Regoverning Markets

Patterns in and determinants and effects of farmers' marketing strategies in developing countries

Synthesis Report – Micro Study

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Keys to Inclusion of Small-Scale Producers in Dynamic Markets

Marketing strategies in developing countries:
Patterns, determinants and effects

A second synthesis report of Component 1: Micro Study

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Regoverning Markets
Regoverning Markets is a multi-partner collaborative research programme analyzing the growing concentration in the processing and retail sectors of national and regional agrifood systems and its impacts on rural livelihoods and communities in middle- and low-income countries. The aim of the programme is to provide strategic advice and guidance to the public sector, agrifood chain actors, civil society organizations and development agencies on approaches that can anticipate and manage the impacts of the dynamic changes in local and regional markets.

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The authors are the Coordinators of Component 1 of the Regoverning Markets Programme. For the synthesis report of the meso study of Component 1, see Reardon and Huang, 2008.

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Contents

1. Introduction

Reardon and Timmer (2007) note that the food industries of developing countries, including all three components of wholesale, processing, and retail have been transforming very rapidly since the start of globalization in the early 1980s. Between the 1960s to the 1980s, traditional food systems of most developing countries went through a period of transformation brought about by public policy. During this time, governments invested heavily in modernizing the fragmented, traditional wholesale sector by building wholesale markets. As part of import substitution industrialization, there was also substantial government, domestic private sector, and foreign investment in the processing sector, leading to its growth and consolidation. The third stage of the process of restructuring was the market liberalization cum globalization stage, initiated in most countries in the 1980s or early 1990s. In this stage, while developing country governments continued to build wholesale markets, the main developments were in continued consolidation of processing, and the rise of supermarkets, with progressive consolidation and involvement of multinationals in that sector. At the same time world food trade doubled, and trade in fresh produce and livestock products quadrupled.

The Regoverning Markets Programme's meso studies (summarized in Reardon and Huang, 2008), synthesize the results of eight country studies (for China, India, Indonesia, Mexico, Poland, South Africa, Turkey, and Zambia), and confirm the general trends mentioned above at the country level. All three food industry components (of wholesale, processing, and retail) have been restructuring over the past 15 years in all the study countries, in general and for the particular products of the study which include fresh and processed produce and livestock products.

While the research literature on agrifood systems furthers out understanding of the changes downstream in the food system (with the major contribution of the Regoverning Markets meso studies), there has been much less research on the impacts on farmers (upstream) of the relatively recent restructuring of the food industry. The present document is a synthesis of micro studies for the eight case study countries of the Regoverning Markets Programme. These studies aim to bridge the gap in the literature, and to draw lessons for policy. Below we discuss in detail the research questions and design. In this introduction we state the essence of the questions addressed, and the hypotheses that emerge from existing research, thus stating the need for the field studies whose results are synthesized here.

The general issues are as follows: given the large and rapid transformation of food industries in developing countries – and thus the market that farmers are faced with – what determines whether farmers can participate in the restructured markets? From the perspective of rural development and poverty alleviation, this question translates practically into: will small and asset-poor farmers be able to sell to the modernized market segments, or will they be excluded? If they are included, will it mean they are better off in terms of net incomes and other factors?

A plausible over-arching hypothesis is that the typical set of changes that accompany food industry restructuring (such as increases in demand from suppliers for food quality and safety, consistency and volume, lower transaction costs, such as the setting up of contracts, preferred supplier systems, centralization of procurement, and so on) will be difficult for small farmers in general, and asset-poor small farmers in particular. Relative to the traditional markets they are used to, that do not demand much from them in terms of quality and transaction specifications, but also do little to reward quality differentiation, the new requirements of modern markets will probably be difficult for them to meet; and even if they are able to meet them, it will not be easy for them to stay in the market and to prosper in the long term. Various early publications on restructuring markets (such as Reardon and Berdegue, 2002) put forward this hypothesis and highlighted the need for more research to ascertain whether this is the case for certain farmers, and if so the underlying conditions.

Given the rapid restructuring of the markets, there is an urgent need for practical, survey-based, farm-level research to test these general hypotheses. However, it is important to first ascertain what research has already been done in this area, in order to refine the hypotheses and guide the work. One of the problems that arises when reviewing literature is that unless studies are carried out using comparable methodology it is not easy to compare results.   In an attempt to minimize this problem, we highlight some examples of contrasting situations to illustrate the range of findings, such as the contrasting dairy sector in Poland and Brazil.

