Staff Paper

Supermarkets and Rural Livelihoods: A Research Method

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Staff Paper 2005-07 **September 2004**

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September 2004

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ACKNOWLEDGEMENTS

This report is one of the results of a collaborative research program carried out during 2004 in Nicaragua, Costa Rica and Guatemala by a team of researchers from four different projects:

- "*Assistance for Trade Capacity Building in Relation to the Application of Sanitary and Phytosanitary Measures*" (RAISE-SPS), and "*Partnerships for Food Industry Development – Fruits and Vegetables*" (PFID-FFV), both of them implemented by Michigan State University with funding from USAID.
- "*Central America Beef Project*", carried out by the International Livestock Institute (ILRI), with funding from the Common Fund for Commodities.
- "*Regoverning Markets*", a global project coordinated by the International Institute for Environment and Development (IIED), the Royal Tropical Institute (KIT), and Rimisp-Latin American Center for Rural Development, with funding from the UK's Department for International Development (DFID).

The program also benefited for the collaboration of the *Rural Agroenterprise Development Project* of the International Center for Tropical Agriculture (CIAT).

The organization and management of this collaborative program was an interesting and rewarding experience in itself. Without any contracts or legal papers of any sort, a solid team of researchers from the participating projects supported by different donors and belonging to institutes of different nature, were able to define a set of objectives and a methodology, to pool or coordinate their own financial resources to fund a substantial budget, and to implement an ambitious work plan spanning five countries. All of this on the basis of a handshake. It is called social capital but it should be known as pure and simple common sense!

The collaborative research program in the three Central American countries was jointly coordinated by Drs. Julio A. Berdegué (Rimisp), Thomas Reardon (MSU) and Paul Schütz (ILRI).

Finally, we are grateful for comments from Chris Barrett on an earlier version of this paper.

SUMMARY

This document presents a research method to analyze the access of small and medium farmers to the supermarket market, and the effect of such access on the producers' decisions and net incomes. The method was developed for and used in a study carried out in 2004 in three Central American countries.

Controlling for product type, the method addresses questions including:

(a) Does selling to the supermarket-market channel have different technological, managerial, organizational and financial requirements than selling to other channels, including traditional retail channels (in which retailers other than local/regional supermarkets are the final interface with the consumer) and extra-regional export channels?

(b) Does selling to the supermarket-market channel pay better or worse (controlling for cost) than the other channels?

(c) Can small and medium producers meet the requirements to access and to operate sustainably in the supermarket-market channel, and under what conditions?

To answer these questions, the process is as follows:

(a) First, one or more specific products are defined; the process and analyses below are conducted per product. Second, at least two market channels must be compared for each product; one the supermarket channel, and the other the 'default' traditional retail channel for that product.

(b) For a given product, each market channel has a set of product and transaction attributes. Product attributes are formalized in product grades and standards: variety, color, ripeness, pesticide residues, and so on. Transaction attributes define the terms under which the exchange between sellers and buyers will take place: price, period of payment, volumes, place and time of delivery, incentives and sanctions for compliance with the terms of the transaction, and so on. The product and transaction attributes may or may not be defined through negotiation between the retailer and other agents in the agrifood chain, but regardless of that, it is the retailer that enforces and probably has the final say on the definition of such conditions. The product and transaction attributes are described and compared across market channels. The roles played by different agents in defining these attributes, are also studied, again across market channels.

(c) A set of product and transaction attributes that is characteristic of a given market channel for a given product, has technological, organizational and managerial implications that reverberate along the chain all the way to the primary producer. The three kinds of implications are analyzed and compared across market channels. An analysis is also conducted of which agents, if any, play a role in supporting others in the agrifood chain to comply with the established attributes (for example, by providing technical assistance to implement a given production technology or financial services to allow a group of farmers build the required infrastructure to bulk, sort, grade and package the product for delivery to the supermarket), and which ones are in charge of monitoring and enforcing compliance with the required product and transaction attributes (for example, product quality control, third party certification, and so on).

(d) Different farmers (with large or small landholdings, close or far from the market, organized or not, young or old, with or without irrigation, with more or less access to credit and to technical

assistance...) have different capacities to implement the technological, managerial and organizational requirements to meet the product and transaction attributes of a given market channel. It is assumed that such capacity is determined at least in large part by the assets position of the household (human, natural, financial, social, physical capitals). An analysis of the determinants of market channel choice is conducted.

(e) A critical question is about the costs and benefits of the above for the small and medium agri-food entrepreneurs. An analysis is conducted to compare such costs and benefits across market channels. This information allows us to compare the profitability of one channel versus the other for a given product, as well the 'costs of entry' to each channel.

1. INTRODUCTION

This document presents a research method to analyze the access of small and medium farmers to the supermarket market, and the effect of such access on the producers' decisions and net incomes. The method was developed for and used in a study carried out in 2004 in three Central American countries.

Controlling for product type, the method addresses questions including:

(f) does selling to the supermarket-market channel have different technological, managerial, organizational and financial requirements than selling to other channels, including traditional retail channels (in which retailers other than local/regional supermarkets are the final interface with the consumer) and extra-regional export channels?

(g) does selling to the supermarket-market channel pay better or worse (controlling for cost) than the other channels?

(h) Can small and medium producers meet the requirements to access and to operate sustainably in the supermarket-market channel, and under what conditions?

The justification for this analysis, given that supermarkets have entered recently as significant buyers of fresh foods from producers in many developing regions, is that prior research has shown that:

(a) different market channels represent different vectors of product and transaction attributes required of primary producers, processors, and wholesalers; the differentiation of those attributes is in turn linked with differences in procurement systems, and thus supply chain structure, of the retailer types;

(b) that these vectors potentially translate into different technological, managerial, organizational and financial capabilities on the part of producers;

(c) that this potentially implies different asset (physical, financial, human, social, natural) requirements to participate in the different channels;

(d) inability to acquire or develop the necessary capabilities by group x (say small farmers without the requisite capital) for channel y could mean exclusion from that channel;

(e) if participation in the supermarket channel has higher mean net income or lower risk, then exclusion for a given group would mean foregone earnings (because of lack of the requisite factors to enter the channel), reduced diversification options and thus higher average risk, and if supermarkets rose to a dominant position in that product market, possible exclusion from earnings in that market;

(f) the above analysis would determine the benefit/cost ratio of development program interventions in increasing access factors of production for the given potentially excluded group; for example, if selling tomatoes to the supermarket-market required more capital

(say greenhouses) and augmented labor (say by training), given land, then a development program manager could compare the cost of providing those factors relative to the benefit (reduced exclusion from possibly lucrative markets) of undertaking that program.

