Supermarkets, Farm Assets, and Technology Choices: a Duration Analysis of Horticultural Growers in Nicaragua

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Introduction

Market participation has been recognized as a main driver of economic development in rural areas of the world. Rural development has expanded market access and participation for small farm households, shifting from production of traditional/staple goods to horticultural goods for urban and foreign markets.

However, not every smallholder who has been exposed to the opportunity of adoption decides to participate, and if they participate, many withdraw from markets after a short period of participation.

Studies of the adoption of horticultural markets have commonly focused on the dichotomous decision of market participation by estimating limited dependent variable models, and without considering the dynamic nature of the adoption process.

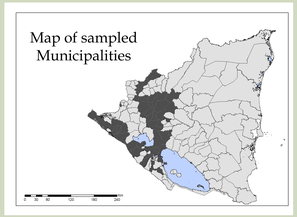
In addition, dichotomous models fail to examine the diffusion of market participation over time. Not all farm households who adopt new, presumably more profitable market channels (such as supermarkets) remain as suppliers of the new market over time.

Objective

We used a duration analysis approach to:

1. Identify the determinants of participation in the supermarket channels by small tomato farmers in Nicaragua, and
2. Once smallholders have adopted the supermarket channel, analyze the factors that influence the decision to remain as supermarket suppliers in the future.

Methods



We estimate the smallholder's decision to adopt (and withdraw) from the supermarket channel using a hazard model framework, in which, the pre-adoption and adoption spells are analyzed in relation to a set of time-varying and time-invariant covariates.

We use a panel constructed from a random sampled of tomato growers taken in 2004 and revisited in 2010.

Implementation

In the first stage, we estimate a parametric hazard function with a Weibull distribution $h(t) = \lambda(x)^{\rho} \rho t^{\rho-1}$

using the Accelerated Failure Time (AFT) model transformation for its simplicity to interpret results.

$$\log(t) = \beta' X + \sigma\varepsilon$$

Results

	Adoption Spell		Withdrawal Spell	
	Coefficient	SE	Coefficient	SE
Observations	646		124	
Lagged (1 year) tomato price per lb. at the municipality level	4.345*	(2.300)	-1.883*	(1.132)
Distance to the nearest ag-inputs distribution store	-0.011	(0.011)	0.009	(0.007)
Age of the head of the household (HHH)	-0.007	(0.009)	0.021***	(0.005)
Years of education of the HHH	-0.028	(0.030)	-0.022	(0.018)
Average years of education taken within the adult members of the HH	-0.029	(0.031)	0.056**	(0.022)
HHH is female	-0.509	(0.351)	-0.172	(0.231)
Number of adults (14 to 60 years old) in the HH	-0.044	(0.062)	-0.064	(0.042)
Share of adults working in local off farm employment	-1.175***	(0.451)	-0.505	(0.326)
Lagged (1 year) participation in a production cooperative by any adult member of the HH	-0.222	(0.246)	-0.331*	(0.172)
Total owned arable land in Ha	0.116*	(0.064)	0.003	(0.048)
Total owned arable land squared	-0.010**	(0.005)	-0.004	(0.003)
Total value of livestock holdings (USD)	-0.000	(0.000)	0.000	(0.000)
Lagged (1 year) farm assets index	0.172	(0.168)	0.218	(0.231)
Lagged (1 year) non farm productive assets index	-0.371**	(0.175)	0.479***	(0.178)
Lagged (1 year) durable assets index	0.430***	(0.129)	-0.048	(0.110)
Distance to the nearest wholesale market (kms)	0.001	(0.001)	-0.001	(0.001)
Distance to the nearest local market (kms)	0.000	(0.005)	-0.007**	(0.003)
Distance to the village center (kms)	-0.002	(0.008)	-0.004	(0.005)
Constant	2.759***	(0.741)	0.015	(0.418)
ρ	1.780		2.239	
$\sigma=1/\rho$	0.562		0.447	
Observations	646		124	
LR Chi^2(18)	35.36		86.99	
Prob > Chi^2	0.009		0.000	

Results

On Adoption:

- The effect of the lagged traditional market price suggest that households are quite responsive to price changes, farmers tend to adopt late when the traditional market price is high.
- Households with more nonfarm productive assets and with more labor dedicated to local off farm employment tend to adopt early, suggesting a link between income and market diversification.
- Households with larger land holdings are less interested in adopt a new market channel.

On withdrawal :

- The effect of the lagged traditional market price is consistent with the previous results, by suggesting that households are more willing to withdraw from the supermarket channel if the price in the traditional market is high.
- Age of the head, average education of the household and lagged nonfarm assets have positive effects on remaining as supermarket suppliers.
- Lagged participation in cooperatives have a negative effect on the adoption spell. This effect is explained by taking into consideration the role of highly subsidized cooperatives formed by the sole purpose of supplying supermarkets, who failed as consistent suppliers once external support finished.

Conclusion

Farm households are very sensitive to price changes, as fluctuations in the traditional price affects the household's decision to adopt/withdraw from supplying supermarkets The results show a link between local nonfarm and market participation, suggesting that income diversification bolsters participation in modern markets.

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