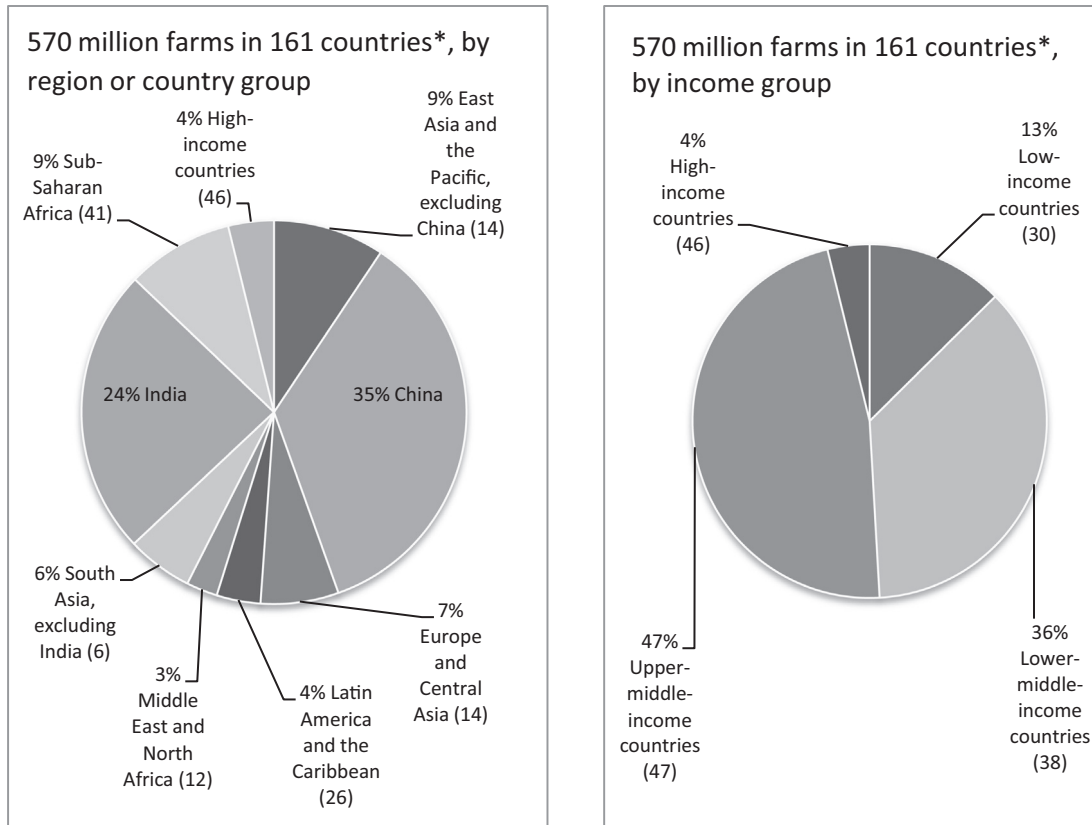


Figure 1. Share of farms worldwide, by country group, most recent observation. Sources: Country-level data are available in [Web Appendix Table 1](#). Notes: Number of countries included are shown in parentheses. Country regional and income groupings are the same as those used by the [World Bank \(2012\)](#). *Only 161 of the 167 countries with observations are classified by the World Bank groupings.

world; our findings suggest the story is not so clear cut and that data are inadequate to have a globally representative picture of the evolution of average farm size over time. All country-level data used for estimates in this section are available in [Web Appendix Table 2](#).

International comparison tables from the 2000 census round allows us to consider average farm sizes for a sample of 107 countries for which estimates of average farm size are available for at least two of the census periods from 1960 to 2000. We first consider the trends at the country level, recording an increase (decrease) for any country where average farm size has consistently increased (decreased) from one period to the next allowing for only one exception over the period. The level of significance of the increase or decrease is not considered. We see clear patterns according to income group ([Table 3](#)). In most low- and lower-middle-income countries, farm sizes have decreased. A slightly larger share of upper-middle-income countries has exhibited increasing average farm size, and the majority of high-income countries has seen a clear increase. Patterns according to regional groupings of low- and middle-income countries show that an increase in average farm size has occurred in some countries in Latin America and the Caribbean, but in few countries elsewhere.

For another indication of what trends are evident in high-income countries as opposed to low- and middle-income countries, we examine the evolution of average farm size from the 1960 census to the 2000 census round for a limited sample of 72 countries. We consider only those countries for which we had an average farm size from at least three census rounds. We imputed average farm size (using linear interpolation) in

all cases where the missing value was preceded and followed by an observed average farm size. When the missing observation(s) was (were) at the beginning or end of the series, we used the adjacent value(s). To calculate the weighted average farm size by income group, we used a fixed weight over time, which is the number of agricultural holdings reported in the country's most recent agricultural census.

