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Rural-urban Territorial effects on dairy farm participation in modern market channels: the case of Colombia

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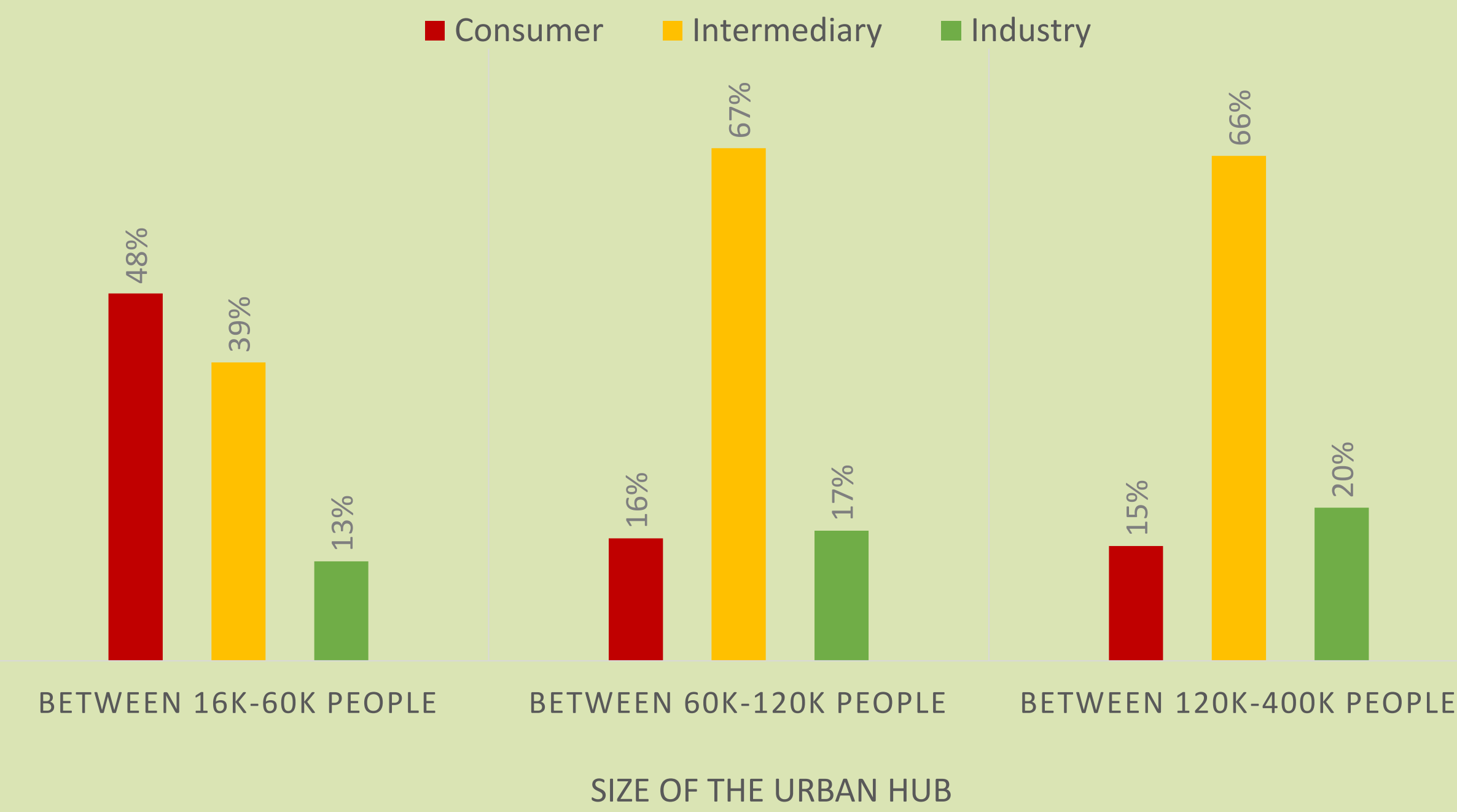
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INTRODUCTION

- Currently in Latin America, **47%** of the urban population lives in secondary/tertiary cities (less than a million people).
- Still, there is very little research on how rural territorial development interacts with transforming value chains in the market catchments of secondary/tertiary cities.
- Meaning it is key to understand the link between:
 - (1) the restructuring of agri-food value chains;
 - (2) rural territorial development;
 - (3) urbanization via the rise of secondary/tertiary cities below several million.
- In Colombia, this link has started to become evident within the milk value chain, as larger urban hubs display a higher use of modern market channels by farmers.

PERCENTAGE OF MILK THAT IS SOLD TO DIFFERENT CHANNELS BY MILK FARMERS IN RURAL-URBAN* TERRITORIES WITH DIFFERENT HUB SIZES



*Rural-Urban Territories or **RUTs** are territories anchored by secondary/tertiary cities that have between 16k-400k people.

OBJECTIVES

- By understanding market channel differentiation is an index of value chain transformation in a territory,
- We want to determine how do the characteristics of different rural urban territories (such as size of hub, violence levels, and inclination of the landscape) as well as distance of farm to urban hub, affect the decision to participate within a market channel for milk farmers in Colombia**

DATA

- We undertook in 2018 a survey of 1180 milk farmers in 20 rural-urban territories .
- The farmers were chosen randomly from a census list from the Ministry of Agriculture.
- Farmers were asked about their current production, farm and non farm assets, market channel choice, input costs distance to markets, as well as recall data.
- Additionally, we held workshops with processors, traders and local cheesemakers in order to determine the availability of market channels for farmers.
- Additionally, we used information from the phase 1, RIMISP 2017 survey to generate a violence index.

