Links among Supermarkets, Wholesalers, and Small Farmers in Developing Countries: Conceptualization and Emerging Evidence*

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1. Introduction

There has been substantial research in the past half decade investigating the rapid rise of supermarkets in developing regions and tracking the very recent and dramatic changes in their procurement systems. Both of those trends can be hypothesized to affect the wholesale sector and conditions facing small farmers. However, empirical research is only recently emerging shedding light on those effects. There is a need to lay out a framework to conceptualize the links among supermarkets, wholesalers, and small farmers, with an aim to better understand the ways in which the rise of supermarkets can affect small farmers, directly and indirectly. There is also a need to review emerging field survey evidence illustrating such links. Both of these will inform policy and program debate. This paper aims to contribute to the filling of these needs.

Besides marshaling case study evidence from several recent field studies, the paper presents a heuristic model of the choices of supermarkets, wholesalers, and farmers concerning links among them. The model combines what are usually strange bedfellows in disciplinary research: (1) industrial organization economics, (2) agribusiness strategic research, and (3) farm microanalytics. These three need to be brought to bear to analyze basic and abrupt change in food system structures, wrought by large retailers and processors, and faced by many small farmers.

We start with a review of recent evidence on the diffusion of supermarkets. We then present a model of the choice of procurement system by supermarket chains, which by extension yields derived demand for direct supply from producers or for the intermediating services of various kinds of wholesalers, who in turn choose producers. In our partial equilibrium analysis that derived demand is met by supply of products by farmers. In this paper for simplicity we don't consider processors.

2. The Rapid Diffusion of Supermarkets: Emerging Evidence and Conceptualization of Determinants

Supermarkets Spreading Quickly over Developing Regions in Three Waves

The diffusion of supermarkets represents a major concentration in the retail industry structure of developing regions. Supermarkets[1] are spreading very rapidly in developing countries, a

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[1] This is a term we use as shorthand for large-format modern retail stores, such as supermarkets, hypermarkets, and discount stores. Our discussion focuses on large-format stores and only secondarily on convenience stores, which tend to be numerous but small and typically tend to have only a small share (circa 5 to 10 percent) of modern retail sector sales.

phenomenon begun mainly in the past decade. The diffusion rates have varied over regions, characterized by three waves.[2]

The first wave started small[3] in the early-to-mid-1990s and had built to a major force in retail by the end of the 1990s in South America, East Asia outside China and Japan, Northern-Central Europe, and South Africa. The average share of supermarkets in food retail went from a mere niche—roughly 10 to 20 percent of food retail circa 1990—to dominate the market with 50 to 60 percent of food retail by the early 2000s. Compare that to the 70 to 80 percent share that supermarkets have in food retail today in the United Kingdom, United States, or France, and one sees a trend toward convergence. Note that there is a second set of countries perched at the tail end of the first wave and near the start of the second wave that we class with the first wave, with their supermarket "takeoff" in the mid-1990s; examples are Costa Rica, Chile, South Korea, Philippines, and Thailand, all with circa 50 percent share.

The second-wave countries include parts of Southeast Asia and Central America, Mexico, and Southern-Central Europe, where the share went from circa 5 to 10 percent in 1990 to 30 to 50 percent by the early 2000s, with the takeoff occurring in the mid-to-late 1990s.

The third-wave countries include countries where the supermarket revolution takeoff started only in the late 1990s or early 2000s, reaching about 10 to 20 percent of national food retail by circa 2003. They include some countries in Central and South America (such as Nicaragua, Peru, and Bolivia), Southeast Asia (such as Vietnam), China, India, and Russia. The latter three are the foremost destinations for retail foreign direct investment (FDI) in the world and are each a fascinating third-wave case, with supermarket sector growth rates circa 20 to 40 percent per year—hence extremely fast change.

Sub-Saharan Africa presents a very diverse picture, with only one country (South Africa) firmly in the first wave of supermarket penetration, but the rest either in the early phase of the third-wave takeoff of diffusion or in what may be a pending, but not yet started, fourth wave. Kenya, Zambia, and Zimbabwe are in the early phase of the third wave and have substantial numbers of supermarkets, initiated by both domestic investment and FDI from South Africa. This investment was attracted by a middle-class base and high urbanization rates, but supermarket penetration is still only where South America was in the early 1980s. The share of supermarkets in urban food retail is about 10 to 20 percent in the large/medium cities, and the share of produce hovers around 5 percent (see, for example, Neven and Reardon 2004 for Kenya). Even with mainly domestic investment and some South African retail capital and technology, there is still considerable uncertainty about the rate at which the supermarket sector in these countries will grow.