Our sample is not globally representative, but it does allow us to consider representative trends for high-income countries, Latin America and the Caribbean, and South Asia. It includes 30 high-income countries which represent 96% of holdings and 98% of agricultural area in the category of high-income countries other than Australia. The 18 countries from Latin America and the Caribbean included in the sample represent 79% and 87% of that region's agricultural holdings and agricultural area. The five countries from South Asia represent 98% of the region's holdings and 86% of its agricultural area. Of the remaining 19 low- and middle-income countries in our sample, five are from East Asia and the Pacific, five from the Middle East and North Africa, and nine from Sub-Saharan Africa. A notable exclusion from the sample is that of China. Also, we have no information on average farm size over time for countries in Europe and Central Asia, due in part to changes in boundaries in that region.

We find that average farm size has increased for the 30 high-income countries as a whole. For Latin America and the Caribbean as a whole average farm size decreased from about 80 ha per farm in 1960 to 50 ha in 1990, after which point it increased to 54 ha in 2000. The trend in South Asia is a clear decrease in average farm size from about 2.6 ha per farm in

1960 to 1.3 ha in 2000. For the remaining 19 low- and middle-income countries as a whole, average farm sizes decreased over the period. We do not have a sufficient sample to have a representative picture of what has happened to average farm sizes for Sub-Saharan Africa, China, the rest of East Asia and the Pacific, the Middle East and North Africa, or Europe and Central Asia.

The average farm size worldwide is determined by countries with the largest number of farms and those with the largest

share of the world's agricultural land. Among countries for which we have an estimate of the number of farms, the five countries with the largest share of the world's agricultural holdings are, in decreasing order of magnitude: China, India, Indonesia, Russian Federation, and Bangladesh. In 2010, those with the largest share of the world's agricultural area (measured as arable land plus permanent crops and permanent pastures) were, in decreasing order of magnitude: China, Australia, the United States of America, Brazil, and the Russian

Table 3. Number of countries exhibiting a decrease or increase in the average size of agricultural holdings, 1960–2000

	Decrease	Increase	Neither clear increase nor decrease
High-income countries	7	26	4
<i>Low- and middle-income countries, by income group</i>			
Low-income countries	12	2	1
Lower-middle-income countries	24	2	0
Upper-middle-income countries	19	5	1
<i>Low- and middle-income countries, by regional grouping</i>			
East Asia and the Pacific	8	2	0
Latin America and the Caribbean	18	7	2
Middle East and North Africa	10	0	0
South Asia	5	0	0
Sub-Saharan Africa	15	3	1

Sources: Authors' compilation using FAO (2013). See also Web Appendix Table 2.

Table 4. Top five countries by number of agricultural holdings and agricultural area

Agricultural holdings (in millions)			Agricultural area (in millions ha)		
Top five countries	Most recent estimate	Share of the world's agricultural holdings (%)	Top five countries	2010	Share of the world's agricultural area (2010) (%)
China	201	35	China	525	11
India	138	24	Australia	456	9
Indonesia	25	4	United States of America	414	8
Russian Federation	23	4	Brazil	261	5
Bangladesh	15	3	Russian Federation	217	4
World total	570		World total	4,889	

Source: Authors' compilation using FAO, 2014a.

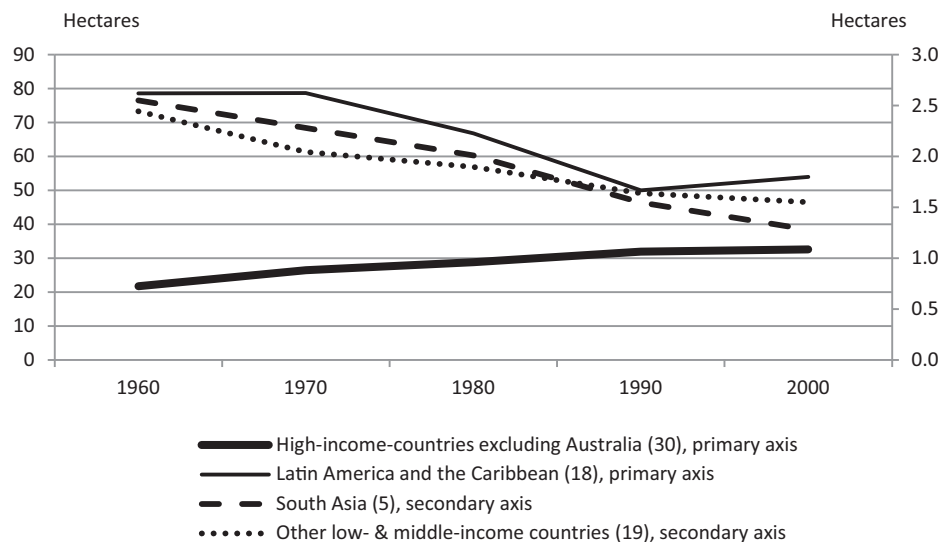


Figure 2. Average farm size, 1960–2000. Sources: Authors' calculations using (FAO, 2013) for average farm size together with the most recent observation for the number of farms. See Web Appendix Table 2. Notes: Total country coverage is indicated in parentheses.