Most research has been carried out on the impacts of the growth and transformation of export markets on farmers (part of the disproportionate attention paid to how trade affects farmers, despite the far greater empirical importance of the domestic market for the large majority of small farmers). The second most prolific area of research in the past 15 years has been on the impacts of processing sector transformation on farmers. This has been the most researched area of the impacts of domestic market change, probably because in many cases processing restructuring took place earlier than retail restructuring, and often used contract farming or other sourcing in clear procurement-sheds around the plants. Thus it was possible to link an obvious change, such as the rise

of big processors, with a clear participant group, such as milk or tomato producers in a set radius of the plant. The third and least researched area has been the impact of the rise of supermarkets on farmers, partly because this is much more recent than the changes in processing or export, and partly because the greatest impact of supermarkets is on the processing sector which does not affect fresh produce. The retail of fresh produce in supermarkets is still a recent addition to the overall food sold, and constitutes just 10-15 per cent of total sales at most. Thus, research into the area is only just starting, as is the phenomenon itself. Finally, despite the massive growth of wholesale markets over the past three decades in most developing countries, constituting perhaps the most widespread area of restructuring, there has been very little study of this highly significant segment, apart from some descriptive studies early on in the 1970s of wholesale markets, and a number of studies of grain market liberalization in the 1990s.

Rather than a set of clear conclusions, the literature to date has produced a very mixed picture of impacts. While we do not have the space for an exhaustive literature review, we highlight below some pairs of studies to illustrate the mixed nature of results.

From the literature on the impacts of export market restructuring on farmers, one finds two contrasting sets of results.

a) Some research shows that export market development has included and helped small farmers, even asset-poor farmers. For example, von Braun et al. (1989) showed that thousands of very small-scale farmers participated in the snowpea export boom in Guatemala, benefiting from higher incomes, access to local labour markets, and the welcome spin-off of increased maize productivity. Even in a much more demanding context, where export markets had shifted their emphasis from quality and new types of products, to food safety and traceability, there are examples of very small farmers maintaining viability, as in the case of Hortico in Zimbabwe (Henson et al., 2005). The important point in such cases is that, while the schemes are 'high control', they are often also 'high support', helping the small farmers with credit, inputs and extension, to meet the more demanding requirements.

b) However, there are plenty of studies that show the opposite scenario: that export market development has excluded small farmers. For example, Carter and Mesbah (1993) found that very few small farmers could participate as growers in the fruit export boom in Chile in the 1980s and 1990s. Similarly, Dolan and Humphrey (2000) show a precipitous plunge in the participation of small farmers in the vegetable export boom in Kenya during the 1990s.

Sorting through the various studies, and looking hard at the contexts, one sees that the mixed results can be explained in terms of the difference in market and technology requirements for various crops and market segments; in terms of the size distribution of farmers in given crop sectors and countries; and thus what options exporters had to source from. Moreover, a close look reveals that in a given country (like Kenya), the above results often all coexist under a multiplicity of conditions and markets.

While the Regoverning Markets Programme research focused mainly on domestic markets, we also noted the literature on the impacts of the export market because the contrast in results has marked the whole debate. However this literature has made a great deal of progress in de-polarizing the debate. In its 'two-stage' research, the Programme has taken into account not only the market context, but has also carefully examined the farm-level impacts. With that in mind, the mixed nature of results in the literature on domestic markets is of particular interest to us here.

In terms of the literature on the impacts of the restructuring processing segment on farmers, past literature shows the same mix of results concerning inclusion, and for similar reasons, relating to varying conditions and contexts. For example in the dairy sector:

a) Dries and Swinnen (2004) found that in Poland (where there are mainly small dairy farms) large processors source from small farms; again, the 'high control, high support' nature of the relationship ensures that processors can meet their clients' quality standards, while also helping their farmers to meet those standards.

b) By contrast, Farina et al. (2005) found that in Brazil and Argentina (where there is a mix between medium/large dairy farms and small dairy farms), large processors have shifted their sourcing from small to medium/large farmers, continuing the high control, but shedding the high support nature of the relationship, in the face of rising quality standards.

Again, as in the case of research on the export market, the mixed results from the literature on the processing market are not surprising, and do not represent a 'clash of world views', if one takes into account the differences in context.