ECONOMETRIC MODEL

- The empirical approach is based on a discrete choice model where producers select a set of marketing channels for agricultural output.
- Farmer *i* makes a choice among three main channels: (1) direct to big/medium processing firms; (2) to local traders; (3) to local consumers/cheese makers.

- Farmer *i*'s utility derived from choice alternative *j* , *j* = 1, . . . , *J* (*J* = 3) is

$$V_{ij} = X_i' \beta_j + \varepsilon_{ij}$$

- Where the vector of characteristics *Xi* contains all the factors that influence this utility.
- The random errors ε_{ij} are assumed to be independent and identically distributed across the *J* alternatives.

- Let *yij* be the dependent variable with *J* outcomes numbered from 1 to *J* . The choice probability is defined by the following multinomial logit framework (after imposing the usual identifying restriction $\beta_1 = 0$):

$$\Pr(y_i = 1|X_i) = \frac{1}{1 + \sum_{k=2}^J \exp(X_i' \beta_k)}$$

$$\Pr(y_i = 1|X_i) = \frac{\exp(X_i' \beta_j)}{1 + \sum_{k=2}^J \exp(X_i' \beta_k)} \text{ For } j = 2, \dots, J.$$

- Estimation of this model is obtained by maximizing the log-likelihood function

THE VARIABLES

- For this study we focused on the farmers' decision to sell to a specific market channel in the last 12 months (assuming no change between seasons).
- On this case the options were the following; to sell to: (1) Big milk processors; (2) Small/medium milk processors; (3) Cooperative; (4) Independent collection center; (5) Local intermediary/trader; (6) External intermediary/trader; (7) Artisanal cheesemaker; (8) Store, (9); Directly to the consumer.
- Here we decided to group in the three categories mentioned earlier where the first group is 1 and 2, the second group is 3 to 6 and the last is 7-9.

- For our determinants we focused on:

- 4 territorial characteristics:**

(1) **Urban hub size:** Where RU1 are RUTs with a hub of 16k -60k people; RU2 are RUTs with a hub of 60k-120k, and RUT3 have hubs with 120k-400k people.)

(2) **Violence Index:** measured using internally displaced population, homicide rates, terrorists' attacks, and coca cultivation

(3) **Geographical:** particularly if the territory was mountainous, hilly or a plain

We included distance to urban hub and distance to paved road at the farmer level to control for individual territorial characteristics.

- Input and Output prices at RUT level:** (1) Average milk price per market channel in the year prior; (2) Average feed prices
- Farm capital:** (1) Share of land owned per year; (2) Share of pasture land; (3) Size of heard
- Non farm capital:** (1) Index of nonfarm productive assets
- Household characteristics:** (1) Age; (2) Sex; (3) Education (None, primary, secondary; graduate level)

RESULTS

Variable	Local Traders		Big/Medium Processing Firms	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Urban hub size				
RU2	1.81***	0.267***	1.60***	0.026*
RU3	0.616	0.029	1.41*	0.140
Violence Index	3.78***	0.75***	-1.21	-0.214
Geographical				
Hills	0.008	0.07	0.467	0.813
Plain	-0.009	0.11	-1.21	0.180
Distance to paved road	-0.010	-0.002	-0.004	0.0004
Distance to Urban hub	0.003	0.000	0.003	0.0001
Output/Input Prices				
Av Price/lt of Big/Medium processors	-0.003	0.008	0.002	0.001
Av Price/lt of Local Traders	-0.001	-0.730	0.000	0.000
Cost of feed	0.006	-0.001	0.000	0.003***
Farm Capital				
Share of land owned per year	0.0631319	-0.002	0.484	0.057
Share of pasture land	0.4722698	0.000	-0.134	-0.064
Size of heard	-0.0083683	-0.002**	0.0017*	0.001*
Non- Farm Capital				
Index of nonfarm productive assets	-0.1535116	-0.045***	0.090	0.0285*
Household Characteristics				
Sex	0.2085934	0.017	0.335	0.022
Age	-0.012307	-0.001	-0.015	-0.001
Education				
Primary	-0.1591189	-0.050	0.173	0.034
Secondary	-0.4112196	-0.096	0.043	0.041
Graduate	-0.7971365	-0.260	0.633	0.187*

***p<0.001 **p<0.005 *p<0.01

CONCLUSIONS

- Being within **more urban** territories increases the likelihood of selling to traders as well as the modern channel.
- Violence index** as well increases the probability of selling to traders but is negative and non significant for modern channel. This might have to do with the fact that traders are able to pick up the milk within the most dangerous zones.
- This would suggest that any policy decision regarding the linking of producers and their value chain has to be location based.
- Non farm capital** and **herd size** seems to have marginal effect on the likelihood of selling to the more modern channel.
- This might suggest that the less endowed producers are not capable to sell to the more modern channels.

- Our next steps are to look into the differentiation of price through territories, as well as the interaction between price and distance.
- Additionally, we will look at differences in the quality of milk, measured by those who are certified and those who are not.