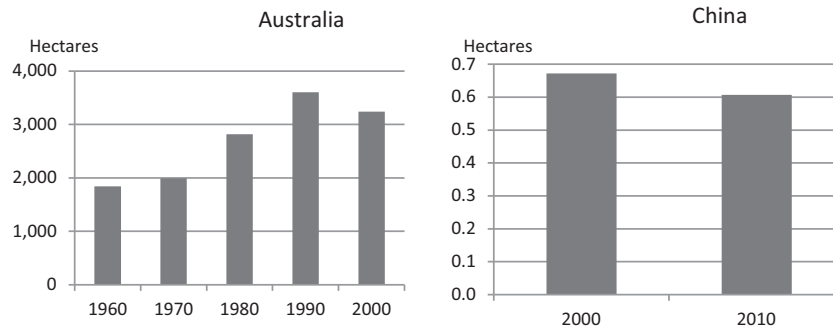


Figure 3. Average farm size over time in Australia and China. Sources: Authors' compilation using FAO (2013) and Government of the People's Republic of China (2009).

Federation (Table 4). Of these countries, in our Figure 2 data were missing or not included for Australia, China, and the Russian Federation.

We deliberately excluded Australia from the 72-country sample in Figure 2 because its farms are so large (averaging in the thousands of hectares) compared to farms in other parts of the world that it appears to be an outlier. Considering Australia on its own (Figure 3), we see that average farm size clearly increased from 1960 to 2000, although it declined during 1990–2000; this lends greater evidence to the tendency for farm size to have increased in high-income countries as depicted in Figure 2.

Given the sheer number of agricultural holdings as well as the amount of agricultural land in China, what happens in terms of average farm size in that country will be a major determinant of the trend in average farm size observed for the world as well as for low- and middle-income countries as a whole. Information from the 2000 and 2010 rounds of agricultural censuses indicate a decrease in average farm size in China in the most recent period (Figure 3). However, some experts argue that farm consolidation is likely to have begun or to begin, given current changes in land policy, which facilitate private ownership (as opposed to merely use) of agricultural land by individuals (Nie & Fang, 2013). Should individuals be able to own (rather than simply use) their land, sales of land will be facilitated and consolidation should become much easier.

The Russian Federation has likely exhibited a decrease in average farm size since liberalization and land reform (Sedik & Lerman, 2008), this lends further evidence to the tendency of farm size to have decreased in low- and middle-income countries from 1960 to 2000. Regardless, the distribution of agricultural land in Russia remains bimodal, with the vast majority of farmers operating small areas, while the majority of land farmed is concentrated among a few large-scale corporate farms (Lerman & Sedik, 2013). This would suggest that the measure of average farm size at the national level is less relevant for the Russian Federation than it may be for some other countries. To have an idea of the scale of most farms in Russia the median farm size would be a more informative statistic than average farm size. However, few agricultural censuses offer estimates of median farm size.

6. FARMS AND FARMLAND DISTRIBUTION

The High-Level Panel of Experts of the Committee on Food Security (HLPE) surveyed definitions of smallholders, presenting a wide array of criteria used by countries in their national definitions (HLPE, 2013). The most commonly used dimen-

sion for measuring farm size is land, but some countries also consider the number of livestock held or the assets used, while others use gross sales as a criterion. The report recognizes that small is a relative concept, depending on agro-ecological as well as socio-economic considerations. What is small in most countries in Latin America and the Caribbean is considered large in most countries in Sub-Saharan Africa or in Asia. Although simplistic, a 1 or 2 ha threshold is frequently used to designate farms as small. For a sample of 81 countries, using data from the 2000 round, the HLPE report found that 73% of farms are smaller than 1 ha and 85% are smaller than 2 ha (2013). Here we consider a more comprehensive sample, with nearly identical results.

Combining data from the international comparison tables for the 1990 and 2000 rounds of the WCA (FAO, 2001, 2013), we are able to consider farms by size for a sample of 111 countries and territories with a total of nearly 460 million farms (Figure 4 and Web Appendix Table 4). Seventy-two percent of the farms are smaller than one hectare in size; 12% are 1–2 ha in size; and 10% are between 2 and 5 ha. Only 6% of the world's farms are larger than 5 ha. Assuming that these

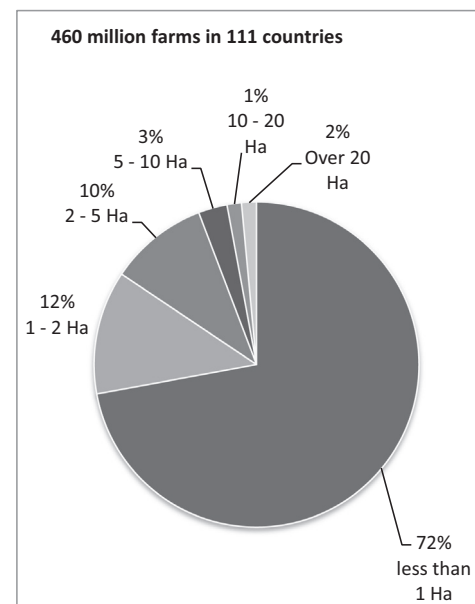


Figure 4. Share of farms worldwide, by land size class. Sources: Authors' compilation using data from FAO (2001, 2013). See Web Appendix Table 3. Notes: The figures are based on the most recent available estimate for each country from the World Agricultural Census 1990 and 2000 rounds.

averages are representative of farm sizes worldwide, we estimate that worldwide there are more than 410 million farms less than 1 ha in size and more than 475 million farms that are less than 2 ha in size (this is the result of more than 570 million farms multiplied by 72% and 84%, respectively). This would support claims that worldwide there are about 500 million small farms (those with less than 2 ha) (see, for example, Hazell *et al.*, 2010; HLPE, 2013; IFAD, 2011; Wiggins *et al.*, 2010).