In term of the literature on the impacts of supermarkets on farmers, there has been only one published article to date, namely on tomato growers in Guatemala (Hernandez et al., 2007). This study followed a similarly funded study showing that supermarkets in Central America have a very mixed procurement system, sourcing some products directly from large commercial farmers, some via specialized/dedicated wholesalers,

and many from traditional or semi-modernized wholesalers (Berdegue et al., 2005). This was a microcosm of the mixed contexts and differentiated markets in which supermarkets work in that region (and most regions). At that time tomatoes were just one of the sourced products. In a context where there are only small tomato growers, supermarkets and specialized wholesalers cannot exclude small farmers – but they can, and do, select tomato growers with the requisite non-land assets such as irrigation (for quality and consistency).

However, we should note that there are several other papers 'in press' that show the same mixed results of the impacts of restructuring:

a) For the greater Beijing area, Wang et al. (forthcoming) show that there is almost complete inclusion of small farmers in horticulture markets supplying the city, and that intermediate retail restructuring, and emerging wholesale restructuring simply do not reach into rural areas for the most part; instead these mainly interface with traditional brokerage and spot markets.

b) By contrast, Neven et al. (forthcoming) find that while small farmers are excluded from modern retail, emerging middle-class farmers (who fall between the many tiny farms supplying the traditional market and the large farm backbone of the exporter farms) are included, supplying horticulture products to Nairobi supermarkets. The new work on supermarkets (to which Regoverning Markets adds) shows the usual mixed results depending on the context, rather than on a clash of world views or sweeping generalizations.

To sum up, the impacts on farmers of a given type of market restructuring, cannot be determined *per* se, but it depends on the specific local conditions. However, when the results of different studies are combined, it is possible to map conditions to types of results, from which lessons can be learned and policies developed.

To address the general issues, and test the plausible hypotheses noted above, the Regoverning Markets Programme launched an eight-country programme of micro (farm- and village-level) research. This is described below, and followed by an examination of the results and the lessons learned.

1.2 Specifics of the micro research of the Regoverning Markets Programme

Given the mixed findings of existing literature, there is an urgent need to fill the gap in knowledge regarding the implications and opportunities for small-scale farms of agrifood industry restructuring. There is also a need to provide evidence on which policy makers, producers and the private sector can base decision-making affecting this process of restructuring. In response to these needs, the Regoverning Markets Programme conducted an intensive programme of collaborative research and policy support, built around a global consortium of southern and northern institutions.

The focus of the research programme is on the restructuring of dynamic national and regional food industries, and the effects that this is having on small-scale farmers, and the implications for local rural economies. In each case, the programme analyses all three segments of the food industry in (retail, processing, and wholesaling), all of which are intimately connected, particularly in the case of fresh produce and processed dairy products that are the foci of the country studies. The identified challenges facing primary producers and their economic organizations are in negotiating market access conditioned by liberalization and modernization.

The research programme of Component 1 comprises inter-linked, modular studies at the national-meso level, the local-meso level, and at the micro level. The national-meso study examines changes in the food industry through key informant interviews structured with a commodity value chain analysis; the local-meso study examines changes in the product and factor market, and the institutional, social, and organizational context at the community level, through Participatory Rural Appraisal (PRA) in order to enhance participation of policy stakeholders and focus policy advice; and the micro-level study focuses on farm-level practices and responses, through surveys and analysis.

There are four sets of general questions addressed by Component 1 (Table 1.1), derived from the general questions of the Regoverning Markets Programme; however, each country has also developed its own specific research questions related to the country situations and derived from the separate meso studies. For the synthesis reports and an inter-country comparison of Component 1, we focus our discussions on the following general research questions.

a) What is the nature of the restructuring of the food industry, and hence the agrifood system downstream from the farmer, for the product(s) in question? What are the

implied changes (relative to traditional markets) in incentives and requirements facing the farmer in restructured markets, derived chiefly from the attributes and standards of the product and the transaction (such as quality, safety, volume, consistency over time of delivery, and packaging)?

This set of questions is asked at national-meso and local-meso levels. The results of the national-meso study serve as a context for, and inform the content of the local-meso study. The latter focuses, in the study zone(s), on how the first-stage processing and local wholesale segments are restructured, and the social, institutional, and organizational context, including power relationships within the chain and government intervention.

b) What are the market channel choices and multi-market strategies of farmers (comparing restructured markets and traditional markets)? How do they undertake these strategies? What are the determinants of the farmers' choices? In particular, what are the technological, managerial, and organizational practices relating to the market channel choices of the farmers? Are small farms and the poor excluded from the market restructuring?

