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**Producing and Procuring Horticultural Crops with Chinese Characteristics:
Why Small Farmers are Thriving and Supermarkets are Absent in Rural China**

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Abstract

The supermarket revolution has arrived in China and is spreading as fast as or faster than anywhere in the world. As the demand for vegetables, fruit, nuts and other high valued products have risen, urban retailers are finding new venues from which they can sell to the increasing prosperous city residents. Supermarkets have seized one niche and today have over \$55 billion in sales, more than a third of the urban food market. However, the experience of many developing countries suggests that there could be serious distributional impacts of the rising of supermarkets. There is concern among policy makers and academics that poor, small farmers might be excluded from market.

The main goal of our paper is to understand what types of farmers have been able to participate in the horticultural revolution, how they interact with markets and how supply chains affect their production decisions. Using a unique set of spatially sample communities in the Greater Beijing area, we find small and poor farmers have actively participate in the emergence of China's horticulture economy. Moreover, there has been almost no penetration of modern wholesalers or retailers into rural communities. In the paper we document seven characteristics of China's food economy that we believe account for this unique set of findings.

Keywords: Horticulture; Modern Supply Chains; Farmer Impacts; Poverty; China

JEL Classification Codes: O33; O53; Q13

Introduction

The supermarket revolution has arrived in China and is spreading as fast as or faster than anywhere in the world. As the demand for vegetables, fruit, nuts and other high valued products have risen, urban retailers are finding new venues from which they can sell to the increasing prosperous city residents. From its start in the early 1990s, today the modern food retail sector has over \$55 billion in sales and more than a third of the urban food market (Hu et al., 2004). The experience internationally, however, suggests that there could be serious distributional impacts of the rise of super markets (Alvarado and Charmel, 2002). Because of the high transaction costs involved with purchasing from millions of small farmers, it is often assumed that supermarkets and their agents will turn to large, better-off farmers that are closer to the city. As a consequence, the rise of demand for horticultural and other high-valued commodities in the consumption basket of consumer and the concomitant rise in supermarkets have created concern among the international community about the possible adverse consequences on small, poor farmers (Yu, 2003; Yuan, 2004).

Surprisingly, given the importance of this topic, there has been little work and little if any systematic empirical analysis of the effect of the rise of demand for high-valued farm commodities and the rise of the supermarket sector that is promoting these high-valued goods on farmers in China. The work that has been done (Lu, 2003), while interesting and providing important insights, is unable to answer a few key questions in a systematic way: Where are the new high-valued crops being cultivated and who is cultivating them? Are the farmers that are supplying most of the demand rich and large? Are farmers that are poor and small able to benefit? What is the nature of the supply

chains that facilitate the procurement of crops from the farmers? Are these supply chains imposing new quality and food safety standards on farmers?

The main goal of this paper is limited to one major theme: getting the facts right regarding the emergence of supply chains and the participation of farmers in China's rapidly evolving food economy. To meet this goal, we sketch a picture of who is supplying horticultural products in China and describe the patterns of marketing chains in China's rural areas, examining who is procuring vegetables, fruits and nuts from farmers. Finally, we seek to understand if there is any descriptive evidence about how marketing supply chains are affecting the way farmers are producing horticulture crops. We end by suggesting what characteristics of China's food economy make the procurement patterns so special.

Data

The data set, collected by ourselves, is comprised of observations on 201 spatially-sampled villages in the greater Beijing metropolitan region. Forty villages were chosen randomly from a set of 5 concentric rings drawn around Beijing, with Tiananmen Square as the mid-point (with radii of 40, 60, 80, 100 and 140 kilometers). In 2005 enumerators visited each of the villages and interviewed village leaders about the horticultural economy. Among other things, during a several hour-long, sit-down questionnaire sessions with enumerators, village leaders recounted information about production trends of their community's major horticultural commodities. The leaders also provided information on the two most common ways that horticultural goods are procured from farmers—including a.) the type of buyer that purchased the crop from the farmer (henceforth, the *first-time buyer*); b.) the location of the first transaction; and c.)

the agent/trading firm to whom the goods were sold by the first time buyer (henceforth, the *second buyer*). Finally, we asked leaders to tell us the nature of the contractual arrangement—either explicit or implicit—between the farmer and first-time buyers.

Who are Producing China’s Vegetables, Fruits and Nuts?

