

10 Quality Control and the Marketing of Non-staple Crops in India

Fafchamps, M.^{1,*}, Vargas-Hill, R.^{2,**} and Minten, M.^{***}

¹*Department of Economics, Oxford University, UK;* ²*World Bank, Washington, DC, USA;* **marcel.fafchamps@economics.ox.ac.uk;* ***ruth.vargashill@gmail.com;*

****bminten@iris.mg*

Introduction

The objective of our study is to assess how the market for non-staple crops currently functions in India and how existing agricultural marketing institutions can be improved. India is rapidly changing. Over the years, Indian governments have put in place institutions for dealing with agricultural marketing. These institutions focus primarily on staple crops such as rice, wheat, pulses and oilseeds. There is a growing suspicion that these institutions are no longer adapting to current trends, and this suspicion is based on two observations.

First, the pattern of domestic demand for agricultural products is evolving. As India gets richer, many consumers become relatively less interested in staple foods and more interested in fruit and vegetables. Rising incomes favour a growing demand for meat – particularly chicken. This generates an expansion in the market for feed crops such as maize. Increased incomes also fuel concerns about food safety and are expected to generate a demand for better food quality among high-income Indian consumers.

Until now, Indian markets for agricultural products have focused primarily on

quantity. Today, many consumers in the upper tier of income distribution are probably prepared to pay extra for food quality and safety. Satisfying the demand for better and safer fruit and vegetables by the richer segments of the population can thus be a way of increasing farmers' income. The question is whether the market for non-staple foods is organized in such a way as to enable growers to capitalize on the rising demand for quality.

Secondly, India has come to realize that it can take advantage of international trade liberalization to export agricultural products. India's confidence in its capacity to take on international markets has risen markedly. If India can compete on international manufacturing and service markets, then it should be able to compete on agricultural markets as well. India is already the world leader in turmeric exports, capturing the lion's share of the international market. Within policy circles there is growing interest in exploring the possibility of breaking into new agricultural export markets, particularly those for processed food products such as mango chutney. As recent history has demonstrated, the keys to these markets are food quality and safety.

While agricultural markets in India have been extensively studied (e.g. Acharya,

2001; Umali-Deininger and Deininger, 2001; Ramaswami and Balakrishnan, 2002; Deshingkar *et al.*, 2003; Banerji and Meenakshi, 2004), little specific information seems to be available about the value chain for non-staple crops. This study seeks to fill this lacuna.

We conducted a combined survey of growers, traders and processors of five selected non-staple crops in four states. Data were also collected at the market and village levels. Information was collected on the production and marketing practices of 400 growers and on the trading practices of 400 traders in each state. Interviews were conducted with 300 processors across all four states (for more detailed information, see Fafchamps *et al.*, 2006).

The four states covered by this study are Maharashtra, Orissa, Tamil Nadu and Uttar Pradesh. They were chosen because they represent the diversity of agricultural marketing institutions and agro-climatic zones that is characteristic of India today. The five crops are maize, mango, potato, tomato and turmeric. These crops were chosen because they are cultivated and consumed throughout the country and are representative of the diversity of non-staple crops in terms of perishability and end-uses.¹

The chapter is structured as follows: (i) we summarize our main findings on crop production, market infrastructure and organization, quality control and equal access; (ii) we discuss these results; and finally (iii) we make some suggestions regarding possible policy improvements.²

Production of Non-staple Crops in India

Before discussing the market infrastructure in India we briefly provide some descriptive statistics on the production of turmeric, mango, potato, tomato and maize. The farmers that produce and sell these crops devote a significant proportion of their land to the production of these crops – at least one-third when the crops are in season. The majority of farmers use bought

inputs in crop production: three-quarters of farmers use chemical fertilizers, over half use pesticides and one-quarter use fungicides. The most commonly used chemical fertilizers are urea, nitrogen, phosphate and potash. The majority of farmers also use non-traditional seeds: 71% of maize farmers, 59% of tomato farmers, 59% of potato farmers and 55% of turmeric farmers.