This set of questions is addressed mainly at the micro level, but also partially at the local-meso level. The results of the local-meso study place in context and inform the content of the micro-level study. The micro-level study provides empirical evidence of the pattern in and determinants of farmers' marketing choices.

c) What are the impacts of farmers' market-channel choices, particularly on their net incomes and production practices (e.g., labour and capital inputs)?

This set of questions is addressed in the micro-level study, which provides empirical evidence of the impacts of farmers' market choices on farmers' income, production technology and/or inputs.

d) What are the policy implications for inclusion of small-scale producers in dynamic markets? How can government policy makers, producers and the private sector use the empirical evidence to make decisions affecting agrifood industry restructuring?

Table 1.1: Research questions of meso and micro studies of Component 1.

Research questions	Modules and survey/data
1. What is the nature of the restructuring of the food industry? What are the implied changes in incentives and requirements facing the farmer in restructured markets?	- Module 1: macro, industrial and trader surveys - Module 2: community/village surveys
2. What are the observed market-channel choices by farmers? What are the determinants of those choices? In particular, what are the technological, managerial, and organizational practices relating to the market-channel choices of the farmers?	- Module 2: community/village and PRA surveys - Module 3: intensive micro-level household surveys and empirical analysis
3. What are the impacts of farmers' market-channel choices on farmers? In particular, what are the impacts of farmers' marketing choices on their net incomes and production practices?	- Module 3: intensive micro level household surveys and empirical analysis
4. What are the policy implications for inclusion of small-scale producers in dynamic markets	- Modules 1-3 of Component 1 and Component 3

The objective of this report is to summarize the micro-level studies (Module 3) of Component 1 in eight countries across four continents. The overall goal is to look for more empirical evidence of market restructuring and quantify the impacts on farmers, based on an intensive farm survey of the selected commodities in eight countries. Specifically, the micro studies examine the sets of research questions listed in Table 1.1 and test the hypotheses related to each set of questions. The report emphasizes the uniqueness of methodologies and data used in the Regoverning Markets Programme, and cross-country comparisons across regions/countries, which reflect varying degrees of food industry restructuring and different policy environments.

The rest of the report is set out as follows: Section 2 discusses the common sampling, survey instruments and methodologies used in the micro studies of Component 1 across the eight countries. Section 3 discusses the observed market-channel choices of farmers, and the key determinants of such choices (research question 2 in Table 1.1). Section 4 summarizes the major findings on the impacts of marketing choices on farmers' income and technology (research question 3 in Table 1.1). The last section concludes with a set of policy implications (research question 4 in Table 1.1).

2. Sampling, survey instruments and methodologies

2.1 Selection of country studies and commodities

The research questions discussed in the introduction have been addressed through a well co-ordinated set of eight country studies. The locations of the studies reflect variation over two dimensions.

The first is variation over stages of food industry restructuring, reflected in the degree of concentration in the segments of the food industry, and thus levels of modernization of agrifood markets. This concentration is indicated by the share of modern retail (supermarkets, hypermarkets and convenience stores) in urban food retail and the share of large-scale processors and food manufacturers in the processed foods sector.

The second is variation over farm-sector structure. This structure is reflected in a number of variables, but a useful one here is skewedness of farm-size distribution. It is, however, a complex task to class countries by this criterion. For example, in countries as diverse as China, India, Poland, Mexico, Kenya, or Zambia, the dairy sector is made up mainly of many tiny farms. But the dairy processing sector is much more concentrated in Mexico and China than in India and Zambia. Moreover, while the grains and livestock sectors have very large farms in a number of Latin American countries, the typical vegetable farm for the domestic market in China, Indonesia, Turkey and Mexico is very small, with variation around the mean in all of these countries. Thus, if one is studying the effects of retail concentration on vegetable farming on the domestic market, most of China, Indonesia, Latin America, and Turkey offer little in terms of farm structure. If one is studying the livestock farm sector for those same places, the farm structure is vastly more concentrated in Latin America than in the Asian countries. An important point here is whether there is a segment of medium to large producers on which supermarkets can rely (at least up to certain supply limits) and establish direct relations, that is the areas in which one most naturally finds exclusion of small farmers, as supermarkets have options. Where most farmers are small, exclusion can still occur, but in this case the exclusion may be according to the non-land assets category, rather than the land category. While land distribution is easier to ascertain *a priori* in making case study choices, it is much more difficult to determine non-land asset distributions without undertaking a survey.