Estimates of the number of farms by farm size class are fairly widespread, since many countries provide that information in their agricultural census. It is more difficult to estimate how farmland is distributed among farms of different sizes, since fewer countries report information on agricultural area by land size class. To date, no comprehensive estimates of farmland distribution have been made for the world as a whole, but some work does give an indication of farmland distribution for selected countries or country groups (see Section 2).

Here we present the most comprehensive estimate possible of the distribution of farms and farmland by land size class; the data underlying the estimates in this section are presented in Web Appendix Table 3. We have data on both the number of farms and the agricultural area by land size class for 92 countries and territories. This sample of 240 million farms represents 42% of the world's farms, as well as about 56% of the world's population, 43% of the population active in agriculture, and 38% of agricultural land worldwide (FAO, 2014a). We cannot claim that this sample is representative of the world's farms. It does not include China, thus omitting about 35% of the world's farms; the Russian Federation and Australia are likewise not included. It under-samples countries in Sub-Saharan Africa and the low-income category, with only nine and eight countries in each group, respectively.

We first consider the pattern of agricultural land distribution observed based on a country's income level. For nearly all income levels, on average, a large share of farms (between 40% and 80%) are smaller than 2 ha; they control anywhere from a few percent to about 40% of farmland (Figure 5). The farmland share represented by the larger cohorts would seem to increase with each income category. For example, farms greater than 5 ha in size cover 27% of the farmland in low-income countries, 43% in the lower-middle-income countries, 96% in the lower-middle-income countries, 96% in the upper-middle-income countries, and 97% in the high-income countries. In short, it would appear that the share of farmland controlled by larger farms is higher in countries with larger average incomes.

We now examine regional patterns among the 58 low- and middle-income countries for which agricultural censuses report information on both number of farms and farmland by land size class (Figure 6). In all regions except Latin America and the Caribbean, the majority of farms are in the smallest cohort (smaller than 1 ha). The distribution of farms and farmland according to farm size seen for the nine countries located in Sub-Saharan Africa is similar to that of the three South Asian countries, where about 80% of farms are smaller than 2 ha and operate close to 40% of the farmland; in those regions, few farms reach a size larger than 50 ha and the few that do comprise only a small share of total farmland. The distribution observed for the nine countries in East Asia and the Pacific (excluding China) is also quite similar, with about 75% of farms being smaller than 2 ha and representing almost 30% of farmland, and farms rarely reaching sizes exceeding 100 ha. In Latin America and the Caribbean, the pattern is radically different. There are relatively fewer very small farms and the bulk of the land is operated by a small number of very large farms. Farms in Latin America and the Caribbean are generally larger and a few very large farms exceeding 1000 ha in size