The method requires that a common set of products be defined. In the case of the Central America collaborative program, we selected tomatoes as representative (at least for "commodity vegetables" as opposed to niche vegetables) of the fresh vegetables category, and beef. Fresh vegetables and meats were chosen for several reasons:

(a) the two product categories allow comparisons over both products and types of chains: fresh vegetables are in a chain that involves minimal processing so relations are relatively direct from producer to wholesaler to retailer, while fresh meat is a more complex chain with the inclusion of a processor (slaughterer) in the chain; this allows the comparisons of two types of chains, controlling for the retailer type;

(b) both product categories have significant presence of small/medium primary producers but also large producers; this means that we could observe different labor/capital ratios and different capital composition for the same product-market channel; hence there is the possibility that we could test the hypothesis that small producers meet product and transaction attributes.

(c) while moving from one set of product and transaction attributes to another, controlling for the product, typically requires a change in pre- and post-harvest technologies used. Our assumption (that we do not test in the research because we chose before starting the two product categories and do not compare them say with dry beans or others) is that this change will be particularly substantial in the case of vegetables and meat, because quality and safety attributes changes require for example non-traditional equipment investments, possibly such as greenhouses for vegetables rather than open field production.

The method requires the comparison between at least two market channels, of which one has to be a supermarket market channel, that is, one in which the final consumer purchases the selected products in a supermarket store. The second channel must be non-supermarket, preferably the 'default' traditional market channel for the given product. In our Central America collaborative study, we selected the leading and the number two supermarket chains in the country (defined by sales), and the most important traditional retailer (also defined by sales).

An additional level, which is not indispensable as the other two are, is to conduct the research in two or more countries, and, if possible, to cross this with the selection of the chains. This allows for comparison across different cultural, socioeconomic and institutional contexts.

Table 1 shows the situations included in our study in Central America.

Table 1. Products, market channels and countries included in Central America collaborative program

Country	Products					
	Tomato			Beef		
	Leading supermarket chain	Number 2 supermarket chain	Traditional retail channel	Leading supermarket chain	Number 2 supermarket chain	Traditional retail channel
Nicaragua	CSU	La Colonia	Central market in the capital city	CSU	La Colonia	Retailers linked to three industrial[1]
Guatemala	La Fragua	Unisuper	Two central markets in the capital city	not studied	not studied	not studied
Costa Rica	not studied	not studied	not studied	CSU	Megasuper	Retailers linked to Livestock Auctions and Municipal Slaughterhouses

[1] Although in Nicaragua the most traditional channel are the Municipal slaughterhouses, they are very rapidly being closed down do to their extremely low sanitary standards and gross inefficiency. Thus, it was judged that they were no longer a viable channel and did not provide a relevant point for comparison with the supermarkets.

This methods paper proceeds as follows. Section 2 defines some important concepts. Section 3 lays out research questions and general methods. Section 4 discusses the producer household/farm survey and associated issues of sampling, data collection, and statistical analysis. Section 5 discusses the use of semi-structured interviews with key actor in the value chains linking producers and the final retail outlets. Section 6 presents the method applied in conducting case studies of small farmers' organizations, as part of the overall research method.

2. DEFINITIONS

The following definitions apply in this document:

Supermarket is a term we here use for simplicity to indicate all the large format retail sector, including supermarkets (usually defined as from 400 to 4000 sq. meters), hypermarkets, which are larger than supermarkets, and discount stores such as membership club stores

Product attributes are specified by product grades and standards. A *standard* is a variable, such as the set of quality and safety attributes specified. A *grade* is a level for a given standard; hence there could be a standard for residual of pesticide x on a piece of fruit, and a grade for that variable is the maximum amount of that residual allowed. Product attributes include quality (e.g., color and size), safety (e.g. bacterial, hormone, or pesticide residues), and characteristics of

production processes (such as "bird friendly"). Product standards specifying those attributes can be "outcome" or "process" standards. *Outcome standards* specify attributes of the product at a particular point in the chain, say reception by the retailer; for example, an apple received by the retailer must be x size, y color, and have w and z levels of bacterial and chemical residues on it. By contrast, *process standards* specify particular technologies to be used pre- and post-harvest.

Transaction attributes are a vector of characteristics of the transaction between the seller and buyer. Controlling for the product attributes, the transaction attributes include volume at a point and over time, timing, presence of a contract that organizes the transaction, and so on. Not that the term "contract" is quite general, using Hueth et al. (1999) definition, where two parties agree to specifications for the product and the transaction, and there is – some- penalty for withdrawing from the transaction (from intangibles like loss of reputation to tangibles like fines). The contract can be written or verbal, formal or informal. Hence, a contract can be as "informal" as inclusion, with a verbal accord, or a farmer in a preferred suppliers list, or as formal as a written legally enforceable contract

A *technology* is a combination of factors to produce a given unit of product x. Hence, 2 units of labor, 2 units of capital, and 1 unit of land is a different "technology" from 3 units of labor, 1 unit of capital, and 1 unit of land. Technologies are characterized by their "factor bias", hence the second one is more labor intensive (less capital intensive) than the former.

By *capital* we mean physical capital unless specified otherwise; in most empirical work, capital is disaggregated into its components, such as tractors, irrigation equipment, etc. Note that "financial capital" is not included in a production function, rather it is only in an input demand function.