The great majority of Africa, however, can be classified as not yet entering a substantial takeoff of supermarket diffusion: (1) At the upper end of this group are a score or so of supermarkets in countries such as Mozambique and Tanzania, Uganda, and Angola, places where South African retail FDI is just starting (see Weatherspoon and Reardon 2003 for evidence on investments by the South African chain Shoprite) and may a decade or two from now be recognizable as a fourth wave. Supermarkets in these countries show signs of early growth and are surrounded by a more general trend of the growth of self-service in relatively large semitraditional stores in urban areas. (2) At the lower end of this set are the very poor countries of Africa such as Ethiopia, Sudan, Burkina Faso, and Mali. It is unlikely that the lower end of this set of countries will see supermarket growth for several decades. Even then, it will be dependent on higher urbanization rates, better investment climates, lower transaction costs, improved infrastructure, much more rapid income growth, and political stability. It will take significant improvements in most of these areas to stimulate FDI by global supermarket chains. We have shown that supermarkets, even in places like South Africa and Kenya,

[2] For country-specific information and more detail, Reardon and Timmer (2005), Reardon and Berdegué (2002), Weatherspoon and Reardon (2003), Dries, Reardon, and Swinnen (2004), Hu et al. (2004), Neven and Reardon (2004), and Berdegué et al. (2005).

[3] In most developing countries there was a supermarket sector, albeit tiny, in a small niche in the upper-income-segment markets and large cities, and growing very slowly, in the 1980s and even before—for example, in Puerto Rico, noted as early as 1953 by Holden (1953) in the Holden-Galbraith study.

have spread beyond the middle class into the food markets of the urban working poor. But the supermarket sector usually requires a critical mass of middle-class urban consumers to build the initial base before expanding into the rest of the urban market.

Two important qualifications regarding the general diffusion patterns discussed above are to note: (1) Diffusion occurs at differential rates over intercountry space. For example, Dries, Reardon, and Swinnen (2004) note that there have been three waves of diffusion of supermarkets in the Central and Eastern European region, each wave a subset of countries. (2) Diffusion occurs at different rates over the space within a country and over socioeconomic strata. The diffusion trajectory is from large to middle to small cities and then even to rural towns, and from upper to middle class and then even to the poor. For example, in most of the first-wave and part of the second-wave countries, and starting even in some of the third-wave countries, supermarkets have penetrated beyond the food markets of the middle class into those of the urban poor.

Diffusion Driven by Demand Factors and by FDI and Procurement System Change

What factors drove the rapid diffusion of supermarkets? Reardon et al. (2003) examine the demand and supply sides of supermarket services in developing regions.

First, demand by developing-country consumers of supermarket services was and is driven by factors predictable from a services demand function with arguments including incentives and capacity variables that are similar to those that drove this demand in Western Europe and the United States: (a) urbanization (with the consequent entry of women into the workforce outside the home and increased opportunity cost of women's time and their incentive to seek shopping convenience and processed foods to save cooking time), coupled with increased demand for processed foods with rise in per capita incomes; (b) price reduction by supermarkets (relative to traditional retail) first of processed products and later of perishables (with cost reductions made possible by symbiotic evolution of technologies and procurement systems by supermarkets and processing firms); (c) real mean per capita income growth; and (d) reduction of transaction costs via access to or acquisition of private or collective capital that reduced the costs to access supermarkets (rise in ownership of refrigerators, growing access to cars and public transport).

Second, supply in developing countries of supermarket services was driven by several important factors that led to supermarkets spreading far faster in developing regions than they had in Western Europe and the United States. Two factors stand out.

On the one hand, a dramatic force for the sudden rise of supermarkets especially in the mid-to-late 1990s was the liberalization of foreign direct investment[4] followed by an avalanche of retail FDI, entering first in the first-wave countries and then the second and then the third waves. In the 1990s and after, FDI was crucial to the takeoff of supermarkets. Domestic chains had been growing slowly before the waves of FDI, and thereafter the surviving domestic chains grew much faster in order to keep pace with foreign chains. The incentive to undertake FDI by European, U.S., and Japanese chains, and chains in middle-income developing countries, was due to saturation and intense competition in home markets and much higher margins to be made by investing in developing markets. When these chains entered in the 1990s, it induced an "investment war" among foreign chains and domestic chains, relentlessly driving market penetration as noted above, and driving consolidation and multinationalization.

On the other hand, retail procurement logistics technology and inventory management were revolutionized in the 1990s. That dramatically reduced costs, allowing supermarkets to extend beyond high-price luxury niches in the markets to penetrate the mass market for food.[5] This was led

[4] Reardon and Timmer (2005) argue that FDI liberalization is a more powerful component of globalization affecting farmers than is trade liberalization.

[5] Supermarkets could then lower prices, first for processed products and very recently for fresh products, competing with small shops and even wetmarkets. D'Haese and Van Huylenbroeck (2005) show that supermarkets have lower processed food

by global chains and is diffusing now in developing regions through knowledge transfer and imitation and innovation by domestic supermarket chains. The logistics changes and other supply chain management by supermarkets were embodied in procurement system change. That change is the crucial link between the supermarket revolution and market conditions of growers, and it is discussed next.