Producers of non-staple crops appear to have unencumbered access to agricultural inputs, but when we compared the welfare characteristics (land holding, education, caste) of farmers of non-staple crops with the average farmer in each state we found a positive relationship between land ownership and the propensity to grow non-staple crops for sale (Fafchamps *et al.*, 2006). However, it is unclear whether this relationship exists because land-rich farmers are more likely to grow non-staple crops or because farmers who grow non-staple crops can afford to purchase more land.

Market infrastructure and organization

The most common form of sale for non-staple crops is through the nearest wholesale market: 80% of farmers in the study reported selling one of the five study crops at the nearest wholesale market in the 12 months prior to the survey, compared with only 11% of farmers who reported selling at the nearest retail market.³ Sales at the farm gate were also observed for some crops.

Cooperatives play a role in marketing of maize and turmeric in some of the states visited, but are largely absent in the marketing of other crops. Using regression analysis we investigated whether farmers have equal access to wholesale markets. Our findings indicate that, within a given area, there is little difference across wealth levels but that farmers with larger quantities for sale seem to be courted by traders for farm-gate sales (Fafchamps *et al.*, 2006).

The survey shows unambiguously that the wholesale market infrastructure for

non-staple crops is not very well developed (see Table 10.1). The majority of wholesale markets are not paved, many do not have dedicated stalls for non-staple traders and there are few grading or cold storage facilities. Sanitation facilities are largely deficient, with few public toilets, inadequate drainage and little or no coordinated pest control.

As anticipated, postharvest losses are rather large in this trading environment: 3% of tomato and potato and 10% of mango is lost at each trading level. This is probably due both to the perishable nature of the crop and to the handling practices.

Survey results indicate that states with

more markets regulated through the State Agricultural Produce Market Act (Maharashtra and Uttar Pradesh) tend to have better market infrastructure. These differences are driven not so much by regulation itself but rather by differences across states in the level of their involvement in agricultural markets. Farmers do not appear to be more satisfied with regulated markets and there is, in fact, some evidence of lower satisfaction.

Auctions are conducted in half of the markets visited (55%). In most cases they are conducted in an informal manner, with little information explicitly conveyed to buyers, who have to inspect each consign-

Table 10.1. Infrastructure, drainage and pest control in agricultural markets (unweighted average over the four states of Maharashtra, Orissa, Tamil Nadu and Uttar Pradesh).

Market infrastructure	
Proportion (%) of markets with Paved road inside market yard	12
Cold storage facilities	7
Grading machine ¹	16
Authorities that offer grading services, e.g. visual inspection /certification	21
Drying machine	1
Area to dry crops	16
Crop fumigation equipment	5
Public toilets	50
Proportion (%) of stalls that have	
Electricity	61
Piped water	25
Telephone (land line)	40
Grading equipment	3
Packing equipment	1
Fumigation machine	4
Drainage and pest control in markets	
Proportion of markets with no drainage (%)	32
Proportion of markets with drainage provided by open sewer (%)	46
Proportion of markets where drainage is adequate (%)	56
Measures taken against rats (% of markets)	
Employees of market/association in charge	5
Pest control contracted to outside firm	3
Individuals take care of rats in their store	32
No particular measure taken	59
Measures taken against insects damaging crops (% of markets)	
Employees of market/association in charge	7
Pest control contracted to outside firm	3
Individuals fumigate in their store	27
No particular measure taken	59
Other	4

¹ In the case of grading machines are available, this is mostly for rice/other cereals (40%) and potato (30%).

ment personally. The grade or size of the crop is reported in less than two-thirds of the auctions and in only half is the place of origin or the name of the buyers and sellers reported. Information about quality is rarely conveyed and in only 12% of auctions is information supplied about how the crop was produced.