3. RESEARCH QUESTIONS AND GENERAL METHODS USED TO ADDRESS THE QUESTIONS

Below we note the specific research questions addressed in our field study in 2004 and general methods used to address them.

3.1. Retailing

What is the incidence of supermarket retailing in tomato and beef?

"Incidence" can be broken up into several measures: (a) sales in a given year by each supermarket chain of vegetables and beef; and the aggregate over chains; (b) total retail sales in the country of tomato and beef; the retail sector comprises sales in supermarkets, shops, central markets, and by hawkers/street vendors; (c) the ratio (a)/(b) is the share of supermarket sector sales in total retail of the product; (d) the total food sales of the supermarket sector (aggregate of the chains); (e) the ratio (a)/(d) is the share of the product's sales in total supermarket sector sales.

There will be no official statistics on (a) and (d) so those will need to be obtained from interviews with chains. The governments might have estimates of (b), but it will be important to cross-check these by using our own estimates of consumption-by-disappearance and identifying the market

purchases portion (c-by-d is total consumption = output plus imports = home-consumption (of production by consumers by producers) plus purchases from retailers (or direct from producers), abstracting from product saved or dis-saved or transferred.

3.2. Procurement systems of retailers characterized as value chains

What are the main procurement systems of supermarkets (say comparing the leading versus secondary chains versus independents) for vegetables and beef? What are the main procurement systems of the other marketing channel (the end commercial buyer defining a channel), including traditional retailers and exporters? Asked differently, what are the structures of the "value chains" from producers to the different final buyers?

As the focal point of this research is to understand changes required of and effects on primary producers, the purpose of this set of questions is to understand the set of actors who form the requirements faced by the producer, what are the determinants of those requirements, and how they are imposed.

The question can be decomposed into several parts:

(a) what are the parts of the value chain for a given product, for each market channel (the latter defined by the end commercial buyer, by which we have identified three broad channels, and within each there are subchannels; for example, the leading supermarket chain will usually have a different structure of value chain than a secondary supermarket chain).

The "technology" of retail and their procurement systems themselves translate into capacity to implement different types and levels of standards imposed on producers and others such as transporters. In turn, that retail/procurement technology will vary by type of retailer, such as the size of the retail chain or consumer segment aimed at. This is related to variation in product diversity, capacity of shelf and inventory refrigeration, and so on. These then translate into requirements for post-harvest practices by producers and others in the supply chain, and also what post-harvest practices are done by what actors in the chain (for example, if supermarket has washing facilities, that function may pass from the producer or wholesaler to the supermarket company).

(b) what characterizes those parts from organization and institutional analysis perspectives?

Retaking (a), an analysis of the parts of the value chain for a product can rely on industrial organization analysis that requires mapping the chain or subsector. For the products we are studying, in general these segments of the chain can be:

(a) input suppliers to primary producers →
(b) primary producers (tomato or beef producers) →
(c) first-stage processors/packers (slaughterhouse, packing house, etc.) →
(d) wholesalers/distributors/transporters →
(e) second-stage processors/packagers →
(f) retailer →
(g) consumer.

Of course, for a given product and a given channel, some of these segments might be missing or others added; for example, producing a common tomato for a traditional local market might involve just the tomato grower and an informal trader that acts as both wholesaler (collecting from the farmer) and retailer (selling to the villager).

Here are examples of specific questions for the case of beef :

(a) Does the chain receive the meat via distribution centers or directly to the stores (and thus packaging and distribution is done by the second stage processors)?

(b) Does the chain have selected slaughtering companies or buy from general wholesalers (hence, does the chain have a preferred supplier system at the processing level)?

(c) If the chain uses a wholesaler instead, is the latter a traditional broker or a specialized-dedicated (to supermarkets) wholesaler?

(d) Does the chain, either directly or via its preferred slaughterer or via a specialized wholesaler, have a preferred supplier system at the level of primary producers? What institutional links (explicit or implicit contracts) and on what terms does the buyer and supplier transact?[2]

The above mapping will need to be done based on information from interviews with the chain participants for the different channels, per product.

Beside mapping the subsector, "traditional" industrial organization analysis characterizes (as we should) the: (a) degree of concentration (such as a Gini Coefficient or a C4 ratio) and the size of the segment; this is a proxy for market power; for example, a rule of thumb used is that a C4 ratio of 60% implies oligopoly (-psony); (b) the prices paid to and net returns (margins) of each of the segments. These two categories of information are related by surmising economic rents accruing to the different segments.

Retaking (b), a number of schools of methods, such as the subsector analysis school or the value chain analysis school (for example, Kaplinsky and Morris, 2001), then analyze the segments and in particular the relations between the segments of the chain in what new institutional economic

[2] Supermarket beef merchandising officers may for example request that the animals should not be bought through auction markets (this is more risky for disease); they can demand a certain temperature of beef when delivered at the supermarket (as the beef shrinks substantially after slaughtering). When the animals are transported from the farms to the slaughtering facility they lose about 5% (or more) of their weight depending on a set of things (time, transport conditions) and intermediaries know this. For beef processing there is also a need to know for each processing company how much is sold to supermarkets, to exports and to any other market channel. Also important are the payment periods and who pays for transport costs. How much is bought directly from producers and auctions. Cost of selling animals at auction markets and how this is distributed between the buyer and seller and the auction company. Beef can be more complex as the supermarket buyer might not talk to you in animal heads but about cuts (ribs, etc.), while the slaughtering company might talk in life weight or carcass weight price.

analysis refers to as organizational and institutional analysis of governance and coordination of the value chain. They disaggregate the latter into three aspects of governance of the chain:

(a) *Legislative governance* comprises the specification of the price by a buyer/segment, as well as product quality and delivery reliability attributes from the supplier of the prior segment in the chain. These attributes map into the sets we have discussed above where we disaggregated and defined these attributes in terms of product versus transaction attributes, grades versus standards, outcome and process standards, and types of product standards (quality, safety, environmental, labor).