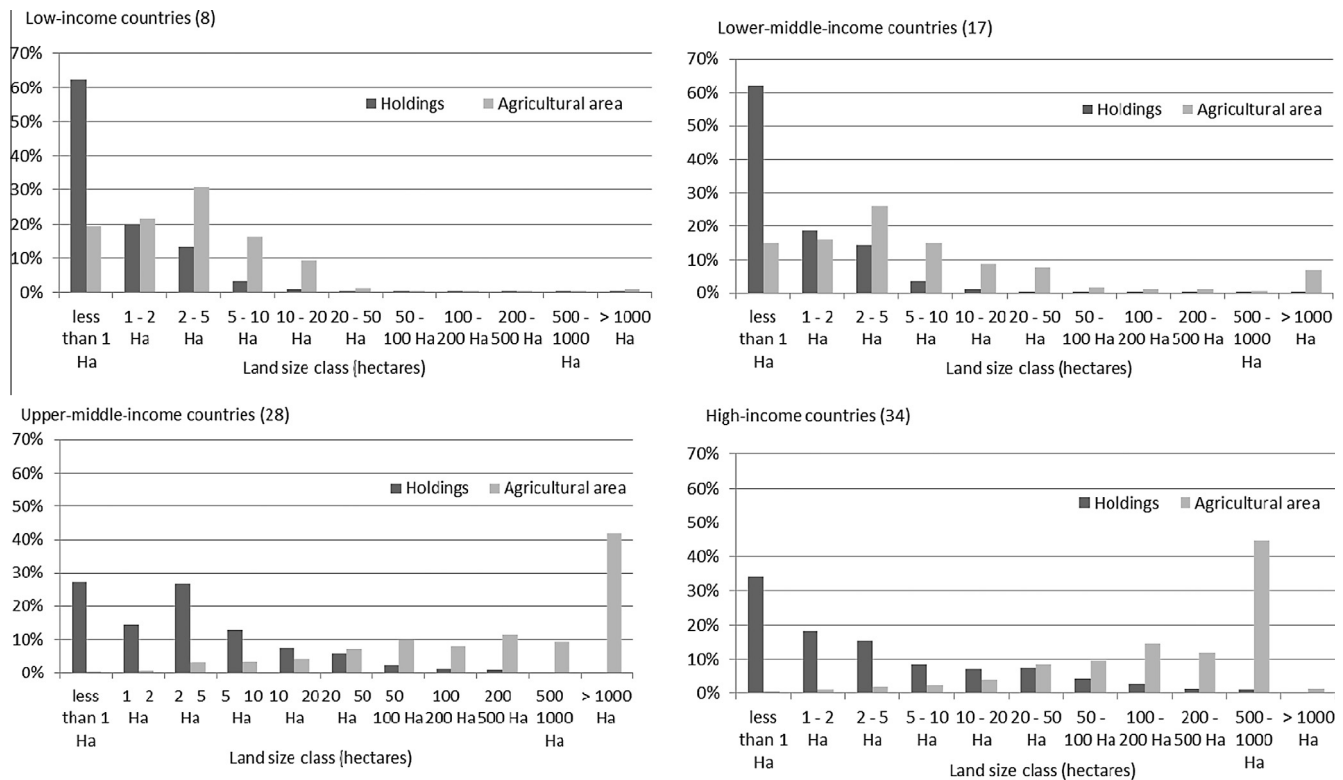


Figure 5. Distribution of farms and farmland area by land size classes and income group. Sources: Authors' compilation using FAO (2001, 2013). See Web Appendix Table 3. Notes: Country groupings are the same as those used by the World Bank (2012). Number of countries shown in parentheses.

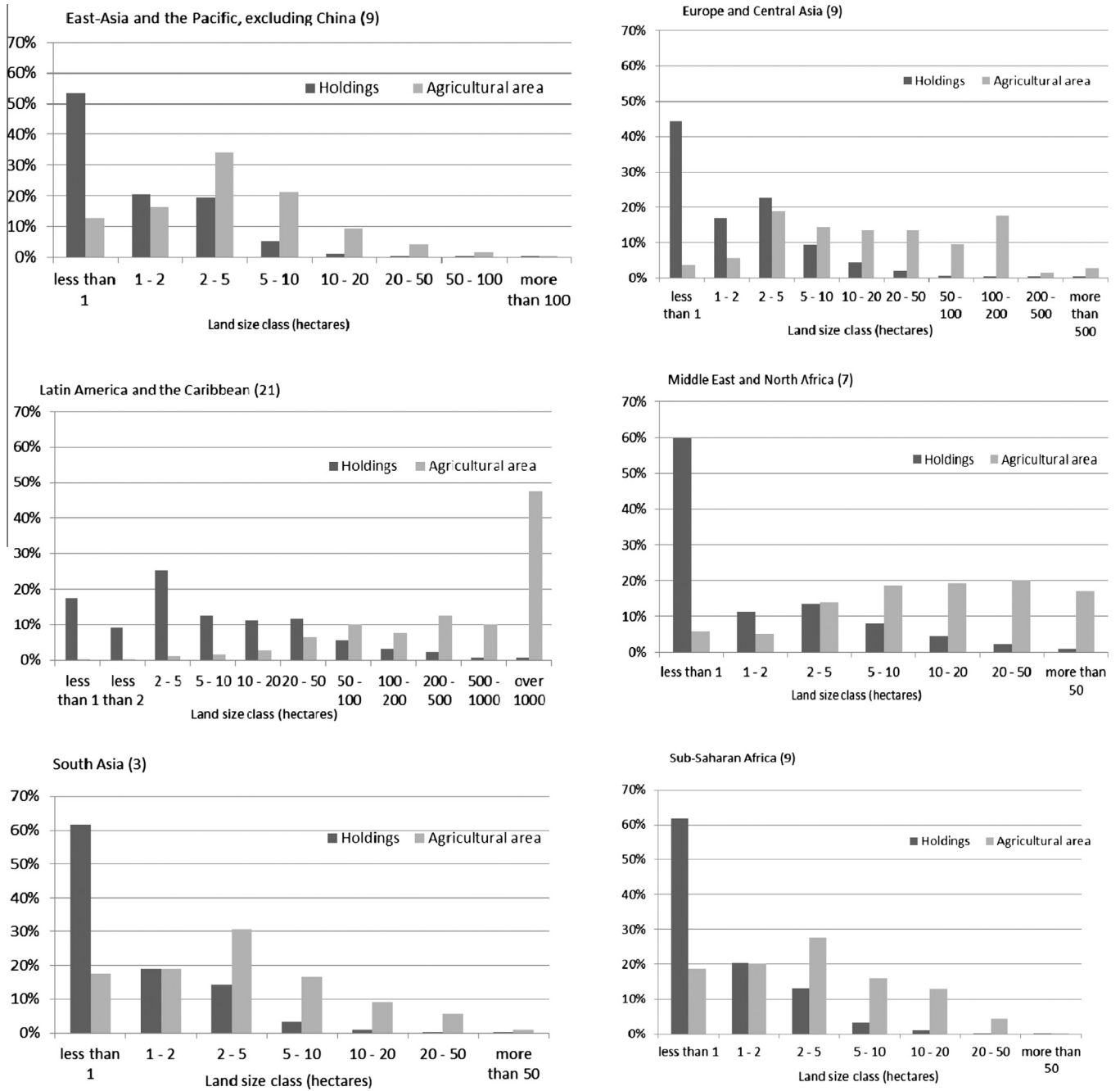


Figure 6. Average distribution of farms and farmland area by land size classes and region. Sources: Authors' compilation using FAO (2001, 2013). See Web Appendix Table 3. Notes: Country groupings are the same as those used by the World Bank (2012) with the following additions: Cook Islands were classified as East Asia and the Pacific; French Guiana, Guadeloupe, and Martinique as Latin America and the Caribbean; and Réunion as sub-Saharan Africa. Number of countries shown in parentheses.