State regulations require farmers to sell through 'commission agents' in Uttar Pradesh and Maharashtra, on the premise that doing so will help farmers receive a higher price for their product. In principle, a commission agent is a broker who matches buyers and sellers in exchange for a commission. A commission agent is not supposed to purchase the crop he has been asked to sell because doing so creates a conflict of interest: the commission agent is supposed to help the farmer get the highest price, but if he is planning to purchase the crop for himself, what incentive does he have to raise the price?

However in wholesale markets in India, commission agents were nearly all found operating as wholesalers for the crops for which they were brokers. An analysis of the prices received by farmers suggests that farmers who sell through a commission agent do not receive a significantly higher price (for details of regression analysis see Fafchamps *et al.*, 2006). These findings seriously put into question the merit of forcing farmers to sell through commission agents.

We started the study concerned that the State Agricultural Produce Market Act may serve as a barrier to entry to trading and, hence, might increase transaction costs for non-staple crops. This is difficult to test formally given the lack of variation across space within each state. But the somewhat obscure way in which auctions are held, the dual role of commission agents and the implicit transfers embedded in stall rental contracts suggest that the Produce Market Act generates rents that are captured by a few traders. Whether these rents are sufficiently large to reduce farmer prices and increase consumer prices significantly remains unclear.

When we initiated this study, we also expected interlinked arrangements (e.g. credit and inputs supplied by the buyer) to be frequent for high-value crops. Given the high cash requirements to purchase all the inputs, we indeed thought that farmers would be unable or unwilling to make these investments without financial help from buyers – or at least without a guaranteed outlet for their production, but we did not find this to be the case. There was very little evidence of interlinked arrangements: only 9% of farmers reported receiving an advance from the buyer of their produce, and only 5% of farmers reported engaging in contract farming.

More than half the contracts observed in the survey were simple forward sales of mangoes, in which the mangoes are sold while on the tree and the buyer usually provided labour to harvest the mangoes. Such contracts involve no input supply, and the buyer does not provide any guidance or quality control. A handful of contracts were observed for potato, and were a broadly similar means for traders to guarantee supply rather than a means by which inputs or advice are provided to farmers.

A suspicion exists that farmers under interlinked marketing arrangements receive lower returns. The reason for this suspicion is that farmers who sell forward sometimes do so because they are in need of cash. Survey results show that a number of farmers point out that forward sales yield a lower price but also reduce risk. Most surveyed contract farmers say that the price is fixed in the contract. Consequently, the price at harvest can be higher or lower than the contract price, depending on the evolution of demand and supply conditions in that year.

Regression analysis shows that contract farming has a significant negative effect on the average price received by the farmer only for tomato. We found no significant effect in the four other crops. It appears there is a substantial demand for contract farming among farmers: 47% of farmers not in a contract said they would like to be. Of

course, the absence of contract farming may simply be due to the fact that it is illegal in many states – although, as the example of Orissa illustrates, laws are not always enforced.

Turning to processors, we found most of them to be very small enterprises. They perform very basic transformation, often of damaged or inferior-quality produce. This is completely ill-adapted to the evolution of the Indian market today. We examined whether the State Agricultural Produce Market Act makes it more difficult for processors and exporters to source inputs, particularly for spices, fruit and vegetables. As we have already pointed out, vertical coordination arrangements (contract farming, backward and forward arrangements) are rare and we found that very few – if any – processors and exporters in our survey source produce directly from farmers. We suspect that the current market structure does not hinder the activities of the overwhelming majority of small processors serving poorer consumers.

The handling losses that are pervasive in the marketing chain may even benefit them, as damaged fruit and vegetables are probably recycled into processed products. The big losers are absent from our survey: these are the processors and exporters who need to guarantee quality and consistency in order to access high-value markets. Given that the current system makes it illegal for them to approach farmers directly, they simply cannot operate within the current marketing arrangement. For them, liberalization is essential.

We encountered difficulties in identifying and meeting processors and exporters in spite of numerous attempts to work through agro-processing and exporter associations. From these difficulties, we gather that these associations are not very active since they were, in many cases, unable to provide an up-to-date list of agro-processors and had little useful information to share about their members. This is yet another sign of the poor state in which the agro-business industry currently operates in India.

