

# Combining agricultural surveys and censuses to develop a typology of small and medium family farms in Peru

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## Introduction:

A big proportion of Peruvian family farms have low productivity and low income. This is why public policy is necessary for this sector. There is ample consensus that policies aimed to this type of farmers will have better results if they are geographically targeted. However, current surveys are limited in information about income, costs and production at reasonable disaggregation levels. This study aims to make small area inferences about these variables combining information from the Agricultural Census of 2012 and the National Agricultural Survey (ENA) of 2014. For this, we employ unit level small area estimation methods to gain higher statistical precision at levels of spatial disaggregation that are not available in the ENA. Further, we use these small area estimates to construct a preliminary typology of small and medium family agriculture in Peru.

## Empirical results:

- Subsistence farmers: 73% of the Peruvian family farmers reports a net farm income less than the minimum necessary to cover their food intake.
- Consolidated farmers: Only 7% have sufficiently high farm income to achieve a low probability (10%) of returning to poverty at any time.
- Remaining family farmers (20%) are distributed equally across the two transition categories.
- The proportion of production aimed at self-consumption within subsistence farmers is significant, as expected, but it is interesting to observe that the share aimed at the market is also sizable.

Table 1: Relative importance of estimated family farm types

Variables	Subsistence	Transition I	Transition II	Consolidated
% Family farmers	71.23%	12.18%	9.70%	6.89%
Net farm income	11.85	165.81	324.16	1787.93
% of production for own consumption	37.40%	18.00%	11.50%	6.60%
% of production for sale	46.10%	65.70%	72.30%	76.30%

## Method:

Producers were divided into four categories: family subsistence agriculture, transitory family agriculture 1 (vulnerable farmers), transitory family agriculture 2 (less vulnerable), and consolidated family agriculture following Soto-Baquero et al. (2007) and Maletta (2011). Net farm income is needed for estimating this typology. We use SAE to predict net farm income using a multilevel mixed effect model that incorporates a Heckman selection bias correction, considering that 18% of the observations have a negative net income. The estimation method includes the following steps: Selection of the variables used in the model using the forward stepwise regression technique for each of the three main regions in which Peru is divided (coastal, highlands and amazon regions)

Estimation of the probability of having a negative income using as explanatory variables the same variables selected in step one. We obtain the inverse Mills ratio.

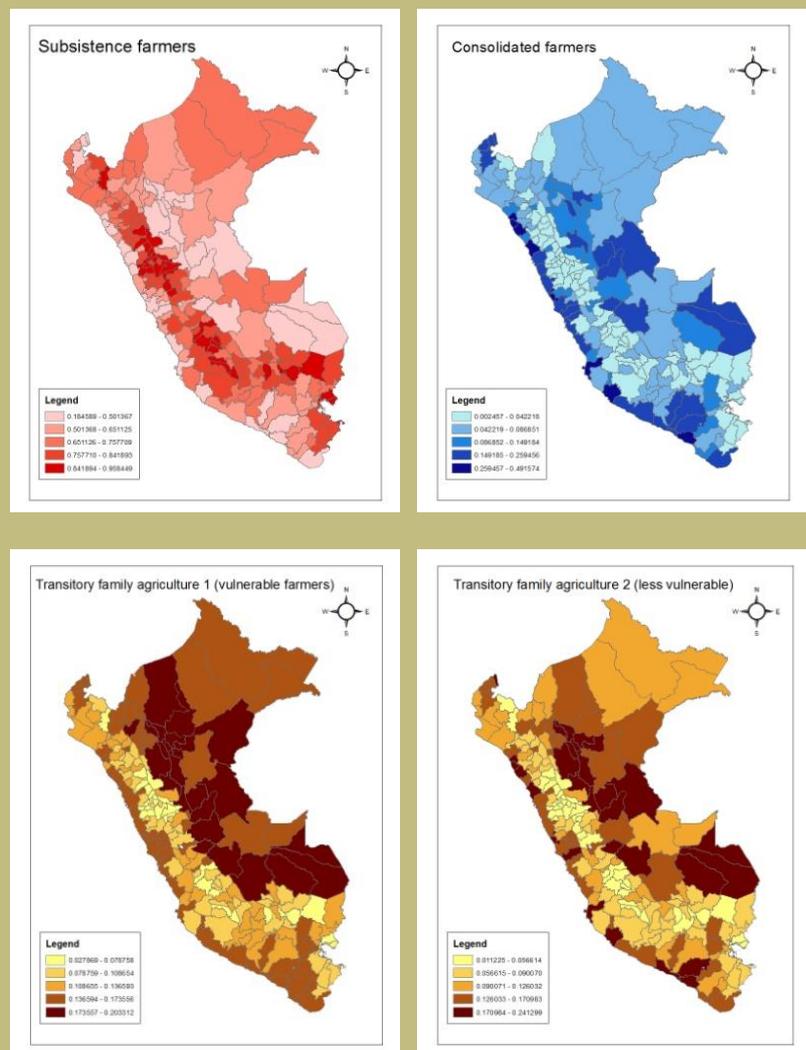
Estimation of a unit level SAE model of the logarithm of net farm income using as explanatory variables those selected in step one and the inverse Mills ratio.

MSE are calculated for a unit level model (Empirical Bayes estimate of a Battese, Harter and Fuller model) and an area level model (EBLUPs based on a Fay-Herriot model) to evaluate which model shows a better performance.

## Validation:

MSE figures indicate that EB estimates of the unit level model outperform EBLUPs area level estimates. Accordingly, we opt for the unit level SAE.

## Mapping of SAE of family farm types (Provincial level):



## Conclusion:

The study shows that SAE methodology can be a very useful to estimate key indicators of agricultural activity at levels of disaggregation (i.e. provinces) that are not typically available –using surveys based on relatively small samples with limited capacity of inference (national or regional).

## References:

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