The rise of demand for horticultural crops (henceforth the term used to describe “vegetables, fruits and nuts grown in orchards”) that have been observed in the demand statistics is beginning to change production patterns of farmers from grain into other crops in the greater Beijing area after 2000 (Table 1, columns 1 and 2). The total sown area of grain between 2000 and 2004 fell from 68 percent to 58 percent. In contrast, cash crops (which include mainly crops, such as cotton and peanuts, crops that are *not* the focus of our study) rose by 4 percentage points. During the same period, the area sown to horticultural crops also rose by 7 percentage points (from 22 percent in 2000 to 29 percent in 2004). Vegetables rose by 2 percentage points; fruit—by far the crop category accounting for the largest share of horticultural crops—rose by 3 percentage points; and nuts rose by 2 percentage points.

While the production trends for the entire greater Beijing area match fairly closely the rise in horticulture demand in China’s urban areas, in this paper we are most interested in the types of farmers that are participating in the supplying the horticulture crops. In fact, when information on the typical farmer that is engaged in farming inside each of the concentric circles is compared (that is information on those farmers close to Beijing are compared to those far from Beijing), it can be seen that farmers in all areas are adjusting their production structure (Table 1, columns 3 to 12). In particular, while average farmers in all areas reduced the share of their area sown to grain by 10 percent

(from 68 to 58 percent, row 1), as might be expected (Fafchamps and Shilpi. 2003) farmers in the first two circles (40 km and 60 km circles) reduced the share of area sown to grain (12 to 16 percent) more than farmers in the other 3 circles (6 to 10 percent) that are far away from Beijing. In other words, although the production of horticultural crops rises everywhere, the largest rise in terms of the share that a village's land that is allocated to horticulture crops is in the 40 and 60 kilometer circles. Interestingly, while the share of horticultural crops in 40 kilometer circles rise mainly came from fruit (19 to 26 percent), the rise in 60km circle came from vegetables and nuts (vegetables, 4 to 9 percent; nuts, 11 to 17 percent).

Participation by the Poor

While the relative smaller rise of horticultural area share in remote area is what one may expect according to the theories of von Thunen (1826), the most significant finding, based on our data, is that poor farmers are increasing their share of the production of horticulture crops (Table 2). To show this, we divide villages into four quartiles, according to each village's reported income per capita. Between 2000 and 2004 we find that farmers in the very poor and poor categories (those farmers living in villages with incomes below the median income level) have increased their share of total sown area of horticultural crops, in general (top row). In fact, by 2004 farmers in very poor and poor villages produced more than half (55 percent) of horticultural crops in Greater Beijing. Even more significantly, farmers in the very poor villages increased their share of vegetables, fruits and nuts between 2000 and 2004 (rows 2 to 4, columns 1 and 2).

A similar picture emerges when examining different types of horticultural crops (Table 2, row 2, columns 5 and 6). For example, in the case of fruit, production is dominated by the farmers in the very poor and poor farmer village. In contrast, farmers in average income villages produce most of the vegetables. Of course, one of the most interesting findings of Table 2 is that the richest farmers are not the driving force (or beneficiary) of vegetables, fruits or nuts.

Hence, according to our data, we have strong evidence the rise of horticultural production in the greater Beijing area is not following the trends that have been observed in other developing countries. Clearly, our data show that farmers in very poor and poor villages are not being left out. In fact, especially in the case of the very poor, they are the driving force behind the rise in the supply of fruit and nuts. Moreover, there is no evidence—even for vegetable crops—that richer (but still small) farmers are dominating production. Indeed, farmers that live in the richer villages (above average and rich) have lost their share in all categories of horticultural crops (eg, 65 to 59 percent for vegetable, 48 to 38 percent for fruits and 62 to 51 percent for nut). In 2004 the richest 25 percent of farmers only cultivated 19 percent of the region's horticultural area.

Where are the Supermarkets?

The surprises on the supply side, if anything, are matched by surprises on the procurement side (Table 3). Although there has been a lot of discussion about the potential implications of the rise modern supply chains and the effect of their procurement agents on welfare in rural areas, according to our data, supermarkets are almost completely absent. Indeed, not one of the 201 village leaders that we interviewed reported the presence supermarkets for the procurement of any horticultural goods (Table

3, Panel A, column 1). Likewise, village leaders reported that only 2 percent of procurement from farmers was from specialized suppliers and only 2 percent was from processing firms (columns 2 and 3). Hence, in the greater Beijing area in 2004, only 4 percent of all horticultural goods were procured by those operating in firms that could be described as part of the modern supply chain.