Quality control

Much emphasis was built into the study on how quality control takes place in the value chain. In agreement with theoretical predictions (Fafchamps *et al.*, 2006), we found that market participants are largely unaware of food safety risk. This is particularly true of farmers and small traders. As an example of this, only 2% of farmers reported that, in the previous 5 years, a buyer had indicated they should not use certain inputs or required a change of postharvest production practices. Large wholesalers and exporters appear slightly more concerned about food safety, but food safety goes basically unrewarded in the value chain.

We also found no evidence that growers or traders alter production and postharvest practices to comply with newer specifications or requirements of buyers, as would be the case if a new breed of wholesalers and exporters were trying to improve quality in order to break into new markets (see Table 10.2).

We found that information about the type of irrigation crops received or the application of pesticide and chemical fertilizer is not passed along the value chain (Table 10.2). In contrast, growers appear quite interested in agricultural practices that raise the quantity sold or improve observable characteristics of the crop, such as grading, packaging or drying. The same is true for postharvest treatment such as fumigation, which is undertaken by few traders and seldom reported to buyers (see Table 10.2).

Sellers, in general, reported only observable attributes to potential buyers. This is consistent with the absence of trust: if the buyer does not trust the seller, there is no point making unverifiable claims about items for sale. Further confirmation of this interpretation is found in the observation that buyers always check observable attributes of what they purchase – they do not rely on seller's report.

An analysis of the prices received by growers shows that a significant price premium is paid to growers for drying, grading and packaging the crops they sell.

Table 10.2. Information transmission and requirements for buyers.

	Crop				
	Maize	Potato	Tomato	Mango	Turmeric
Information available to buyers					
Proportion of crop grown by farmer who reports buyer can tell practice has been undertaken: (% of those that have undertaken practice)					
Choose particular seeds / variety	62	85	58	81	78
Plant at a specific time	23	65	48	–	44
Apply pesticides	11	33	20	7	21
Apply fertilizer	9	63	21	5	16
Irrigate	23	56	32	7	11
Dry after harvest	84	–	–	–	91
Clean after harvest	75	77	54	62	77
Grade	39	80	62	69	54
Fumigate/treat after harvest	10	14	9	27	30
Proportion of crop grown by farmer who tells buyer practice has been undertaken: (% of those that have undertaken practice)					
Choose particular seeds / variety	2	6	16	6	6
Plant at a specific time	1	5	7	–	6
Apply pesticides	1	10	10	6	7
Apply fertilizer	1	6	9	2	5
Irrigate	1	4	12	2	1
Dry after harvest	1	–	–	–	0
Clean after harvest	3	10	7	3	0
Grade	1	6	13	3	0
Fumigate / treat after harvest	0	25	8	2	4
Package / crate	13	65	10	3	7
Mill/grind	3	10	3	1	15
Requests on production, postharvest and phytosanitary practices by buyers					
Proportion of crop sold for whom buyers have (in last 5 years, %):					
Changed specifications regarding product quality	1	15	8	1	0
Indicated they should not use certain chemicals/inputs	5	4	4	0	1
Requested/required change of postharvest practices	3	9	6	0	2
Paid more if farmer complies with new specs/reqs	2	2	3	0	0
Proportion of crop grown by farmers who have changed to comply	2	0	2	0	1
Buyers of agricultural products in this village pay attention to (% of villages):*					
What type of seed has been used	32	40	38	13	33
What kind of pesticides has been used	17	22	22	6	14
When pesticides have been applied	13	17	17	6	12
What kind of irrigation water has been used	10	8	14	2	12
Buyers of agricultural products in this village refuse Produce affected by pests/fungus (% of villages)*					
	54	54	63	35	52

* Source is village survey; for other variables source is farmer survey.