(b) *Judicial and executive governance* comprises the monitoring (by buyers or their proxies) of the provision of the product and transaction attributes by suppliers, and incentives (price premia and assistance of buyer or their proxy to the supplier, as in the resolution of idiosyncratic factor market failures – for example where a specialized/dedicated wholesaler provides input credit and technical assistance to farmers on a preferred supplier list) and sanctions ("fines" and other sanctions such as warnings or delisting).

(c) *Reach and richness* of governance mechanisms, which is a qualitative measure of how applicable the above governance mechanisms are over products, market segments, actors in the chain, and so on. One could modify this to say that it is possible to categorize different governance mechanisms, of a given buyer for a given product, over supplier types; for example, Hortifruti in Costa Rica provides some assistance to small farmers that it does not to its large suppliers (as one would predict from the idea of idiosyncratic market failure experienced by different segments of producers).

Note that the above approach implies strategy and sentience of the actors in the chain. But this is not a necessary assumption to use the general approach.

Researchers in new institutional economics identify as a "contract" the specific set of the above governance mechanisms agreed between a buyer and a supplier (between any two segments of a chain). Hueth et al. (1999) eschew the idea that a contract only exists if there is an explicit, formal, written contract. Rather, and this is the concept operative in our research, a contract exists if the two parties are cognizant of the above governance mechanisms governing their transactions – the specification of a price, some set of product and transaction standards, and the potential sanctions (tangible or intangible) accorded on non-delivery. A contract can thus be simply an informal, verbal accord on these items, and the sanction can be as intangible as loss of reputation among buyers. That broader definition of contract is useful for our research because there are then only two options, purchase on the spot market (where the buyer does not see or know the producer and vice versa) versus transactions under contract. The nature of the contract can be thus studied, and the specific terms and requirements (in attributes) of the transactions from a given supplier to a given buyer thus known, which is the central "shock" to the producer that we are studying.

The value chain and contract analysis requires interviews with representatives of the actors in the chain, for each of the market channels for each product.

3.3. Behavior and outcomes at the level of the primary producer

The general question related to this central issue of the research is as follows: for both tomatoes and beef, what difference does it make (hence what impact does it have) whether a primary producer, or a processor, sells in the supermarket-market channel versus the traditional retailer or exporter channels? In particular:

(a) What are the determinants of a producer's "channel choice"? That is, why do different types of small and medium agri-food entrepreneurs participate in the supermarket supply channels, contrasted by the traditional supply channels? Objectives, decision-making criteria, preferences, constraints?

(b) Once chosen the supermarket channel, what are the implications of the product and transaction attributes required by the supermarket, in terms of the technological, management and organizational changes that need to be implemented by other upstream agents along the agrifood chain, and what are the financial implications of such changes? For instance: maximum levels and types of pesticides or hormones used, greenhouse and drip irrigation use, recording of input quality or quantity, product or process third-party certification, availability of cold chains, and so on.

(c) What are the costs and benefits of the above for the small and medium agri-food entrepreneurs? How do those compare, controlling for the product, with the actions required, weighted by the product and input prices, for the alternative market channel, that is, the traditional market? This information will allow us to compare the profitability of one channel versus the other for a given product, as well the 'costs of entry' to each channel.

The research on these issues is undertaken in two ways, first normative (what should be) and then positive (what is).

The normative "first step" in the portion of the research focused on producer responses/effects is the following:

(a) From the above analysis, we will know what are the product and transaction attributes required and price given by the buyer in a given channel, for a specific product of a particular variety and grade. For example, we will know what quality and safety attributes are required by supermarket chain CSU of Nicaraguan farmers of a common tomato, and what transaction attributes are ((price, payment period, what minimum volume required, what periodicity of shipment required).

(b) Experts/key informants will be interviewed to inform us what technologies can be used to deliver the above attributes. This is technical information that does not necessarily indicate whether the needed (by the buyer) supply can be produced at a positive net earnings by producers with those technologies. For example, what technology/ies are needed by a Nicaraguan tomato producer to deliver to CSU the minimum volume of tomatoes satisfying the product and transaction attributes/standards specified by the

supermarket chain? It is important here to understand technology options to deliver the same attribute set and quantity – in economics terms, the "isoquants" in factor space. That is, can the required set of attributes be delivered by producers using capital-using versus capital saving technologies (in other words, could a small farmer stay in the game by substituting labor for capital, or labor for land?). Where are the factor use thresholds in the needed technologies? That is really the central issue. A simple illustration is in transactional over-time consistency: if a supplier can only stay on a supermarket's preferred supplier list if he/she can supply tomatoes all year round, then that implies that the factor threshold is irrigation and perhaps a greenhouse. A more complex example is whether there are a variety of (substitutable) methods to produce a potato of a given caliber, which imply different levels of the capital/labor ratio, and thus allow capital-poor and labor-rich farmers to grow the needed size potatoes, or if that is not possible.

In the capital investment literature (since the 1950s/60s), such as Jorgenson (1971), and assuming for the moment that the capital in question is technology-embodying, then the normative analysis above implies a "K*" vector, the desired capital stock, of a producer. We can think of K* being a vector that includes types of equipment, skilled labor, and land of a given quality. That is, to participate in a given channel, the producer needs to have at least K*. In that literature, typically the researcher then finds out what K is (actual capital stock) and models the determinants of the difference between K and K*.

For our purposes, then, the essential conceptual model is that of the inter-producer determinants of K – K* (the difference between what technology (proxied by technology-embodying capital holdings) the producer actually uses and what he/she would need to use to participate in channel x.

The approach that we take to implementing the conceptual model (the statistical analysis to address the research questions) depends on what the key informants say about K* (the technology needed), and what we observe from producer survey information about the array of technologies used to produce for a given channel.