It is ideal to maximize the variation of these two variables over case-study countries, while limiting the variation over products and food industry segments, that is to have a mix of food industry segments' restructuring and product types, such as a mix of

produce and dairy processing studies over the countries. This provides inter-segment and inter-product variation.

Based on the above criteria, the following eight countries and corresponding products have been chosen for case studies (Table 2.1). In the dairy sector we consider that India is in the initial stage of food market restructuring, while Poland is in the advanced stage. In the horticulture sector, we consider that South Africa and Mexico are in an advanced stage of food market restructuring; Turkey is in an intermediate to advanced stage; Indonesia is in an early intermediate stage; and China is in the initial to intermediate stage. These country's categories of food market restructuring are consistent with the results from our meso-level studies in these eight countries (Reardon and Huang, 2008).

The categories of food market restructuring for these eight countries are consistent with macro economic indicators presented in Table 2.1. Data in Table 2.1 show that in general across the study countries, the level of food market restructuring is positively associated with *per capita* GDP and urbanization, and negatively associated with the role of agriculture in the economy.

Table 2.1: The countries, products and macro-economic indicators in the selected eight micro study countries.

Country	Stage of overall food market restructuring	Product selected	Per capita GDP in 2006, US$	Agri GDP share in 1996, %	Urban population share in 1996, %
India	Initial	Dairy	656	20	28
Zambia	Initial	Beef	895	26	40
Poland	Advanced	Dairy	8613	5	62
China	Intermediate	Tomatoes & cucumbers	2018	12	44
Indonesia	Intermediate	Potatoes & tomatoes	1643	13	48
South Africa	Advanced	Tomatoes	5724	3	57
Turkey	Intermediate	Tomatoes	5527	9	63
Mexico	Advanced	Strawberries	8052	5	74

Note: GDP was converted into US$ based on the official exchange rate.

2.2 Sampling and data

The studies have been conducted in all eight countries according to a common sampling framework, namely, a stratified random sampling survey. Therefore, the household surveys are representative samples of each country or region(s) within the country. Details of sampling approaches and variable(s) used for stratification in each country can be found in the country reports.

A common survey questionnaire was designed at the project level, and then field-tested and finalized in each country. The final questionnaire for the household survey was reviewed by component leaders to ensure the household survey allows the country team to answer all the research questions. A farmer should be able to answer the complete questionnaire within 60-90 minutes. The questionnaire covers household characteristics; land and cropping areas; outputs of the studied commodities; marketing channels and prices of the studied commodities; inputs and technology; crop and other income; household durable assets; household-level instrumental variables and others variables. A full set of questionnaires for each country can be found in each country report and in the Regoverning Markets website.

It is important to note that in order to test the inclusion or exclusion hypothesis and avoid the causality problem; the household survey also elicited information about what had occurred in past years. For example, concerning land assets or non-land assets, the questionnaires included not just current assets but also lagged assets, thereby providing information on the asset base before market-channel entry in an attempt to avoid problems of causality or endogeneity in market participation that would have occurred if we used general, current observations only.

In order to better understand farmers' market choices, the household surveys also covered marketing information beyond the sale at the farm level, for example, the identities of first and second buyers in order to get an idea of the awareness of farmers of the market channel into which he/she had been selling.

Having collected data from the stratified random sampled households, a weighting system was established for each country. This weighting system was based on the stratified variable and nature of sampling in each country. With these data, all country teams calculated point estimates of all variables that are nationally or regionally representative.

Each study was carried out by a national research team, with supervision and support provided by the regional co-ordinator. The Component 1 leaders, the authors of this synthesis report, and other members of the working group provided professional advisory support as necessary.

