

# Are Small Farmers More Productive in Rwanda?

## Labor market imperfections seem to be a key reason for the inverse relationship between farm size and productivity in Rwanda

While an inverse relationship between a farm's size and its productivity is a recurrent empirical finding, different explanations are proposed in the literature. One is that small farmers apply more than the optimum amount of inputs, possibly because of factor market imperfections. Another is a failure to adequately measure key factors, especially land area or quality. Empirical evidence from Africa remains particularly ambiguous.

But as countries seek to modernize agriculture and transition from a subsistence-based economy, the answer matters: If small farms are efficient, policy should focus on attracting upstream investment (such as in agroprocessing) and link smallholders to markets. If they are not, a strategy aimed at leapfrogging to large-scale farming may be more desirable, along with a regulatory environment that discourages further subdivision and promotes land consolidation.

In Rwanda, Africa's most densely populated country, fragmentation and small farm sizes are considered key policy issues. Average farm size is only 0.72 hectares in four parcels, not enough to satisfy even subsistence

needs with traditional technology. This prompted the government to put in place a national land policy promoting land use planning, consolidation of land into "economic" plot sizes, and prohibitions on subdivision.

Such measures are not uncontroversial and have proved to be difficult to implement in other settings. In a recent paper Ali and Deininger undertake an empirical investigation of the underlying assumptions using nationally representative plot-level data that allow them to control for household-specific heterogeneity.

Descriptive statistics by tercile of the farm size distribution reveal three regularities. First, plot (and farm) size is inversely related to land quality; that is, smaller farms and plots have higher land quality and are less likely to be affected by crop shocks. Second, differences in output per hectare and input use intensity across farm size classes are pronounced (figure 1): output value per hectare for farms in the bottom tercile (\$860) is almost three times that of those in the top tercile (\$298), with differences even more pronounced at the plot level (from \$1,296 to \$317). But third, for profit per hectare based on actual input costs and labor valued at market wages, the inverse relationship between size and productivity essentially disappears (figure 2).

Empirical results suggest that technology is characterized by constant returns to scale; that even after

controlling for land quality, yields, labor intensity, and shadow profits per hectare are all much higher on small farms; and that profit per hectare (with labor valued at market rates) is virtually identical across holding and plot sizes. Results thus point to labor market imperfections as a major reason for the inverse relationship between farm size and productivity, but suggest that with existing market imperfections, small farms are able to gainfully absorb large amounts of labor.

As long as farmers' labor use responds to price signals, land market interventions such as restrictions on subdivision or involuntary consolidation programs may thus yield few benefits and could even be counterproductive. Efforts to reduce labor market imperfections, and nonagricultural growth that leads to higher wages and nonagricultural employment opportunities pulling labor out of agriculture, may be more effective tools to improve rural welfare.

*Daniel Ali and Klaus Deininger. 2014. "Is There a Farm-Size Productivity Relationship in African Agriculture? Evidence from Rwanda." Policy Research Working Paper 6770, World Bank, Washington, DC.*

Figure 1. Yield Per Hectare at the Plot and Holding Level

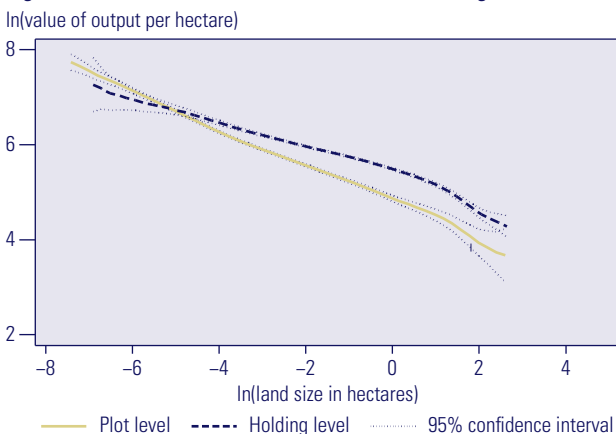


Figure 2. Net Profit Per Hectare at the Holding Level, with Family Labor Valued at Market and Shadow Wages