We may find that the informant says that most elements of K* represent lumpy investments, and that those investments are in fact necessary to produce the needed vector of attributes (that is, there is no substitutability of unskilled labor or land for those capital items). For example, if to grow potatoes for the leading supermarket chain, a farmer needs certified or other high quality seed, large amounts of fertilizer, access to a sprayer, well-conditioned storage space to be able to deliver the product over a period of several months, grading, cleaning and bagging equipment, plus a small truck. We can then verify from data about the technologies used by farmers participating in the supermarket-market channel that they all use K*. But if some do not, that suggests either that the attributes are in fact not fully monitored (reflecting a weak "reach" in the governance mechanisms) or there is actually technological flexibility (factor substitutability) to deliver the required attributes, that the informant did not know. Determining whether it is weak standard enforcement of that in fact there is technology flexibility would then be a key issue in the study.[3]

[3] Of course, it is possible that we could observe that all, for example salad tomato, producers that sell to the supermarket-channel use drip-irrigation and greenhouses. That would prove only that it was sufficient – but not

To implement the above conceptual framework we relied on a two-stage analysis, assuming recursivity in the sense that a farmer chooses a market channel (based on incentives facing and capacity of the farmer), and then chooses a production technology to concord with the requirements of the market channel chosen. (This abstracts from the possibility that farmers using a certain technology, such as irrigated high chemical-using farming, would opt for a market channel knowing that he/she is well positioned to meet the quality and multi-seasonal aspects of the transactions required in that channel). There are two steps then to the empirical analysis.

(a) Choice of market channel – as a function of the incentives and capacities of the producer (or their group)

(b) Choice of technology (embodied in a set of adoption choices of capital items) as a function of incentives and capacities of producers.

Both decisions are economic decisions, usually modeled as a function of variables reflecting output and input prices, risk, pre-determined holdings of various forms of capital, and other shifter variable (Sadoulet and de Janvry, 1995). The essence of this analysis would give us is an understanding of how different farmer characteristics (for simplicity let us think of this as farm size and distance from road as a proxy for transactions costs) determine channel choice, and then given channel choice, what determines the technology used. One estimates, using a producer sample, the adoption of technologies (demand for technology-embodying inputs) and market channels. In generic terms, both of those are functions of a set of incentives (signals embodied in the product and transaction attributes determined by the supermarkets) and capacity variables (determined by the assets at the disposal of the farmers and the transaction costs that affect the productivity of those assets) that determine whether a producer wants to and can enter the channel and use a given technology.

The typical form such an adoption function assumes (in economics) is as follows:

The adoption of X = f(output prices, input prices, risk, quasi-fixed capital, and shifters)[4]

The variables retained in an implementation form of the general model need to display statistical variation over the sample of producers. If the sample is wide enough spatially, this could be the case for the prices and risk variables, but let us assume away that source of variation for the moment, except for one variable reflecting transaction costs[5] (distance to road as a proxy for the

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inevitably necessary, to have those capital items. It could be for instance that supermarkets (mistakenly) assumed it is necessary and chose farmers with those items to be on the preferred supplier list – just as they might assume that only farmers with a given sized farm could produce for them. Or it could also be, as has been often reported in the contract agriculture literature, that the supermarket implicit or explicit technological demands are excessive with respect to the goal of obtaining X quantity of quality X produce, but are imposed on growers (together with the associated costs) in order to reduce the risk of not having sufficient volume or the required quality.

[4] This is the input demand function derived from the profit function (without assuming necessarily a profit-maximization objective of the producer); see Sadoulet and de Janvry (1995).

[5] For example for beef transaction costs, beyond transport cost and/or minimum volume can be represented by payment period; time spent at auction markets, risk of not selling an animal in a market choice (grade uncertainty for

price of transport). Beside that variable, let's focus on the "household characteristics" variables. The data then needed from the household survey to estimate those functions include the technologies used, the household characteristics, the prices faced, and the market channels chosen. Survey methods for obtaining this information in farm household surveys are found in Reardon and Glewwe (2000).

There are a variety of ways to implement the above analysis: probit or multinomial logit analyses, anova analyses, and cluster analyses.

In the event, we have used two sets of two-stage estimations. (1) We first estimated a probit function (a regression with the regressand being whether one did something, and the regressors being in the categories of determinants discussed above) for channel choice (whether the farmer sold tomatoes or beef in the supermarket channel), and then we estimated the production function in the subsample of supermarket-channel farmers and in the subsample of the traditional-channel farmers. Given that the latter involved an endogenous stratification, we needed to control for the conditional probability of the farmer being in the channel; for that we used a double-hurdle estimation technique (Heckman two-stage estimation). (2) We then estimated the same channel-choice probit, but the second stage is demand functions for key inputs and output supply functions. The results are reported in other papers.

4. SURVEY ISSUES

4.1. The survey questionnaire

A survey questionnaire must be designed, field-tested and revised repeatedly, until it complies with the following conditions:

(a) It must allow us to answer each and every research question. It must be explicit which sections and questions of the survey form will be used to obtain results to answer which research question(s). Each question in the survey form must be justified in terms of actually contributing to one or more research questions.

(b) A farmer must be able to understand and answer all the questions. The questions must be unambiguous and clear from the point of view of the respondent, without the need for any further action by the enumerator aside from reading the questions as they are written in the questionnaire.

(c) A farmer should be able to answer the complete questionnaire within 60 minutes.

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supers or no buyer for auctions). frequency of auction sales in the producer region can affect. all these translates into information costs, negotiation costs, monitoring costs (Hobbs, 1997).

4.2. Survey sections

A specific survey must be designed for each product (in the case of Central America, beef and tomato). However, all the surveys used in Central America, had the same sections. The order of the sections in the survey was established after several rounds of field-testing, to intercalate more difficult and detailed questions with others which are less complicated to answer, and also to mix more sensitive issues with others which raise less concerns on the part of the respondent.