represent nearly half of the total farmland. In the Middle East and North Africa, 70% of all farms are below 2 ha, but more than 50% of the land is farmed by holdings above 10 ha in size.

We can improve the representativeness of the sample by including an additional 14 countries for which we have information on the number of farms by farm size class as well as the total farmland operated nationally, but not by land size class. These countries include China as well as Canada, Guinea Bissau, Hungary, Lesotho, Libya, Malawi, Mozambique, New Zealand, Slovakia, Slovenia, Spain, St. Kitts & Nevis, and Viet Nam. We estimate the farmland distribution in each of

these countries by assuming that the average farmland size in each cohort in the 14 countries is the midpoint of the cohort. That is, in each of the countries the farms in the 0–1 ha cohort average 0.5 ha; those in the 1–2 ha cohort average 1.5 ha, etc. The hectares of farmland in the largest farm size class reported by each country are calculated as the difference between the total number of hectares of agricultural land in the country and the sum of the estimated hectares of land in the smaller land size classes (using the midpoint assumption).

Adding the 14 countries, including China, to the 92 country sample, we have a 106 country sample covering a total of 450 million farms. These countries represent 80% of the world's

farms, about 85% of the world's population active in agriculture, 80% of the world's population, and 60% of agricultural land worldwide (FAO, 2014a). We find that 84% of the farms are smaller than 2 ha and operate about 12% of the farmland (Figure 7). Otherwise stated, only 16% of the world's farms are larger than 2 ha, but they represent 88% of the world's farmland.

For two reasons this is a fairly conservative estimate of the degree to which farmland distribution is unequal at the global level. First, by using the midpoint assumption for the 14 countries that do not report information on agricultural land operated by land size class, our estimate probably overstates the share of farmland held by small farms worldwide. Secondly, as data were not available for Australia or the Russian Federation, our estimate does not include either of those two countries. Both Australia and the Russian Federation have vast amounts of farmland, the majority of which is found on large farms; were either of those two countries included in our estimates they would show the distribution of agricultural land worldwide as being even more unequal than it appears in Figure 7 (FAO, 2013; Lerman & Sedik, 2013).

In conclusion, in countries at lower levels of income smaller farms operate a far greater share of farmland than do smaller farms in the higher income countries. This is perhaps best illustrated by considering the share of farms and farmland represented by farms that are smaller than 2 ha. Globally, about 84% of farms are smaller than 2 ha, and they operate about 12% of farmland. In low- and lower-middle-income countries, as well as in countries of East Asia and the Pacific (excluding China), South Asia and Sub-Saharan Africa, about 70–80% of farms are smaller than 2 ha and operate about 30–40% of land in those countries. In upper-middle-income countries (excluding China), high-income countries, Latin America and the Caribbean, Middle East and North Africa a large share of farms are likewise smaller than 2 ha in size, but they operate less than 10% of farmland.

Claims are often made that small farms are responsible for large shares of the world's food production, often without a clear definition of a small farm. What can meaningfully be considered a small farm clearly depends on the country and the context. However, as we have seen, globally farms smaller than 2 ha operate only 12% of the world's agricultural land. We do not know the relative land productivity of farms smaller than 2 ha relative to those larger than 2 ha, although a large body of literature on land productivity by farm size has shown a phenomenon referred to as the inverse land

productivity relationship, i.e. that in a number of countries smaller farms have higher crop yields than do larger ones (Barrett, Bellemare, & Hou, 2010; FAO, 2014b; Larson et al., 2014). We likewise do not know what share of farmland on holdings smaller than 2 ha is used for food production as opposed to agricultural production or what share of land included in our estimates of farmland area is land that lies fallow. Nevertheless, it seems implausible that farms smaller than 2 ha in size are able to produce the majority of the world's food using a mere 12% of the world's farm land, and, in any case, claims to the contrary are unsubstantiated. For some regions and country groups, however, these farms manage a larger share of the region's land and are thus likely responsible for a larger share of the region's food or agricultural production than at the global level. In East Asia and the Pacific, excluding China; South Asia; Sub-Saharan Africa, and in low- and lower-middle-income countries farms smaller than 2 ha operate 30–40% of agricultural land. This would suggest that their share of regional or group-wide agricultural production is sizeable, but it does not provide proof that they are responsible for a majority of agricultural production in those regions or country groups.

7. THE NUMBER AND DISTRIBUTION OF FAMILY FARMS

Family farms have figured prominently in the discourse about agricultural development, but definitions are often unclear. The term family farm may even be used interchangeably with smallholder farm. In an attempt to lend some clarity, we provide an estimate of the total number of family farms worldwide as well as the share of agricultural land they operate, which has implications for their contribution to total food and agricultural production.