Even when we look at data on the second buyer in the supply chain, the modern supply chain plays a fairly minor role (Table 4, Panel C, columns 1 to 3). When asked to whom the first buyer sells, supermarkets only are involved in 3 percent of the volume. Specialized supply firms also account for only 3 percent. Processing firms are the second buyer for 10 percent of the volume of horticultural crops. In total, even by the second link of the marketing chain, modern supply chains are playing a relatively minor role, accounting for only 16 percent of the volume.

Instead, the main story of horticulture marketing in China in 2004 is the domination of traditional supply channels, mostly by small traders. According to our data, fully 79 the first-time buyers of horticultural goods were small traders (Table 3, Panel A, row 1, column 4). These small traders, which during harvest season can be seen veritably everywhere in areas that are producing horticultural crops, enter the village itself and buy directly from farmers. Almost all transactions (more than 99 percent) are spot market transactions, exchanging the commodity for cash. In addition, in 8 percent of the cases (column 5) farmers take their crop, as they have done for hundreds of years, to local period markets to sell to local consumers and traders.

As a result of the domination of traditional supply chains, it can be seen from our data that the supply chain penetrates far into the village (Table 3, Panel B). While some

of the traders bought from farmers in local periodic markets (about 6 percent), most of them came to the farmer. In fact, when aggregating procurement from the by traders in the farmer's own fields (65 percent), in the village's center (9 percent) or at the side of the road near the village (3 percent), more than 75 percent of all procurement took place inside or immediate next to the boundary of the village (row 1 in Panel B). Only 15 percent of first time sales take place in formal wholesale markets (11 percent) or urban wet markets (4 percent). Finally, small traders not only make up the first link in the marketing chain. In fact, 49 percent of second buyers also were small traders (Table 3, Panel C, column 4).

Marketing Supply Chains and Impact on the Quality of the Supply

In this section we examine the data that we collected about technology used by farmers in our sample and examine the effect that marketing supply chains have on the use of technology. On one hand farmers in the sample frequently changed technologies—either the crop they were producing or the type of variety they were planting. For example, of the 201 villages in our sample, the main vegetable, fruit or nut crop that was planted in the village in 2000 was replaced by another crop by 2004 in 14 percent of the villages. When discussing their main vegetable, fruit or nut crop, farmers reported that they switched varieties on average about once every 3 to 5 years. Clearly, farmers in the horticultural economy in the greater Beijing area are actively searching for new technologies.

These descriptive statistics, however, do not really answer our question about the impact of modern supply chains. There are many other reasons why farmers may switch technologies beyond the marketing supply chain. In other words, counts of technology

turnover can be deceiving. In fact, during the 1980s, a time when there clearly were not modern supply chains in the grain sector, farmers turned over their grain varieties up to once every three to four years (Rozelle et al., 2005). Hence, the turnover in variety may be due to other factors.

In fact, when we asked village leaders directly about whether or not their farmers were being required by the procurement agent to change the way that they were producing their horticultural crop, the answer was nearly “zero.” In only 3 of 201 villages was it reported that trading firms influenced the timing, quantity or brand of the fertilizer that farmers used on their crop. In only 6 of 2001 villages was it reported by trading firms influenced the use of pesticides. Hence, in our sample, at least from the view point of the producer in 2004, there is little *direct* link between the demands of the trader and the farming practices of the producer.

Conclusions

In this paper we set out to assess the effect that modern supply chains and the rise of the horticultural economy in China has had on the farming sector in China. Although we only have data on a single area of China—greater Beijing, our sample is spatially sampled and so we are able to produce regionally representative figures on the rise of opportunities for planting horticultural crops and the penetrations of modern marketing supply chains into rural areas. These questions have concerned policy officials not only in China but are of concern to leaders around the world. Surprisingly, although we showed the rise of horticultural crops was paralleled by a surge in the emergence of supermarkets in urban areas, there has been almost no penetration of modern wholesalers or retailers into rural communities in China. Instead, China’s horticultural economy is

dominated by small traders who are themselves poor and small, operating in firms of 4 people or so and making only about \$2 US dollars per day in PPP terms. Clearly it appears as if this is a special case of “Producing Horticultural Crops with Chinese Characteristics.”

So what makes China special? While a full analysis and more definitive conclusions require more research, it is our opinion that there are 7 characteristics about China’s horticultural economy that produces these surprising results. First, China’s land holdings are relatively equal; there are no large farmers (characteristic 1). Second, there also are almost no farmer cooperatives that can allow farmers to act in concert with one another (characteristic 2). The third characteristic that may be relevant to explaining the role of small, poor farmers in the rise of China’s horticultural economy is that although land is relatively equally allocated across all communities in China, there are still differences (characteristic 3). And in the case of horticultural producers, farm households in more remote areas have relatively more land (0.17 ha per capita) than those in areas nearer to the urban center (0.09 ha per capita). In addition, there are also differences in the access that these households have to labor for working on the farm (characteristic 4). Although horticultural farmers have the same family size as those not engaged in horticultural farming, the main differences are due to differential access to off farm jobs. Hence, when considering characteristics 3 and 4 together, it is easy to see why poor farmers have increased their share of area in many of the horticultural crops—they are relatively land and labor rich.