The survey sections are:

(a) Household, respondent and enumerator identification (this information is not stored, digitalized or analyzed, and is recorded temporarily only for purposes of supervision)
(b) Control questions to verify that the household meets the sampling criteria (if not, the interview is terminated)
(c) Experience as a producer of beef or tomato
(d) Membership in farmers' organizations and services received from them
(e) Household composition and characteristics of individual household members
(f) Access to market
(g) Farm size, land tenure and land quality
(h) Land use last season and five years ago
(i) Land allocated to beef or tomato production, last season and five years ago
(j) Irrigation today and five years ago (for tomato survey)
(k) Traction today and five years ago
(l) Yields and production of tomato/cattle last season and five years ago
(m) Marketing channels: volume and prices per channel, last season and five years ago
(n) Terms and conditions of supermarket channel, if applicable
(o) Technical assistance, credit and other services received from other agents in market channel (supermarket, dedicated wholesalers, non-dedicated wholesalers...) or non-market agencies
(p) Production and post-harvest technology and costs for tomato and beef production (includes inputs, equipment, labor)
(q) Comparison by respondent of supermarkets channel vis-à-vis other channel, with respect to product and transaction attributes and convenience to farmers

4.3. Channel choice definition

There are some important qualifications and ambiguities in the term 'supplier' and 'market channel,' that we discuss below.

(1) A producer may sell directly to the supermarket, delivering either to a centralized Distribution Centre or to one or more stores.

(2) A producer may sell to a wholesaler who in turn sells to the supermarket. There are two situations within this category:

(a) a producer may sell to a wholesaler who in turn sells to a supermarket, among other buyers, but the producer does not know this; we will call that wholesaler a "non-dedicated wholesaler", in that it is not regular or well known to whom the wholesaler sells; if the producer sells a tomato to her or him, you do not know if in turn she/he will sell it to the wholesale market or to a supermarket or to some other client; these non-dedicated wholesalers can be called "traditional wholesalers" but the latter term is ambiguous.

(b) a producer may sell to a "dedicated wholesaler"; the dedicated wholesaler is known to the farmer respondent to have some regular degree of "dedication" (identified segment of his sales) to supermarkets (could also export or sell to wholesale market as well) or himself reports that he is dedicated; in Central America this is the case of for example Hortifruti (who mainly distributes to the CSA chain, but also sells to McDonalds and others), of the "wholesale" procurement division of La Fragua chain, or Vergara in Guatemala.

(3) Some ambiguity in a survey, regarding classification of a wholesaler, arises for several reasons:

(a) Ownership. Some dedicated wholesalers happen to be owned by the supermarket company or the holding company that also owns the supermarket; this is the case of Hortifruti in Costa Rica and Nicaragua. Whether the supermarket company owns the dedicated wholesaler should matter to us, for our specific purposes, for the following reason.

(b) Degree of "dedication". Above we discussed the issue of whether the producer respondent knows whether the wholesaler to whom he sells is "dedicated" (to supermarkets as an identified, regular segment of its market). But there is also the issue of degree of dedication. If a wholesaler only sells regularly a very small portion of his product to supermarkets, we may say that he is a non-dedicated wholesaler. This can get too complicated and vague, however, and the notion of "regularity" of "dedication" should be the criterion for the definition. If x wholesaler only sells 10% of his product to a supermarket company but does so regularly, we call him a Dedicated Wholesaler. The producer then knows he has to produce certain product and transaction attributes to meet the Dedicated Wholesaler's needs with respect to that niche, that is the operative issue for us. Of course it is all easier and non-ambiguous if the wholesaler mainly sells to one or more supermarket companies as their main thing.

(c) Most Dedicated Wholesalers do some processing of the product received from the primary producer. This can vary from just washing, sorting and packing it to cutting it or freezing it. Thus, in a sense one could classify a processor that does not buy product from a separate primary producer, but produces his own intermediate input, as a combination of Dedicated Wholesaler plus processor. For example, a

slaughterhouse that buys animals from ranchers, kills them and packs the meat, and then distributes to a supermarket company.

(d) Usually there are only few producers who sell directly to supermarket stores (defined not as the procurement company or division, but actually deliver to the retail stores and stock the shelves). These are usually large companies. An interesting point is that sometimes these producers are also Dedicated Wholesalers, that is, they grow but they also buy from other farms (could be a mix of own farms plus outgrower scheme where they have other, usually smaller than them, farmers that produce and then they buy the product). If we interview one of the latter farmers (just for argument here take bananas as example), then their Dedicated Wholesaler may be a corporation such as Chiquita. It does not matter that the latter also produces. In this case, for example Chiquita, is called a grower/packer/shipper.

(4) The "channels" in the "channel choice" analysis are actually vectors or sets or packages of transaction attributes that include payment terms, transaction terms such as implicit contract terms and conditions (such as monitoring, standards specified, etc.), and risk and periodicity. We get that information from our key informant interviews to make initial choices for identification of channels, and we can validate and explore variation around average transaction conditions, by including questions about this in the producer surveys as well. For example, did the grower get input credit from the channel, or not?

4.4. Grower identification and classification

(1) There needs to be deliberation on how to classify a producer's market channel choice. Many producers sell to multiple channels (to diversify risk, and to market the different grades of a given product to different markets). To classify a producer as participating in supermarket channel we may pick a threshold, or just use 0/1 and then explain statistically the share or level of sales to that channel.

(2) For sampling, we will need to specify limits of the size strata.

4.5. Sample selection

There are several basic requirements of the sample:

(1) Above all, the sample needs have the characteristics that allow us to address the research questions, hence several important points:

(a) As we ask about choice of channel, we need producers selling to the supermarket channel (directly or indirectly, see above), and not to the supermarket channel (for example, only to the traditional wholesale market or to villagers).

(b) As we ask about different products, we need an - adequate - sample for each product, if we run separate regressions by product.

(c) As we ask about different producer types (say for example size of farm) we need different producer sizes in the sample so that any variable in the regression, say farm size, does not generate in the regression estimation the error "insufficient variation in observations on this variable". Hence, including 100 small farms and 1 big farm will guarantee that the farm size variable will not be significant in a regression.

(d) We do not ask about the effects of different zones, but could ask this and then add "zone type" as a variable in the regression, or just add a dummy variable for zone and not attempt to interpret variation. To do the latter one needs different kinds of zones (say far from capital city and near, to control for say transaction costs). That would involve selecting sample that covers different zones. But there may be practical tradeoffs, such as getting zone variation but not sufficient variation in farmer type. On the other hand, we may need several zones to get an adequate sample for a given product type. These are practical issues to think through.