There is no universally agreed definition of family farms, although various stakeholders have established definitions either for purely analytical purposes or for the implementation of government programs. Despite wide variation among definitions of family farms, there are some commonalities. A survey of 36 definitions of family farms found that the most common aspect of such definitions is the use of family labor and that many of the definitions also specify that the farm is managed by the family (Garner & de la O Campos, 2014). Some definitions limit the size of the farm explicitly by establishing a maximum land area for the farm, beyond which the farm is no longer considered a family farm. Finally, a definition may require that the share of household income from non-farm activities not exceed a certain level.

Information from national agricultural censuses can provide insights into the prevalence of some of the characteristics that commonly enter into the various definitions of family farms. International comparison tables are available describing such characteristics for some countries included in the 2000 round (see Web Appendix Table 4 and FAO, 2013). The sample sizes are small since many countries chose not to report such information in their census. We first consider whether the farm is owned or operated by a family and next whether the labor is supplied by the family or by hired workers.

Some censuses report on the legal status of the holder of the farms (see Section 3 for the definition of agricultural holder), but the censuses generally do not report on ownership of the farm. In most of the 52 countries for which we have information (FAO, 2013), more than 90% of farms (and often close to 100%) are held by a single individual, a group of individuals or a household, either with or without a formal contract; only a

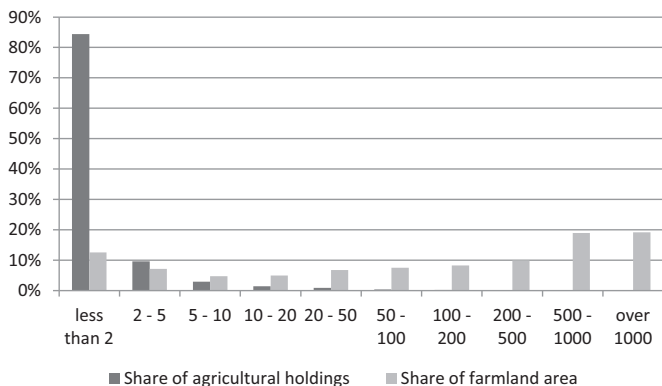


Figure 7. Distribution of farms and farmland area by land size classes, 106 country sample. Sources: Authors' compilation using FAO (2001, 2013). See Web Appendix Table 3.

very small share of farms are held by a corporation, cooperative, governmental institution, religious institution, or an unknown arrangement.

Several definitions of family farms also require the family to supply the majority of the labor used on the farm. Data on the use of family and hired labor are quite limited in the censuses. Only 55 countries report data on the number of permanent hired workers; for nearly all of these, the average is very small, far less than 1 hired worker per farm (FAO, 2013). Only 30 countries report data on both family and permanent hired labor; for these countries the total number of family members engaged in agriculture exceeded the total number of permanent hired workers by a ratio of 20–1. In many contexts, seasonal hired workers provide an important source of labor for farms, but data on seasonal hired workers are available only from very few agricultural censuses. Therefore, in the absence of more information, we conclude that family labor exceeds hired labor on the vast majority of farms (FAO, 2013).

We use this information, together with our estimate of the total number of farms worldwide, to provide a rough estimate of the total number of family farms worldwide. We assume that at least 90% of the world’s more than 570 million farms are held by an individual, small group of individuals, or household, as was the case for our 52 country sample. This leads us to estimate that there are more than 500 million family farms worldwide.

Due to data limitations, the estimate of more than 500 million family farms worldwide should be considered an approximation. Current agricultural censuses are not available for many countries where the number of farms has probably increased in recent years, so the total number of farms likely exceeds the 570 million estimated here. Furthermore, in almost all countries for which data are available, 90% represents a conservative estimate of the share of family farms in the total. On the other hand, agricultural censuses do not provide data on seasonal workers, who are an important source of labor for farms in many contexts. Accurate data on the use of seasonal labor might lead to lower estimates of the share of family farms in several countries, depending on the threshold used for the share of non-family labor in the family farming definition.

Information on how farmland is distributed among family and non-family farms is limited. However, for a subset of 28 countries for which data are available the unweighted average share of total agricultural land operated by farms which we have classified as family farms is 73%. Calculating a weighted average (using the amount of agricultural land in each of the 28 countries as weight), we find that 77% of the land is operated by family farms.

The sample is small, but if it is representative of the world as a whole, it would suggest that more than 90% of the world’s farms are family farms and that they operate about 75% of the world’s land. This would imply that family farms are likely to be responsible for the majority of the world’s agricultural and food production. However, family farms, as defined in this article, are a diverse group which includes farms of all sizes. In designing policies for agricultural development, it is necessary to bear this diversity in mind and distinguish among different types of family farms.

8. CONCLUSIONS AND IMPLICATIONS

In summary, the main findings of this article, which represent very broad estimates, are:

There are more than 570 million farms in the world; more than 475 million farms are smaller than 2 ha, and more than 500 million are family farms.