Three additional characteristics help reinforce the propensity for poorer farmers to be increasing their participation in the horticultural economy, while the supermarkets are

almost completely absent from the production areas. Since China's horticultural economy is almost completely unregulated (characteristic 5) and since China's road and communication networks have improved remarkably over the past 10 years (characteristic 6), small trader working with a limited amount of capital and using extremely large amounts of low cost labor are clearly out-competing all other types of would-be procuring agents. Finally, one of the main characteristics of China's economy that produces the status quo is that China is still a relatively poor nation and its consumer, so far, may not be placing a very high premium on food safety or obtaining a standard product (characteristic 7).

Hence, this is good news, at least now, for small poor farmers. Although, it should be recalled how fast China is changing in so many dimensions. It is possible that if any one (or perhaps any several) of these characteristics changed, we should expect to see China's horticultural economy—from both the supply and procurement side change.

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Table 1. Cropping Patterns and the Role of Horticultural Crops in Greater Beijing, 2000 and 2004

Crops	Greater Beijing (total)		40 km Concentric Circle Sample Region		60 km Concentric Circle Sample Region		80 km Concentric Circle Sample Region		100 km Concentric Circle Sample Region		140Km Concentric Circle Sample Region	
	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)
Grain	68	58	64	52	63	47	68	62	72	64	72	62
Cash crop	10	14	9	12	9	13	9	11	9	14	12	17
Horticultural Crops ¹	22	29	27	36	28	39	23	27	18	22	16	21
Vegetables	4	6	4	4	4	9	6	7	2	3	4	6
Fruit	13	16	19	26	13	13	12	16	13	16	10	11
Nuts	5	7	4	6	11	17	5	5	3	3	2	5

¹ Sown area for horticultural crops includes area sown to vegetable, fruit and nut orchards.

Table 2. Contribution of Sampling Areas by Income Category (Quartiles) to Horticultural Production in Greater Beijing, 2000 and 2004

	Very Poor First Quartile (1-25)		Poor Second Quartile (26-50)		Above average Third Quartile (51-75)		Rich Last Quartile (76-100)	
	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)	2000 (%)	2004 (%)
Crops								
Horticultural Crops	15	23	31	32	33	25	20	19
Vegetables	9	12	25	29	53	47	12	12
Fruit	16	25	37	37	34	24	14	14
Nuts	21	30	17	19	8	9	54	42

Data source: Authors' survey.

Table 3. Supply and Marketing Channels of Horticultural Markets in Greater Beijing Area, 2004

Panel A: First-time buyers (percent)								
	Modern Supply Chains			Traditional Supply Chains		Other Supply Chains		
	Supermarkets	Specialized suppliers	Processing firms	Small traders	Farmers sell in local periodic markets	Cooperatives	Consumers direct purchase from farmers	Others ¹
Horticultural Crops	0	2	2	79	8	0	7	2
Vegetables	0	3	5	82	5	0	1	3
Fruit	0	1	1	75	11	0	9	3
Nuts	0	6	0	88	3	0	3	0

Panel B: Location of First Transaction (percent)							
	Farmer's fields	Village center	Roadside	Periodic markets	Wholesale markets	Urban wetmarkets	Others ²
Horticultural Crops	65	9	3	6	11	4	2
Vegetables	64	0	3	6	18	9	0
Fruit	60	12	3	9	12	3	2
Nuts	86	11	0	0	0	0	4

Panel C: Second-time Buyers (percent)							
	Modern Supply Chains			Traditional Supply Chains		Other Supply Chains	
	Supermarkets	Specialized suppliers	Processing firms	Small traders	Traders sell to consumers in periodic markets	Cooperatives	Others
Horticultural Crops	3	3	10	49	13	0	22
Vegetables	6	0	6	57	11	0	20
Fruit	1	2	9	46	16	0	26
Nuts	3	10	19	50	6	0	12

¹ "Others" (first time buyers) includes purchases by agents of hotels or restaurants, gifts to other farmers or procurement by organized groups (such as enterprises for distribution to their workers).

² "Others" (second time buyers) includes sales to other villages and sales to market sites that supply processing and other food firms.