These attributes of the consignment serve to reduce transactions costs to traders. Consequently, they are only valued by traders and do not translate into a price premium further down the value chain. This is consistent with the view that packaging only serves to facilitate the work of wholesalers, but carries no useful information further down the value chain. The data also suggest that many processors purchase low-quality fruit and vegetables and care little about quality.

By vertically integrating the value chain and by creating a long-term trust relationship between grower and buyer, contract farming can in principle provide a commitment mechanism capable of overcoming the information transfer problem but, as detailed in the previous section, few contracts were observed for the non-staple crops studied. When they are observed they do not seem to be used to ensure quality of produce. It is possible that more sophisticated contract farming practices exist in India, but given survey findings it appears they account for only a small proportion of traded quantities of the five non-staple crops studied.

These findings suggest that the value chain for non-staple crops in India remains fairly undeveloped. It is conceivable that, given the level of development of the country, many Indian consumers are unwilling to pay a large price premium for higher-quality fruit and vegetables. We also suspect that few consumers would value organically grown produce. Given the cost of upgrading existing market infrastructure and the difficulty inherent in enforcing contracts about unobservable crop attributes, our findings are probably not surprising. However, rapid growth and the rapid rise in incomes are likely to result in a dramatic rise in the demand for safe, high-quality food. The current value chain is unable to satisfy this demand.

Discussion

The unprecedented increase in standards of living that many countries have enjoyed

since the beginning of the Industrial Revolution can ultimately be explained only by the increased productivity that results from the application of science to technology. Technological innovation can take many forms: some are embedded in equipment and infrastructure, while others are embedded in new industrial inputs and consumer products. Yet others are embedded in new organizational forms – new contracts, new institutions, new ways of organizing the factory floor, new ways of doing business, etc.

Many factors play a role in how technological innovation is generated and how it permeates through the world economy, and it is beyond the scope of this analysis to discuss them here. In particular, it is no secret that more technologically advanced ways of doing things do not always spread naturally to all sectors of the economy. There is room for a lot of variation. But what is important to observe is that the degree of sophistication of an industry can be judged by examining its technology level – in terms of equipment, infrastructure, products and organization. Higher productivity can ultimately be achieved only by upgrading technology. Sometimes this means bringing in new capital, sometimes it means reforming organizational forms.

In this chapter we have examined the value chain for non-staple crops. Perhaps the most striking feature that comes out of our analysis is the stark contrast between the high level of technological sophistication achieved in the production of fruit and vegetables and the rather primitive state of the marketing chain. As highlighted, nearly all the growers of non-staple crops that we interviewed use modern techniques of agricultural production, but the marketing chain appears quite backward by comparison.

In fact, the forms of market organization that we described here resemble those described by Greif (1993) for Medieval Europe and by Fafchamps (2004) for sub-Saharan Africa. The limited use of modern equipment and infrastructure in the non-staple value chain in India results in large

crop losses and makes sanitation problematic, with inadequate drainage and sewers and improper pest control.

Forms of organization also appear rather primitive. Although in many states the law requires that the sale of agricultural products be performed in auctions, for non-staple crops these auctions appear problematic. Farmers are supposed to sell their produce through commission agents, but in nearly all cases these commission agents are also wholesalers who buy and sell the same products, thus creating a conflict of interest.

We found little contracting among traders or between traders and farmers. Quality control is limited to observable attributes and crop certification is absent. Processors are predominantly small and uninvolved in improving quality and, in fact, we suspect that in many cases it is the low-quality fruit and vegetables that are used for processing.

These findings are surprising. India has done extremely well in improving agricultural productivity through agricultural research, dam construction and green revolution-type innovation. But, for the non-staple crops we have studied, it seems to have missed the boat entirely on agricultural marketing. This is probably because the emphasis so far has been on quantity: India needed to feed its growing population, and to do this it had to increase staple production. It is likely that, in the eyes of policy-makers, the role of the marketing chain has historically been viewed as no more than a transmission mechanism to take the pulses and grain to the consumer, with little or no value added and at the lowest cost possible.