From 1960 to 2000, average farm size decreased in most low- and lower-middle-income countries and in South Asia as a whole. It decreased from 1960 to 1990 in Latin America and the Caribbean as a whole, before increasing from 1990 to 2000. Average farm sizes increased from 1960 to 2000 in some upper-middle-income countries and in nearly all high-income countries for which we have information. Data on average farm size are lacking in particular for China as well as many other countries in East Asia and the Pacific and for countries in Sub-Saharan Africa. Expectations of land consolidation in China, together with a slight increase in average farm sizes for a small sample of low- and middle-income countries from 1990 to 2000, raises the question: has average farm size for the world as a whole already begun to increase or will it increase in the near future? For many low- and lower-middle-income countries, however, average farm sizes are likely to continue to diminish for some time still.

Globally, about 84% of farms are smaller than 2 ha, and they operate about 12% of farmland. In countries at lower levels of income, smaller farms operate a far greater share of farmland than do smaller farms in the higher-income countries. In low- and lower-middle-income countries, as well as in countries of East Asia and the Pacific (excluding China), South Asia, and Sub-Saharan Africa, about 70–80% of farms are smaller than 2 ha and operate about 30–40% of the land.

Our findings illustrate that the terms family farm and small farm must not be used interchangeably. According to the most commonly used definitions, more than 90% of the world’s farms can be considered family farms, while 84% of all farms are small farms (less than 2 ha) (Figure 8). Indeed, while there must necessarily be a considerable degree of overlap between the two categories, they are not the same. While family farms operate the majority of the world’s agricultural land (about 75%), small farms (below 2 ha) operate only about 12% of the world’s land.

These estimates of farm distribution provide insights into the share of the world’s food or agricultural production that is produced by either of the two groups. With family farms operating 75% of the world’s agricultural land, and with a consistent high share across almost all countries, it follows that they are likely responsible for the majority of the world’s food and agricultural production. However, it is implausible that with only 12% of the world’s land, small farms, defined as those operating less than 2 ha, are able to produce a large share of the world’s food,

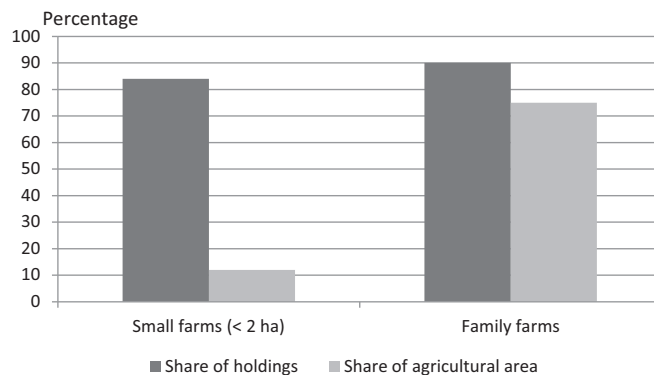


Figure 8. Share of holdings and agricultural area, by farm type. Sources: Authors’ compilation using data in Web Appendix Tables 3 and 4.

and claims that they do remain unsubstantiated. For some regions and country groups, these farms control a larger share of the land and are thus likely responsible for a large share, but not necessarily a majority, of food or agricultural production in those regions or country groups.

These estimates attempt to provide a comprehensive description of the number and distribution of farms and farmland worldwide, but there are important caveats, both in terms of the analysis and the data used. Future work might improve upon these results by conducting a comprehensive statistical analysis of the data we have used, which are made available in [Web Appendix](#). In terms of data, agricultural census reports have achieved a high degree of standardization as a result of the World Programme for the Census of Agriculture. Nevertheless, as with any international dataset, variations among surveys in terms of definitions, methodologies, geographical coverage, and the inclusion (or not) of non-household farms mean that the estimates are often times not comparable across countries or over time. Continuing to improve documentation of the coverage and methodology used in agricultural census reports is important to gain a better understanding of the degree to which such variations are a problem.

Furthermore, agricultural census data are rarely made available to researchers at the farm level. As a result, the agricultural and development economics profession relies mostly on household surveys, which, despite being a rich source of detailed information, do not include larger commercial or government owned, non-household farms. A comprehensive understanding of the agricultural landscape requires access to data that cover all entities in the sector and not only farm households. It would seem appropriate to redouble efforts to make farm-level agricultural census data more easily accessible to researchers as well as to encourage all countries to conduct comprehensive agricultural censuses which either sample or enumerate all types of farms throughout a country.

Were all agricultural censuses to include information on farmland distribution it would help us improve our understanding of farmland distribution worldwide. Also useful for analytical purposes would be the systematic inclusion of data on use of hired labor—both permanent and seasonal.

Continued efforts to enhance the collection of up-to date, comprehensive and more standardized agricultural census data are essential to having a more representative picture of the number of farms, small farms, and family farms as well as changes in farm size and farmland distribution worldwide.

NOTE

1. Small is a relative concept and highly context specific, with national definitions of small farms varying widely from country to country and wide variation in approaches to measuring the number of smallholders. The most widely used approach for global or regional estimates is that of

using the size of an agricultural holding. An overview of this issue is beyond the scope of this paper. For more, see, for example, [FAO, 2015](#) and [HLPE, 2013](#).

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APPENDIX A. SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.worlddev.2015.10.041>.

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