Table 2.2 provides a summary of samples and major characteristics of households in eight countries. There are several interesting results.

a) In general, the average farm is small in the horticulture sector in nearly all countries. For example, average farm size in China was only 0.5 ha for vegetables, and 0.7 ha for tomatoes; while in Indonesia the average size of potato farms was 1.3 ha (column 3, Table 2.2). A similar small-farm size is also found in Turkey (1.23 ha). Although South Africa and Mexico have larger farm sizes than those in other country studies, the average areas were still only 5.7 ha and 3.8 ha, respectively. The variations among countries may decrease if we consider the difference in quality of land, as the vegetable farms in China are all irrigated and many of the vegetables are produced in greenhouses, while in South Africa and Mexico many are open field or only flood irrigated. The reader should note that in the case studies of Mexico (strawberries), South Africa (tomatoes), Indonesia (potatoes), and Zambia (beef), there are also medium and large farms, but they were not included in the samples. In the cases of South Africa and Zambia, the study products are produced in highly polarized agrarian structures, and only the small-farm segment was included in the farm survey. In South Africa, the leading supermarket chains source mainly from the large, commercial produce growers (see the meso synthesis report); the same is true of Zambian beef (see below). In Mexico and Indonesia, the farm structure for the study products is dominated by small farmers, but there are instances of medium or larger farmers, and case studies of these are included in the meso study reports.

b) On average, the farm size is also small in the livestock sector, though there is a relatively large variation in farm size over the three studied countries, not only in terms of cultivated and/or pasture land, but also in sizes of herds (columns 4 and 5). For example, the average herd size ranged from 7.5 milk cows in India to 16.4 milk cows in Poland. Note that the sample of Zambian beef producers was chosen from the small ranch/farm segment of a very polarized agrarian structure, with huge beef ranches (typically about 20,000 hectares and 5,000 head of cattle per large ranch) on one side, and small producers on the other. The large processors (and thus supermarket and export suppliers) source disproportionately from the large ranches (See the meso study).

c) Despite the small average farm size in the samples chosen for the study countries, there is often a large variation in size even within the category of small farm. For example, in South Africa, "most respondents have communal land tenure, with average farm size ranging from less than 2 ha up to 50 ha." (Chikazunga et al., 2008). In Mexico there is also significant variation within the small farm category. The variations in farm size within a country will enable us to test whether the smallest or largest farms in the small-farm category are included or excluded from food market restructuring.

d) In a number of the countries there is substantial variation in non-land assets, especially productive assets, over small farms, including irrigation capital, greenhouses, and various forms of equipment. In theory, these are important for inclusion or exclusion from modern channels that require greater quality, consistency, and volume than traditional channels. By contrast, there tends to be much less variation over households in human capital assets such as age, experience, and education. These non-land assets are included in the econometric models, and their effects discussed below in the model section.

e) There is a large variation in the stage of farm associations and/or co-operatives, and many of them are loose farm organizations. While the definitions of farm associations differ among the countries studied, six out of eight countries have a similar share of farms participating in similar loose associations (China, Indonesia, South Africa, Mexico). The number of farms involved in mixed farm organizations (farm associations + co-operatives in India) ranged from 4 per cent of tomato farms in China, to 72 per cent in Mexico. More effective farmers' organizations observed in country studies are the marketing co-operatives in Poland and Turkey, although the share of farms participating in these is still only 12 per cent in Poland and 18 per cent in Turkey (last column in Table 2.2).

Table 2.2: The sampling and major characteristics of sampled households in eight countries in 2006.

Country (product)	Sample	Family size	Head education (years)	Land (ha)	Studied crop area (ha) or number of cows	Shares (%) of farms participated in farm association or co-operative
India (dairy)	390	5.7	6.1	1.7	7.5	53
Zambia (beef)	120	9.0	9.0	6.1	54	36
Poland (dairy)	323	4.9	11.0	28.5	16.4	12
China (cucumbers)	228	4.0	7.7	0.4	0.11	7
China (tomatoes)	229	3.8	7.6	0.6	0.15	4
Indonesia (potatoes)	500	4.0	7.2	1.3	0.37	27
Indonesia (tomatoes)	596	4.0	6.9	0.7	0.33	9
S. Africa (tomatoes)	347	5.7	6.5	5.7	2.2	45
Turkey (tomatoes)	396	4.2	6.1	1.23	0.26	18
Mexico (strawberries)	241	4.6	6.0	3.8	2.4	72

2.3 Econometric analyses

The country studies were carried out using a common methodology. The models have been developed to examine two out of four sets of research questions listed in the introduction section.

a) What are the major determinants of farmers' marketing choices? Do farm size and non-land assets determine exclusion from modern market chains?[1]

b) What are the impacts of farmers' marketing choices on farmers in terms of income, production or technologies?