(2) There are implications and issues related to the above that we need to think about:

(a) If we want to run a separate regression per product, then we need the three kinds of variation per product. That is, we cannot have 180 farms growing tomatoes and only 20 farms growing potatoes, and have a separate regression for potato farmers, that is statistically usable.

(b) If we want a single regression (meaning not different regressions by products), then we can have a smaller sample for a given product, but we will not be able to answer questions about how different farm types behave in only a given product segment. The only way to do that might be to have an interaction term (say tomato producer dummy interacting with farm size). Also, we will probably find that the product variable in such a regression is endogenous.

Hence, the sample will determine what kinds of answers we can give to the research questions. If we cannot have a big enough sample, then we need to make sure the research question is revised to fit the sample that we can choose for the analysis.

5. SEMI-STRUCTURED INTERVIEWS

5.1. Categories of individuals to interviewed

Interviews are conducted with relevant representatives from each significant agent in each market channel and each product, including:

(a) Organized and un-organized farmers
(b) Leaders of farmers' organizations
(c) Wholesalers (both dedicated and non)
(d) Processors
(e) Alternative clients for farmers in relevant local, regional or national markets (including informal traders or middlemen)

(f) Procurement officers and other staff in supermarkets who deal directly, on a day to day basis, with the farmers and/or the wholesalers
(g) Managers of the relevant product section in the supermarket company (e.g., fruits and vegetables or meat section, of fresh products section)
(h) Store managers
(i) Private suppliers of support services to producers, traders or processors (technical assistance, credit, third-party certification, brokerage, market and price information...)
(j) Relevant governmental organizations and community leaders

A brief description of each type of actor follows:

Farmers are rural families with or without membership in a small farmers' organization (SFO) that sells either FFV or beef to supermarkets directly or via wholesalers. In some cases more than one member of a given family may have membership or participate in a SFO.

SFO leaders are specific members of a SFO with either formal or informal leadership positions. One should focus on formally elected SFO leaders (President, Vice President, etc.) or, failing a formal organizational structure, enquire as to who exercises leadership functions in the group with SFO members, service providers, government agencies and community leaders.

Wholesalers are formal businesses that receive and distribute product to one or several supermarkets. They may be dedicated or non-dedicated, located in rural or urban settings and exercise diverse functions in the chain including not limited to buying, sorting, processing, packing and shipping. Key issues to understand with wholesalers include the legislative, judicial and executive governance functions they exercise along the chain. The reach and richness of these mechanisms may vary based on product and type of producer as noted by Reardon.

Alternative buyers are informal actors[6] that receive and distribute product to one or several market channels. They may or may not sell to supermarkets. These are the traditional wholesalers in the FFV and beef chains who link small farmers to a variety of markets. For the purpose of this study, we will focus on traditional middlemen that provide alternative channels for products – i.e. second quality or excess quantity. These actors are key to understanding why or why not a farmer or a farmer organization can meet its commitments to formal wholesalers and supermarkets and product leakage out of the supermarket channel.

Supermarkets are the recipients of the FFV and beef products prior to their sale to the final consumers. They may form parts of transnational firms, be local chains or independent supermarkets. One should focus on stores that are part of the specific market channels included in the study and within the stores on key individuals who define contractual terms, exercise

[6] They come in many sizes and shapes ranging from local producers who also market their – and their neighbors – products to specialized actors who provide wholesaler functions in the chain. They tend to specialize in specific products and/or markets that they know well. They differ from the wholesaler in that they tend to provide embedded business development services – credit, market information, seed, fertilizer, etc. – to their clients and perform important social functions as well – safety net for family disasters, god parents for children, etc.

quality control over the products, make purchasing decisions, authorize final payment for product received and decide about key support services that should be provided to preferred suppliers[7].

Private service providers are organizations that exercise support functions. They may be for profit firms (i.e. seed or irrigation providers) or non-profits (i.e. rural development projects or NGOs), formal or informal. In this study we will focus on service providers who provide at least one of the following services to the farmers and their organizations included in the study: (a) access to production technology (seeds, irrigation, greenhouse material, cattle feed, etc.); (b) access to crop level technical assistance (extension services, training in production or post harvest technologies, veterinary services, etc.), and; (c) organizational training and support (administrative training, capacity building to link with specific market channels, etc.). Farmers and SFO leaders, wholesalers and supermarkets will identify key private service providers for each case.

Relevant government agencies are individuals or programs focused on providing support to the selected farmers and SFO. For the purposes of this study, they should have active involvement in the case (i.e. interact fairly regularly with the SFO or its members) and may provide similar services (extension, access to improved production technology) as points (a) and (b) in the aforementioned category. SFO members and leaders and private service providers will identify relevant government agencies for each case.

Community leaders are individuals located in the production areas included in the study who can provide a general overview of the social and economic impact generated by linking to supermarkets. For the purposes of this study, they may include mayors, city council members or other recognized leaders. SFO members and leaders, private service providers and relevant government agencies will be asked to identify relevant community leaders.

For effective and convincing analysis and results, the comparison and triangulation of data from diverse actors is absolutely essential.

[7] These actors basically perform functions related to legislative, judicial and executive governance in the chain as defined by Kaplinsky and Morris (2001).

Table 2. Topics to be covered in interviews with specific groups of individuals

Key factors to include in interview	**Actors to be Interviewed**							
	Farmers	Farmer leaders	Wholesalers	Alternative buyers	Supermarkets	Service providers	Government	Community leaders
Productivity	■	■				■	■	
Technology	■	■	■	■	■	■	■	
Costs	■	■				■	■	
Income / employment	■	■	■	■	■	■	■	■
Organizational structure of the farmers' organizations	■	■				■	■	■
Organizational functions of the farmers' organizations	■	■	■	■	■	■	■	■
Contract terms / obligations	■	■	■	■	■	■	■	
Chain governance / decision-making	■	■	■	■	■	■	■	
Compliance monitoring / sanctions	■	■	■	■	■	■	■	
Farmer access to support services	■	■	■			■	■	■

5.2. Topics

General and specific questions are formulated for each actor to examine the situation prior to entry into the supermarket channel, the current situation, the process in moving from the initial condition to the current one, and the (tangible and intangible) costs and benefits of the transition. Table 2 provides an idea of what will be sought from each type of actor in the process.