3. Supermarket Procurement System Change: Emerging Evidence and Conceptualization of Determinants

Observed Patterns in the Evolution of Supermarket Procurement Systems

There is continuous and rapid change in procurement systems in the supermarket sector in developing regions, which in turn conditions the organizational and institutional context in which supermarkets choose farmers (and wholesalers) and influences the incentives facing and capacities of farmers regarding participation in the supermarket market channel. Note, however, that this procurement system change has occurred at sharply different rates over chains in a given country,[6] with the three to four leading chains (with usually the majority of the supermarket market, however) undertaking the lion's share of the procurement innovations. The second- and third-tier chains and independent supermarkets, not to mention the traditional retail sector, continue to depend mainly on traditional brokers and the "spot" wholesale market. Thus, in the early phases of supermarket diffusion, farmers and wholesalers face two very different retail segments: a small set of leading chains with a small share of the food market, undertaking modernization of their procurement systems in ways that condition the requirements and incentives facing producers; and a large set of second-tier chains and traditional retailers with a large segment of the food market, manifesting traditional food market conditions and requirements. As supermarket diffusion occurs, the situation reverses, and farmers face a food market dominated by leading supermarket chains that have or are modernizing their procurement systems in ways we describe below.

The patterns of technological, organizational, and institutional innovation observed can be described as the "four pillars" of procurement system change (Berdegué et al. 2005; Reardon et al. 2003):

1. The first pillar is a trend toward centralization of procurement (per chain). As the number of stores in a given supermarket chain grows, there is a tendency to shift from a per-store procurement system to a distribution center serving several stores in a given zone, district, country, or region (which may cover several countries). This is accompanied by fewer procurement officers and increased use of centralized warehousing and sophisticated information technology and chain management. Additionally, increased levels of centralization may also occur in the procurement decision-making process and in the physical produce distribution processes. Centralization increases efficiency of procurement by reducing coordination and other transaction costs, although it may increase transport costs (shifted onto suppliers) by extra movement of the actual products. Studies from China, Costa Rica, and Brazil show estimates of roughly 30 to 40 percent cost savings from centralization.

   Centralization proceeds in steps, with a shift from by-store procurement to use of distribution centers handling distribution in a zone—then a country, then a region, then globally. Reardon and Timmer (2005) note that such spatial broadening already has, and will have, increasing effects on trade levels, composition, and structure. There is (initial) evidence pointing to a "U" curve of trade content of procurement, meaning that in the early stages of supermarket establishment in a developing country, the share of imports in total sales is high

prices than local stores in small towns in South Africa. Neven and Reardon (2004) show the same for urban Kenya. We also observe similar prices for commodity vegetables between supermarkets and wetmarkets in several large cities in China (Hu et al. 2004), Mexico City (Reardon et al. 2005), and Guayaquil, Ecuador (Zamora 2004).

[6] Note that this sharply differing adoption rate is also common to developed countries; see Kinsey (2004) for evidence from the United States.

(as supermarket supply chain development is rudimentary); as supermarkets develop their local supply chains, the import share declines, only to rise again as supermarket chains themselves regionalize and link to global sourcing networks. More research is required on this theme.

2. The second pillar is the adoption of organizational innovations comprising a shift from reliance on spot markets (in particular, traditional wholesale markets and brokers) toward growing use of specialized/dedicated wholesalers. They are specialized in a product category and dedicated to the supermarket sector as their main clients. The changes in supplier logistics have moved supermarket chains toward new intermediaries, sidestepping or transforming the traditional wholesale system. Reardon et al. (2005) note, for example, that the traditional wholesale markets in the main cities in Mexico have experienced a fall in volumes traded by 25 to 30 percent in the past two to three years; an important factor (although not the sole factor) in this rapid decline is that as supermarkets have spread, they have altered their sourcing systems toward specialized wholesalers or buying direct.

   These specialized wholesalers cut coordination and enforcement costs, and enforce private standards and contracts on behalf of the supermarkets. A related development is the trend toward logistics improvements to accompany procurement consolidation and a shift in supply organization to implement those improvements. Retail chains increasingly outsource—sometimes to a company in the same holding company as the supermarket chain—logistics and wholesale distribution functions, entering joint ventures with other firms. An example is the Carrefour distribution center in Brazil, which is the product of a joint venture of Carrefour with Cotia Trading (a major Brazilian wholesaler distributor) and Penske Logistics (a U.S. global multinational firm).

3. The third pillar is the adoption by leading supermarket chains of the institutional innovation of contracts with their suppliers—in particular via their dedicated, specialized wholesalers managing a preferred supplier system for them. Such contracts are part of what the industrial organization literature terms “vertical restrictions” that fall short of full vertical integration (generally and usually avoided by both supermarket chains and food processors) but that approximate in certain ways the outcomes from vertical merger (Carlton and Perloff 2000). The contract is established when the retailer (via its wholesaler or directly) “lists” a supplier. That listing is an informal (usually) but effective contract[7]—in which delisting carries some cost, tangible or intangible. These implicit contracts sometimes include technical assistance and credit (directly or through inducing credit supply from a private bank the manager of which sees the supermarket contract as a collateral substitute); this constitutes interlinking and interlocking output-factor markets (Bardhan 1980; Eswaran and Kotwal 1985) and enables the resolution of idiosyncratic factor market failures (commonly facing small farmers today) through the supermarket-grower or supermarket-wholesaler-grower contract (Reardon and Swinnen 2004) and is paralleled in the processing industry with assistance-augmented contracts that increase enforcement and reduce holdups (Gow and Swinnen 2001; Swinnen 2004).