With the growing importance of non-staple crops, this emphasis on quantity alone is no longer sufficient. For these crops, raising productivity takes the form not only of increased quantity but also of improved quality. What ultimately matters is the revenue growers receive. If certain consumers abroad and in India are willing to pay more for high-quality agricultural produce, then raising rural income requires

that farmers be incited to produce those quality fruit and vegetables and that the value chain be in a position to guarantee quality to potential consumers.

This study has shown that this cannot be accomplished with the current market organization, because many quality attributes are not immediately observable, or are only observable at a cost. Furthermore, even if a given attribute is conferred to a crop by farmers – e.g. safe and healthy food – this attribute must be preserved through the value chain for it to be rewarded by customers.

Policy Recommendations

Several institutional solutions can be envisaged for improving the non-staple value chain. We have discussed one of them – contract farming. As far as we can judge from the results of our study, contract farming does not, for the moment, contribute to enhancing product quality. But it could potentially be used by exporters and by processors aiming at the higher end of the market, provided the law is changed to allow direct purchases from farmers.

In other parts of the world where retail trade has been liberalized, supermarkets (often run by multinationals such as Carrefour or Tesco) have rapidly taken a major share of grocery retail trade. So doing, they have revolutionized the value chain for fruit and vegetables (Reardon *et al.*, 2001). In India, current laws and regulations hinder market development in this direction. Indeed, many states require most crops to be traded through regulated wholesale markets. As we have seen, however, this is not true in all states. In Tamil Nadu, for instance, regulated markets are few while in Orissa they are largely ignored by traders. In more advanced states such as Maharashtra, further development of the fruit and vegetable value chain most probably requires a change in the law.

We are aware of the fact that the liberalization of retail trade is on the

political agenda in India. We realize that many issues are involved and that the decision whether to liberalize or not has many more ramifications than its effect on fruit and vegetable markets. It is neither our role nor our intention to tell the Indian government how to resolve this issue, but we can inform the policy debate.

Based on evidence from other Asian countries, there is no doubt in our minds that the non-staple crop value chain would be revolutionized by a liberalization of retail trade, coupled with a revision of the State Agricultural Produce Market Act to allow supermarkets and wholesalers to buy directly from farmers. This would lead to more vertical integration of the fruit and vegetable value chain, thereby enabling information about quality and food safety to travel through the chain.

Even without a change in the law, we expect supermarkets to take a more active role in fruit and vegetable marketing, simply because the rapid expansion of the Indian middle class makes the transformation of consumption habits inexorable. But without liberalization the role of supermarkets will remain stunted and it will fail to reach its full potential, which is to raise the price of non-staple crops paid to the majority of farmers.

As the evidence from Tamil Nadu and Orissa suggests, deregulation will not answer all problems, however. Agricultural markets have deficient infrastructure, irrespective of whether they are publicly regulated or not. We are particularly concerned about the poor sanitation that characterizes most non-staple markets. Although the Indian poor may not have the money to pay for more sanitary food, we suspect that poor sanitation in fruit and vegetables is responsible for non-negligible morbidity and mortality in the Indian population, particularly because of poor drainage, absence of toilets and contact between food and rats or other pests.

We also worry about poor sanitation in the food processing industry and the possible accumulation of unsanitary elements in processed food (e.g. *Escherichia coli* and

other bacteria, pesticide residues, extraneous materials, etc.). The findings reported here suggest that, because of credibility issues, the market cannot deliver sanitary food in a decentralized manner. There is therefore room for coordinated action to improve the infrastructure and pest control practices of existing markets.

Based on these observations, a two-pronged approach may be best suited to the enablement of Indian farmers to capture gains from quality upgrading while, at the same time, ensuring that small farmers and poor consumers are not sacrificed. Ultimately, the objective is to raise farmers' incomes by making it possible for them to tap into new, more remunerative markets. This can only be accomplished by raising quality and food safety and this, in turn, requires a different organization of the value chain.