Factors related to the link between the farmers and other actors in the chain, in particular links between the farmers and supermarkets or supermarket agents, must receive priority attention, including:

(a) description of the 'contracts' (in the sense used in this document, i.e., not restricted to formal documents, but defined to include all forms of agreements between two parties that specify the conditions for a transaction)
(b) the characteristics or attributes of the product and the transaction
(c) positive and negative incentives (sanctions) for enforcing compliance
(d) monitoring of compliance with agreements
(e) mechanisms for information-sharing and decision-making for coordination purposes
(f) support systems established by supermarket or with third parties to allow the farmers to meet supermarket standards and thus increase compliance.

5.3. Process

Each study will follow an iterative process moving from one end of the chain (i.e. supermarkets and wholesalers) to the other (i.e. the farmers) at least two times to clearly identify key information, triangulate data across actors and answer questions that arise during the fieldwork.

(a) The initial point of departure will be semi-structured interviews with supermarket buyers to identify key issues related to chain governance (both legislative and judicial/executive) including specific contractual arrangements with the farmers and SFO and executive functions performed by the later, production and post-harvest technology requirements and income implications.

(b) The second phase of the case study will focus on wholesalers – both dedicated and non – as well as middlemen that work with the farmers and SFO by revisiting their governance functions in the chain. Greater emphasis will be placed on support services provided to the farmers and SFO directly by the wholesalers or through third parties.

(c) Finally, semi-structured interviews will be organized with farmers and SFO members either individually or in a focus group and SFO leaders. In these sessions, key wholesalers, middlemen, private service providers, government agencies and community leaders will be identified.

(d) Based on information from supermarkets, wholesalers and the SFO, semi-structured interviews with private service providers and relevant government agencies will

proceed to identify support strategies that do or do not facilitate on-going farmer and SFO participation in the supermarket channel.

(e) Finally, previously identified community leaders will be interviewed to assess the larger economic and social impact of participation in the supermarket channel.

6. CASE STUDIES OF SMALL FARMERS' ORGANIZATIONS

The method for addressing the research questions may include one or more case studies of small farmers' organizations (SFO) linked to the supermarket market. The SFO case studies can be conducted using the same instruments discussed before: the survey of farmer's households and a set of semi-structured interviews.

In the overarching research proposal to which these case studies contribute, three issues are highlighted: (a) technological and transactional requirements for supermarkets relative to other market channels; (b) income considerations – controlling for cost – of supermarkets versus alternative channels; and, (c) under what conditions can small and medium producers meet supermarket requirements using what technologies.

The purpose of the case studies is to complement the analysis of survey data and provide additional information to understand the central research issues. As such, the case studies will examine the situation of the SFO ***prior*** to entering the supermarket channel, the ***current*** situation and the ***process*** followed by the SFO and support agencies in terms of productivity, technologies, organizational structures and functions to meet the increasing demands of this channel. Some general research issues for each key factor identified in Table 2 are shown in Table 3.

Table 3. Research issues in case studies of small farmers' organizations

Key factors	Previous situation	Process followed	Current situation
Productivity	Production in Kilos / ha	How has SFO member productivity per hectare changed since entering the supermarket channel?	Production in Kilos / ha
Technology	Varieties, crop management, post harvest	How have varieties, crop management and post harvest technologies changed since entering the supermarket channel? How do these changes compare with the alternative channels?	Varieties, crop management, post harvest technologies
Costs	Production costs (ha) and post harvest costs	How have production and post-harvest costs varied since entering the supermarket channel? How do these costs compare with those of alternative channels?	Production costs (ha) and post harvest costs
Income	Gross and net income per ha. Income per family from SFO products	How has gross and net income per hectare changed since entering the channel? How has rural family income varied since entering the supermarket channel?	Gross and net income per ha. Income per family from SFO products
Organizational structure of the SFO	Legal status of the organization, number of members, number of members with specialized functions.	How has the legal standing of the SFO varied? How has the membership of the SFO changed and why? How has the number of members charged specialized functions changed?	Legal status of the organization, number of members, number of members with specialized functions.
Legislative functions	Product quality, price and consistency.	How has the product quality required varied? How do quality requirements vary across channels? What percentage of SFO product does not meet supermarket quality standards? How has this changed over time? What does the SFO do with substandard produce? How has real prices for the SFO products changed over time? How does the supermarket channel compare with alternative	Product quality, price and consistency.

		channels? Frequency of deliveries of the SFO to the supermarket channel? How has this varied over time? How does this compare to alternative channels?	
Administrative functions	Administrative functions (product selection, production plan, price negotiation, delivery, reception and distribution of payment).	How have the administrative functions of the SFO changed in the supermarket channel? How have the production or post harvest functions of the SFO varied in the supermarket channel?	Administrative functions (product selection, production plan, price negotiation, delivery, reception and distribution of payment).
Judicial / Executive functions	Quality monitoring, incentives and sanctions.	How is product quality monitored? By whom? Who assumes the costs this implies? What incentives or support mechanisms exist to meet quality requirements? Who provides this support? Who pays for it? What sanctions exist for non-compliance along the chain? Who decides to apply them under what conditions?	Quality monitoring, incentives and sanctions.
SFO access to support services	Number and types of support services received by the SFO. Subsidized versus commercial support services. Unmet demand for specific support services	How has the number and type of support services available to the SFO changed? How has the ratio between subsidized and commercial support services available to the SFO varied? How has SFO access to new, specific support services changed with insertion in the supermarket channel?	Number of types of support services received by the SFO. Subsidized versus commercial support services. Unmet demand for specific support services

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