4. The fourth pillar of procurement system change is the rise of private quality and safety standards implemented by supermarket chains and large-scale processors. While food retailing in these regions previously operated in the informal market, with little use of certifications and standards, the emerging trend indicates a rapid rise in the implementation of private standards in the supermarket sector and other modern food industry sectors such as medium- and large-scale food manufactures and food service chains. The rise of private standards, mainly for quality but in incipience of safety, of food products and the increasing importance of the enforcement of otherwise-virtually-not-enforced public standards make up a crucial aspect of the imposition of product requirements in the procurement systems. In general, such standards function as instruments of coordination of supply chains by

[7] *Contracts* is used in the broad sense of Hueth et al. (1999), which includes informal and implicit relationships. That best fits the relationships between growers and supermarkets in developing regions where written contracts are very rare.

standardizing product requirements over suppliers, who may cover many regions or countries. Standards specify and harmonize the product and delivery attributes, thereby enhancing efficiency and lowering transaction costs (Reardon et al. 2001; Berdegué et al. 2005; Henson and Reardon 2005).

The differences in standards between the traditional market and the supermarket market imply substantial differential investments in technology and organization by producers. That is illustrated for the case of Ecuadorian potatoes by Zamora (2004), who shows the dramatic increase in product and transaction requirements that the shift from the spot/wholesale market with few standards to a situation of application of the "four pillars," in particular with private standards for product and transaction attributes that are much stricter than the traditional market. He notes that the traditional market demands from potato growers only (1) a certain set of varieties; (2) a maximum level of mechanical damage; (3) a minimum size; and (4) a certain color. By contrast, the supermarket channel demands (1) a certain set of varieties; (2) a certain form; (3) a maximum level of mechanical damage; (4) a level of cleanliness; (5) a level of food safety; (6) a certain odor limit; (7) a certain size; (8) a certain color; (9) a certain maturity; (10) temperature maintenance; (11) specific packaging; (12) a certain volume; (13) timing and place restrictions; and (14) a specific payment period.

Heuristic Model of Diffusion of Procurement System Innovation: Decisions of Retailers and Suppliers

Here we present a simple heuristic model of the diffusion of these procurement system innovations over chains. This is an extension of a simplified model presented in Reardon et al. (2003).

The Procurement System Choice Set of the Supermarket Chain's Procurement Officer

The choice set includes the choices of the four pillars described above versus staying with the traditional procurement system. We present this as a binary choice for simplicity; in practice the chain must also decide the degree and speed of change. The investments are in various forms of capital, and in a parallel to the term used in the technology literature, it is a vector of capital "embodying" technological, organizational, and institutional change:

1. Investment in physical capital (distribution center, electronic data transfer systems with suppliers, truck fleet, etc.); physical capital can be produced through investments or can be acquired in input markets.
2. Investment in organizational or social capital (establishment of a relationship with a specialized/dedicated wholesaler or a direct relationship with a farmer—versus simply continuing to source from the traditional "spot" wholesale market); organizational capital can be thought of as "embodied" in relationships, associations, and so on, which require investment to "produce."
3. Investment in institutional capital (establishment of implicit contracts or preferred supplier lists, which implies derivative investments in monitoring mechanisms, technical assistance and credit provision mechanisms, product collection or reception infrastructure, or, alternatively, passing costs to suppliers); institutional capital can be thought of as "embodied" in contracts and property rights, which require investment to "produce."
4. Investment in institutional capital (establishment of private standards, which implies establishment of testing or monitoring systems and equipment, possibly investment in certification systems or relationships with third-party certification systems).

The Objective Function of the Supermarket Chain's Procurement Officer

The typical first-tier supermarket chain in a developing country tends to be either a multinational or a large domestic firm that is in intense competition with global or regional multinationals. In the supermarket sector, there is the constant threat of new entries or attempts at entry by chains from the region or around the world. Supermarkets are also competing with the small shops and informal wetmarkets that come with an advantage of long habit, freshness and variety, and freedom from paying taxes (but which have the disadvantages of lack of economies of scale in procurement and lack of coordination or traceability in the supply chain).

The chains compete with each other and with the traditional retailers on the basis of quality differentiation for the relatively small segment of middle- and upper-income urban consumers, and on the basis of food price for the broad mass of lower-middle-income and working poor urban consumers. We assume they maximize profit subject to a "market-share first" strategy to occupy commercial territory in order to build intertemporal economies of early entry, competing for scarce real estate locations. They are assumed then to seek to do the following:

1. Minimize intermediate input cost (i.e., the net price they pay the wholesaler or farmer for procured products).
2. Minimize transaction costs (plus minimizing risk by preventing episodes of "shorts").
3. Maximize product quality (such as taste and cosmetic appearance) while minimizing quality instability over time.
4. Maximize product diversity to seek or counter spatial monopolistic competition.