Subject to the caveats we raised earlier, we therefore propose to liberalize retail and agro-processing while at the same time reinforcing existing wholesale market infrastructure – particular sewers, drainage and pest control. The rationale behind this approach is that, as has taken place in South-east Asia and Latin America, liberalization will foster entry by large, experienced processors and supermarket chains. These new entrants will, in all likelihood, set up dedicated sourcing arrangements with modern wholesalers, large farmers and farmer cooperatives.

The liberalization of retail trade can take agricultural marketing a long way forward, but it tends to favour larger farmers. The experience from these other countries indeed suggests that large processors and supermarkets are uninterested in sourcing produce directly from a myriad of very small producers who find it difficult to follow strict quality norms. This raises equity concerns. Indeed, while many farmers will be able to sell their produce at a premium to new processors and supermarkets – either directly or through cooperatives – some will be too small to produce the quantities large firms need.

It is, of course, possible to compensate

the natural propensity of supermarket chains to deal with large farmers by helping small farmers meet their stringent quality requirements and delivery schedules. A recently completed case study, for instance, shows how this was accomplished in Madagascar, where European supermarkets now procure French beans from small farmers in the highlands. Success stories like this one should not, however, obscure the fact that support systems of this kind cannot be put in place for all small farmers in the country. Fortunately, this probably does not matter too much.

India's demand for fruit and vegetables will continue to rise. While the upper end of the market will progressively put more emphasis on quality and food safety, we expect that, as more and more people move above the poverty line, they will demand more fruit and vegetables, focusing initially on quantity rather than quality. This segment of the market, which is growing, will continue to be served by the existing market chain. Poor and middle-income consumers will continue to be served by the current value chain, where quality is not much rewarded and where direct observation of product attributes is central.

We also expect many small-scale processors to remain in existence to serve poorer consumers who are less willing to pay for quality and food safety. We therefore do not expect liberalization to result in the collapse and abandonment of the current marketing institutions. Quite the contrary: it will probably become stronger. The study has shown that small farmers currently have equal access to wholesale markets. We do not see a reason for this to change.

In practice, our two-pronged approach requires that the market for non-staple food be 'deregulated' in the following sense. We see no reason for states and local government to divest from wholesale markets. In fact, if anything they should invest more. Even in Tamil Nadu, where agricultural markets are – for the most – unregulated, more markets are the property of local government.

There is thus an important role for local

government to play. What needs to change is the prohibition that precludes traders and processors from buying directly from farmers and from setting up long-term contracts with growers. Unless these restrictions are lifted, the sector will not reach its full potential and will remain stuck with a set of institutions that may have been justified at a certain stage of Indian development but that are no longer adapted to current needs and opportunities.

With respect to the upgrading of existing wholesale markets, it is our opinion that much can be accomplished by using the fees currently raised by market authorities. Based on the information we gathered, it is our impression that these revenues are implicitly used by local authorities as a form of tax revenue. They are not sufficiently used to improve market infrastructure, especially simple improvements such as better drainage, public latrines and pest control.

With an audit from central government, many wholesale markets may turn out to have sufficient funding to pay for their own improvement. More expensive improvements such as cold storage may not be self-funding, but they are not needed everywhere. Actual market management could be sub-contracted to a private provider who can then be held accountable for insufficient maintenance and sanitation.

The self-funding approach will not work in all states, however. In Orissa, for instance, regulated markets exist on paper but are not used in practice. In Tamil Nadu many markets are run by the local municipality but generate few revenues. In these cases, upgrading wholesale markets will require an infusion of funds from elsewhere in government.

We would also like to suggest ways of improving the current auction system. The work of Banerji and Meenaski (2004) indeed suggests that, even in some of the most sophisticated auctions in the country – rice auctions in Delhi, for instance – there is evidence of manipulation. Unfortunately, it has proved difficult to elicit

information on the way auctions are conducted in practice. We even suspect that, in a number of cases, market authorities have reported auctions taking place when, from other sources, we found little evidence that auctions were occurring for the five studied crops. This is particularly true in Orissa, where auctions of non-staple crops are close to non-existent.