Demand Side: The Adoption Decision of the Procurement System by the Retailer

The choice vector we focus on here is (1) continue to buy from the traditional wholesale market, hence spot market; (2) buy direct from farmers; or (3) buy from a specialized/dedicated wholesaler who (mainly) buys direct from farmers (imposing the standards of the chain, and using implicit contract/preferred supplier system). Here we abstract from the choice of the specific supplier, an issue taken up below.

The preceding arguments in the utility function translate into the following incentive variables in the adoption or investment function related to those choices:

1. The capacity (a vector of variables) of the traditional wholesale market to meet procurement officer objectives.
2. Alternatively, the capacity (and cost) of local farmers to supply the supermarket directly.
3. Alternatively, the ease (cost) of sourcing the products that meet the above attributes internationally.
4. The cost (for example, the interest rate) of the investment needed to meet the objectives.
5. The capacity (such as financial and management capacity) of the chain to undertake investments to meet the objectives.
6. The price vector of the competitors, hence cost competition among retailers, per consumer segment.
7. Quality and product differentiation of the products sold by competing retailers, combined with consumer effective demand for those attributes.
8. Threshold firm size to justify investments; note that there is usually a threshold quantity of stores or product throughput in a procurement system to justify use of a distribution center.[8] This reflects a kinked investment curve for continuous variables, and a Leontieff-type (step-level) function for lumpy investments like depots or distribution centers.

[8] In Brazil that amount is noted by de Souza et al. (2004) as 2,000 tons a month as a minimum of fruit and vegetable throughput in a chain.

9. The “importance” of the product in the chain’s competitive positioning; this is not necessarily measured in terms of share or even profitability, but can be in terms of store image or consumer “draw”; that is usually the case for produce in general and for some products that are site specific, such as avocados in Mexican supermarkets, the cost of which is used as a “gancho” (hook) to draw in consumers who will then buy other things (Reardon et al. 2005).

Supply Side: The Decision (by Wholesalers and Farmers) to Participate in Supermarket Procurement Systems

Wholesalers shift toward relative dedication to supplying supermarkets, and farmers shift toward supplying supermarkets (directly, or indirectly via their agents, the specialized wholesalers) as a function of incentives and capacity for such supply.

The incentive variables include the following; think of them as differentials of the supermarket channel, over or under the base reference point of that variable observed in the traditional market channel:

1. The price differential or premium over the traditional wholesale market that the supermarket channel can pay; note, however, that this should be observed as the price averaged over the total product including the share not accepted due to quality rejections and all deductions for shelf fees, interest costs due to lagged payment period, and so on.
2. The cost of technological change (to meet the technological and postharvest practices requirements of volume, consistency, quality, and so on, implied by the four pillars of supermarket procurement system change noted earlier).
3. The cost of “doing business” with supermarkets, including various fees, as well as waiting weeks for payment instead of receiving payment immediately as in the spot market.
4. The relative market risk of dealing with supermarket channels as compared to spot wholesale markets.

The capacity variables include the vector of “capital” discussed earlier from the supermarket side, but now applied to the supplier side; again, think of these as differentials between the supermarket channel requirement and the traditional market:

1. Holdings of technology-embodying physical capital such as irrigation equipment or greenhouses.
2. Organizational capital such as associations to aggregate product over many farmers.
3. Institutional capital, such as contracts between a farmers’ cooperative and member farmers to supply produce to the specifications of the specialized wholesaler buying for a supermarket chain.

4. Illustrations and Emerging Evidence

While the leading chains in a given country are—on average and in general—disposed to, and capable of, implementing the innovations above, one sees substantial variation in adoption of the innovations over supermarket locations in a given country, and over product categories. For example, a chain might adopt the procurement innovations for processed products but not fruit, or for watermelons but not tomatoes, thus setting up a preferred supplier scheme, opting to have watermelons delivered to a distribution center under implicit contract, applying private quality norms, but opting to continue to just send a truck to the traditional wholesale market for tomatoes each morning. Moreover, the type of producer chosen (large versus medium versus small farmers) can differ a lot over products, for a given supermarket chain in a given country, or over countries for a given product.

Given the limited scope of this paper, below we merely illustrate this variation, drawing on the conceptual framework to explain, or in some cases merely hypothesize, reasons for the patterns observed. In general the emerging cases can be explained by the conceptualized determinants discussed above.

Illustrations of Procurement System Choices of Retailers

A Guatemalan Illustration

Berdegué et al. (2005), Hernandez et al. (2004), and Flores (2004) show for the case of the La Fragua supermarket chain in Guatemala the use of a mix of procurement systems for produce, depending on the type of produce.

First, there has been a clear application of the first pillar of change—centralization. La Fragua's produce procurement office operates a large distribution center for the country. In 1999, 20 percent of its produce passed through the distribution center (as opposed to direct to stores) versus 98 percent in 2004 (while the overall volume quintupled). The reason for this shift was to save on coordination costs and centrally monitor quality.

Second, there has been a marked shift toward two of the other pillars of procurement change—an increase in direct sourcing from farmers as well as a shift to reliance on specialized wholesalers, but with great variation over product categories, explicable by the above discussion.

In 1999, 25 percent of the produce came directly to them from producer-suppliers (as opposed to wholesaler-suppliers delivering from rural areas or from the wholesale market), and by the end of 2004 more than 40 percent came directly from producer-suppliers.

The main category of fruits and vegetables procured is "large-volume products"—roma (cooking) tomatoes, potatoes, bell peppers, melons, and watermelons (together 30 percent of La Fragua's produce). In 1999, 40 percent of this category was centralized; now 100 percent is sourced from a half dozen large wholesaler-intermediaries that buy from the wholesale market and thus from thousands of small farmers. Since 2000, La Fragua has been exploring sourcing directly from farmers, but it is faced with several problems: (1) There is virtually no investment in irrigation or greenhouses at the farm level in these commodity products, due to the high cost of such investments relative to the low profit rates. That means the products need to be sourced over a number of production zones over the year to get constant supply, implying high transaction costs for direct sourcing. In particular, roma tomato and potato growers are quite scattered geographically and tend to be very small producers. (2) The very-smallholder nature of production and the lack of irrigation and greenhouses implies that there is great variety in product quality, and thus there are high sorting costs that retailers prefer to pass on to wholesalers handling large volumes. (3) Retailers tend to want product harvested and delivered fresh daily, again a source of high transaction costs that small producers are unwilling to undertake. Thus, La Fragua still relies on wholesaler-suppliers for these basic commodities because of the limitations of growers. Wholesalers perform the service of selection and grading (that La Fragua did itself in the 1990s) to get the best quality from the large volumes coming into the wholesale market.

Why then does La Fragua still work actively to establish direct sourcing from growers of these items? (1) It wants to avoid wholesaler margins. (2) There is no traceability to growers when using wholesalers, which constrains the shift over time to implementation of quality and safety standards. The shift to direct sourcing through a producer-supplier system will be a function of the cost of investments by farmers (in greenhouses) and La Fragua (in coordination) against the benefits of foregone payments to wholesalers and increased quality consistency of these bulk products.

The next category is "medium-volume bulk products": carrots, cabbage, lettuce, onions, and salad tomatoes (together 15 percent of produce sales) and other main fruit (limes, oranges, papayas, and pineapples). Five years ago, 20 percent of this category was centralized, now 100 percent. In

1999, 70 percent of this category was sourced from the wholesale market—and today only 30 percent comes from the market (most limes, onions, oranges, and papayas) and 70 percent now comes from preferred-list producer-suppliers. Each product has only one or two suppliers. The greens and carrots require daily harvest and fast delivery and thus well-organized and equipped producers. In some cases, such as lettuce, a large amount of the supply comes from either commercial companies, who have smallholder contract schemes, or several small farmer associations that bulk the product from many small farmers and ensure quality (Flores 2004).

The next category is bananas, the largest single item (8 percent of sales), now sourced from large producer-suppliers.

The next category is “low-volume greens”: celery, spinach, and herbs such as cilantro and mint. In 1999, 20 percent was sourced from producer-suppliers and the rest came from the wholesale market, and all noncentralized. By 2004, all but the herbs were centralized and all were bought directly from producer-suppliers, usually small growers near the city, performing the service and labor-intensive care required to grow and deliver these delicate items.

The last category is “seasonal products”: high-volume products such as mangoes, and low-volume fruits. In 1999, 20 percent of the mangoes was purchased from preferred suppliers from their own farms, and the rest from the wholesale market; 20 percent was centralized. As of 2004, 100 percent came from producer-suppliers, and 100 percent were centralized.

In sum, La Fragua has adopted “on average” the four pillars of procurement system change, but with very substantial variation over product types, mainly due to the supply characteristics of the different products at present in Guatemala. The most common changes across products are centralization of procurement through the distribution center and the imposition of private standards of quality; the least commonly shared change is the shift to preferred-supplier systems and away from the wholesale market The traditional procurement system of sourcing from the wholesale market persists mainly for the set of basic vegetable commodities, albeit with a tendency to focus on several large wholesalers in the wholesale market who can meet the quality, consistency, and volume requirements of the chain. Moreover, small farmers figure substantially in product supply to the chain, either through the wholesale market for several key commodity vegetables such as roma tomatoes or through specialty perishables such as lettuce. By contrast, several medium and large producers are key to the supply of some bulk vegetables and many fruits. The variation in sourcing over farmer types is driven by transaction costs and access to medium and large farmers willing to supply the supermarkets. It also reflects the size distribution of farms by type of produce; in Guatemala one tends to find a relatively flat distribution of farm size (mainly small) in vegetables for the local market and a skewed distribution for tropical fruit such as bananas.

A Kenyan Illustration

Neven and Reardon (2004) show for the case of Uchumi, a main supermarket chain, in Kenya the use of a mix of procurement systems for produce, depending on the type of produce.