One could hope to increase market efficiency by decoupling the movement of physical quantities from trade itself, which could in principle take place in another location (e.g. in a commodity exchange) in a more transparent manner. For this to be feasible, however, one must unambiguously describe the physical attributes of each lot offered for sale. As we have seen, many auctions do not report detailed information about consignments; buyers are supposed to observe the produce in person.

The current role of commission agents also needs to be revisited. As detailed, survey results show that this separation of roles, which is present, for instance, among brokers in the cereal market in Ethiopia (Gabre-Madhin, 1997, unpublished PhD thesis), is not practiced in India. The phrase 'commission agent' seems to be used only as a title conferred by market authorities. Our suspicion is that commission fees are a way for large wholesalers to restrict competition by guaranteeing themselves a minimum margin. But without detailed price data – that market authorities do not collect – it is difficult to prove this statistically.

One could hope to increase market efficiency by decoupling the movement of physical quantities from trade itself, which

could in principle take place in another location (e.g. in a commodity exchange) in a more transparent manner. For this to be feasible, however, one must unambiguously describe the physical attributes of each lot offered for sale. As we have seen, many auctions do not report detailed information about consignments; buyers are supposed to observe the produce in person.

The current role of commission agents also needs to be revisited. As detailed, survey results show that this separation of roles, which is present for instance among brokers in the cereal market in Ethiopia (Gabre-Madhin 1997), is not practiced in India. The phrase 'commission agent' seems to be used only as a title conferred by market authorities. Our suspicion is that commission fees are a way for large wholesalers to restrict competition by guaranteeing themselves a minimum margin. But without detailed price data – that market authorities do not collect – it is difficult to prove this statistically.

Notes

- 1 Maize is a feed crop. Turmeric is a spice also used as a dye. Tomato, potato and mango differ in terms of perishability and ease of transportation.
- 2 This chapter is a brief summary of the results of a larger report (Fafchamps *et al.*, 2006) and the reader is referred to this report for more details.
- 3 Although variation was observed across states. For example, in Maharashtra 96% sell at the wholesale market, whilst in Orissa 59% sell at the retail market. See Fafchamps *et al.* (2006) for more details.

References

- Acharya, S.S. (2001) *Agricultural Marketing in India*, Part of the Millennium Study of Indian Farmers (mimeo).
- Banerji, A. and Meenakshi, J.V. (2004) Buyer collusion and efficiency of government intervention in wheat Markets in northern India: an asymmetrical structural auction analysis. *American Journal of Agricultural Economics* 86, 236–253.
- Deshingkar, P., Kulharni, U., Rao, L. and Rao, S. (2003) Changing food systems in India: resource Sharing and marketing arrangements for vegetable production in Andra Pradesh, *Development Policy Review* 21, 627–639.

- Fafchamps, M. (2004) *Market Institutions in Sub-Saharan Africa*. MIT Press, Cambridge, Massachusetts.
- Fafchamps, M., Vargas-Hill, R. and Minten, M. (2006) *The Marketing of Non-Staple Crops in India*. Report submitted to the World Bank, Washington, DC.
- Greif, A. (1993) Contract enforceability and economic institutions in early trade: the Maghribi Traders' Coalition. *American Economic Review* 83 (3),525–548.
- Ramaswami, B. and Balakrishnan, P. (2002) Food prices and the efficiency of public intervention: the case of public distribution system in India. *Food Policy* 27, 419–436.
- Reardon, T., Codron, J.-M., Busch, L., Bingen, J. and Harris, C. (2001) Global change in agrifood grades and standards: agribusiness strategic responses in developing countries. *International Food and Agribusiness Management Review* 2, 421–435.
- Umali-Deininger, D.L. and Deininger, K. (2001) Towards greater food security for India's poor: balancing government intervention and private competition *Agricultural Economics* 25, 321–335.