For vegetables, which make up 45 percent of the value of produce sold at Uchumi, roughly 50 percent is sourced directly from growers. Medium-sized producers supply the largest share, 25 percent, followed by large farms at 15 percent, and small farms at 10 percent. Brokers supply 45 percent of Uchumi’s vegetables, while the rest (5 percent) is imported. Small farmers supply mostly leafy greens (kale, spinach, traditional African vegetables) and vegetables sold in small volumes (e.g., herbs). Other vegetables are supplied by the larger farmers. The latter especially applies to fresh-cut vegetable packs because most small-scale farmers do not have a packing shed, which in this case is a key requirement. Currently large farms supply 75 percent of fresh-cut vegetable packs, and that percentage is expected to increase to 90 percent over the next five years. Brokers mainly resolve shortfalls.

For fruits, which make up 55 percent of the value sold, Uchumi sources 35 percent directly from growers—15 percent from large-scale farms, 10 percent from medium-sized farmers, and 10

percent from small producers. Imports represent roughly 25 percent of procured fruit, and the remaining 40 percent is supplied by brokers. Small farms play only a small role with regard to fruits (examples of fruits where they are involved are watermelons, passion fruit, and strawberries). For fruits there is a heavy reliance on brokers (because they buy mangoes, for example, from smallholder producers in different regions of the country as the seasons change), large-scale farms/plantations (e.g., Kakuzi, a 6,400-acre agrifood business listed on the Nairobi Stock Exchange), and imports. As a group those three suppliers represent 80 percent of Uchumi's fresh fruit supplies.

As Uchumi's sales of produce increase, it is moving away from traditional brokers (and their long supply chains *and* the mostly smallholder producers they buy from) to get supplies directly from farmers. Brokers, as a source of produce, have decreased from the main supplier category (70 percent in 1997) to less than 50 percent in 2003 (45 percent of vegetables and 40 percent of fruits). Reducing its reliance on brokers is the first priority at the moment for Uchumi's produce procurement, and management expects that by 2008 brokers will make up no more than 10 percent of supplies—that is, they will be used only to resolve shortfalls from regular suppliers (similar to Freshmark, Shoprite's produce procurement arm in South Africa; Weatherspoon and Reardon 2003). Direct supplies by farmers allow supermarkets to increase simultaneously control over quality, supply reliability, and price stability and thus make them more competitive with traditional retailers.

In sum, as in the case of La Fragua, Uchumi tends toward adoption of the four pillars of procurement system change, with a similar attempt to shift toward direct sourcing from farmers where possible. Again, there is substantial variation in average farm size over products; again, as in Guatemala, there is a relatively flat distribution of farm sizes for many domestic vegetables, and thus the chain draws on smallholders, while for some vegetables and a number of fruits there is greater skewedness in farm size distribution and a tendency to draw on medium and large farmers where available.

A Brazilian Illustration

Mainville et al. (2005) examined produce markets in Sao Paulo, Brazil, and focused on sourcing by leading chains such as CBD (the largest chain in Brazil, mainly of domestic capital, but in joint venture with a French chain, Casino) of tomatoes and lettuce. Several key points emerged.

CBD shifted from a decentralized (store-by-store) to centralized (in a large distribution center) procurement system for produce from 1998 to 2004. CBD implemented a preferred-supplier system, shifting from sourcing directly 38 percent of its produce to 70 percent in 2002. That allowed important reductions in spoilage losses.

The system differs substantially, as in the above cases, between low-profit commodity products such as tomatoes and niche products that are highly perishable, such as lettuce.

In the case of highly perishable products in which quality is most important, the shift was complete: in 1997 CBD sourced only 10 percent of its lettuce from direct procurement, whereas by 2002 that share was 100 percent. In the past several years, there has been a significant reduction (three quarters) in the number of suppliers as CBD culled for those able to meet the quality and logistics requirements. As in the previously discussed cases, the more capitalized small and medium farmers were retained. The investment requirements in terms of production and postharvest (cold chain) are substantial.

In the case of commodity tomatoes, those still are sourced from wholesalers, but with the shift, as in the cases above, toward specialized/dedicated wholesalers who also have packing plants in production areas. In contrast to lettuce, but like commodity tomatoes in the Central America case, the investment requirements at the production and postharvest levels are not substantially different for the supermarket channel.

Emerging Evidence from Grower Surveys

The evidence concerning the grower-level impacts of supermarkets on producers is far more recent and partial, but it points toward a similarly mixed picture.

First, a relatively unambiguous picture appears to be emerging of exclusion of small processing and food-manufacturing firms in supermarket procurement systems in developing countries. While there are very few studies on this, the forces leading to exclusion seem to aim in just one direction. For example, Hu et al. (2004) note that whereas supermarket chains in Beijing tend to increase the diversity of processed products, they show a strong tendency to select a small number of medium-to-large firms capable of delivering a consistent-quality product at large volumes. This ensures "one-stop shopping" for the chains—that is, a given firm is able to supply a diversity of product lines in order to reduce transaction costs for the chain. The chains reap economies of scale from large volumes of processed products moving through their distribution centers, and they seek to work with larger firms that can ship to their centers or have their own distribution centers that they can use to distribute to stores. This is an international trend, although seen vividly in the rapidly changing Chinese supermarket sector. Hu et al. (2004) noted an example of a Beijing chain that cut its number of processed food suppliers from 1,000 to 300 in one year once it had its distribution center in place and could consolidate suppliers. Dries and Reardon (2005) note a similar tendency in Russia for dairy products, and Balsevich et al. (2004) for meat products in Costa Rica and Nicaragua. Moreover, the effects on the majority of growers are felt indirectly, via the choice by supermarkets of larger processors, as processed food constitutes half to two-thirds of the food sales of a typical supermarket or hypermarket in developing regions.

Second, however, changes in supermarket procurement systems also affect growers directly in the case of fresh fruit and vegetables—and thus the processing sector does not mediate the link between farmers and supermarkets or the wholesalers that serve them, which is why most studies of supermarket effects directly on producers have been (only in the past year) in this category. There have been several recent studies of growers supplying supermarkets—in Kenya (Neven. 2004) Nicaragua (Balsevich et al. 2004) Guatemala (Flores 2004 and Hernandez et al. 2004); and Ecuador (Zamora 2004), for example. The results from the new studies tend to show the following:

First, small farmers are involved in supermarket supply chains in these case study countries. There can be substantial involvement of small growers, such as in commodity tomatoes in Nicaragua and Guatemala and lettuce in Guatemala.

Second, however, just as it is not the poorest and smallest farmers who tend to produce fruits and vegetables, among growers of the latter it tends to be the upper tier in terms of assets (*not necessarily in terms of size,* but in terms of physical, human, and organizational capital) who supply supermarkets. This is clear in all the cases noted above. By contrast, where small farmers do not have the requisite capital to make the grade, supermarkets tend to reduce the ranks of preferred suppliers to the tier of small farmers who have the requisite capital, or to medium farmers, as illustrated for potatoes in Ecuador (Zamora 2004) or vegetable producers in Thailand (Boselie 2002).

Third, the net benefit of selling to supermarkets relative to selling to traditional markets tends to be much higher in products ("noncommodities") compared to commodities. For example, Flores (2004) shows that Guatemalan small farmers with the range of capital sufficient to allow them to sell lettuce (a niche crop) to supermarkets earn several times more (in net terms) per hectare than do small farmers selling to traditional markets. By contrast, for Guatemalan commodity tomato producers, Hernandez et al. (2004) shows that there is not much difference in net returns between selling to wholesalers selling to supermarkets versus wholesalers selling to traditional retailers, although there is a perception that the market risk is lower when a farmer enters a relationship with wholesalers dedicated to the upper-tier market, such as supermarkets, which requires a constant and consistent supply of a certain commercial quality.

Fourth, farmers' associations or cooperatives tend to be necessary (to reduce transaction costs) but far from sufficient; growers can use them to facilitate entry into the market, but a range of

other threshold investments in management, institutions to ensure collective compliance with supermarket standards, and physical capital are needed to keep farmers in the dynamic markets (see Berdegué 2001 for the case of Chile and Jano et al. 2004 for cases in Central America).

5. Conclusions

In general, evidence from studies of the procurement system choices of leading supermarket chains supports a general tendency to a shift toward the innovations represented by the four pillars (centralization, shift from traditional wholesale markets to specialized/dedicated wholesalers, shift from spot market to de facto, implicit contracts via preferred supplier systems, and the rise of private standards). This is important to small farmers because there is parallel evidence that in many developing countries supermarkets are rising quickly to dominate the dynamic urban market, and thus to become key “mediators” of new market opportunities for small farmers.

Controlling for the type of chain (we have dealt exclusively here with the dominant, leading chains), there are, however, substantial differences over products, mainly reflecting the relative abilities of local producers (acting directly) and imports versus extant local wholesale markets to satisfy the requirements of the supermarket chain. Very roughly calculating, one can say that even leading supermarkets have made the shift only at most halfway (40 to 50 percent) away from wholesale markets. That means that for at least half of their product, they are still sourcing from wholesale markets, and in most countries in all regions, that means from thousands of small farmers, via traditional wholesalers.

But the fact that the shift is still only partial does not negate that most indicators point to a continuation of the shift toward direct sourcing, at very variable rates depending on the country, the chain, and the product. Whether supermarkets source directly, or via specialized wholesalers, there is a general tendency (irrespective of region) to prefer sourcing (where possible) from *more capitalized farmers* who can meet the requirements of the chain; the good news for the future of small farmers is that these are not necessarily large farmers but can be and often are simply the upper tier of small farmers, the commercialized small farmers with the adequate vector of technological, organizational, and institutional capital. In some cases export firms or large farmers are available to source from, and they are typically preferred because of the low risk and transaction costs they imply. But a rough estimation is that in all regions the large or export farmer is on average not the main provider of fresh products to supermarkets, but rather it is the medium and the small-but-capitalized farmers that are dominant in the sourcing done directly or via preferred suppliers, and that that trend will continue for some time, and grow. That then clearly points to the need for development programs to apply themselves to building the capital needed by small farmers to access these markets where that access is identified as poverty alleviating and beneficial to the small farmers.

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