While the models of the determinants of farmers' marketing choices, M_{ki}, and their impacts on farmers, Y_{ij}, may differ among countries in term of specific variables used in the regression, generally, all micro study countries follow similar specifications as follows:

M_{ijt} = f (Incentives$_{it}$, FarmSize$_{it-n}$, Non-land Assets$_{it-n}$, Shifters$_j$, IVs)

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[1] This question was modified from the original which focused on small-farm exclusion, because all the country studies sampled only in small-farm areas; however, the variation within the small-farm category still allowed us to test for farm-size variation, and the variation in productive non-land assets allowed us to test for its impact on exclusion or inclusion.

Y_{ijt} = f (Incentives$_{it}$, FarmSize$_{it-n}$, Non-land Assets$_{it-n \, and \, t}$, Shifters$_j$, M_{ijt})

Where, *i, j* and *t* index household, region (or community or village) and year. Definition of each variable set is defined below:

M_{ijt} is a vector of the marketing choices of ith farmer from jth location in year t. Of eight countries, five divide the farmer's marketing choices into two choices, namely modern vs. traditional marketing choices. In the India, Indonesia and China studies, three channels are specified. For example, in India, the study simultaneously examines co-operative, private and traditional market choices by farmers in the dairy sector. In the Indonesia tomato case, the country study divides farmers' marketing choices into traditional channels, modern wholesalers, and supermarkets. In the China vegetable study, the marketing channels were divided into small brokers, wholesalers and modern channels. In the Turkey study, the country teams carried out two-stage estimates. First, they estimated the farmer's marketing choice between processing firms and non-processing firms. Then among those in the non-processing firm channel, they estimated modern vs. traditional marketing channels on the tomato sector.

Y_{ijt} is a set of variables that are hypothesized to be affected by the farmer' marketing choices (M_{ijt}). In this project, while we left each country to decide which variable(s) better measured the Y(s), in each country, the impacts on income, input levels or technology are all calculated empirically.

Incentives: a set of variables reflecting the prices. If prices are known and measured accurately, and panel data are available, they are used directly as incentive variables. However, because the regressions in most countries are only based on a cross-section of household data, most countries use proxies for price variables. For example, the following variables are used in the empirical regression: household distance from road and/or city, location dummy (reflecting both price and non-price factors), off-farm labour share lagged (measuring farmers' past income or opportunity cost for crop or dairy production).

FarmSize: a variable representing the size of the farm, and measured as household cultivated land in crop production, or the number of animals in the herd in the base year or in year t-n. We use the lagged land area or head size, in an attempt to minimize likely endogenous problems encountered in the marketing choice equation. Ideally, the land area should be lagged until the year before the farmers made a particular marketing choice, examined in the study.

Non-land Assets: a set of variables representing the household's assets, and used typically in the literature as:

a) human capital (head of household's age, experience and education; number of household members as a proxy for own-labour capacity, and others);

b) consumption capital (reflecting overall wealth of the household such as type of dwelling, livestock holdings and others);

c) productive capital (such as on-farm irrigation capital, greenhouses, vehicles, and others);

d) organizational capital (such as membership in co-operative);

e) financial capital (credit, non-farm earnings lagged).

The values of these lagged variables are used in the market participation equations to avoid endogeneity with market channel choice. Note that there can be large variation in all five types of assets over households, and that, compared with medium or larger farmers, small farms might have substantial levels of these assets, accumulated from earlier income through migration, local off-farm employment, prior cash cropping, inheritance, of government programmes. The elements of the asset categories vary according to the product and the local situation. In some countries, productive assets were not included, for example, irrigation in China, because there was little variation over farms; or greenhouses in the tomato sector in Indonesia, because they are not used in that situation. In several instances, indexes of assets were used (e.g., consumption assets in China and productive assets in Mexico). Details of the non-land asset variables used and the effects measured in the regressions, on modern market channel participation, are summarized in the section on results.

Shifters: these are location, institutional (e.g., farm association or co-operatives available in the area), policy and other shifters that are specific to the product and locations studied. The location is a control variable that reflects all non-time variations among study areas. Farm associations or co-operatives measure institutional or organizational capital in the area. (The latter is listed as a household asset in the variable set for non-land asset variable, and as a shifter or meso asset where the regression shows existence of a co-op in the area, separate from whether the household is a member, such as in the Indonesia potato study). Policy differs largely among countries; it reflects either positive or negative distortions from the government in the studied countries.

*IV*s: instrumental variables used in the marketing channel choices of farmers when the impacts of marketing choices on farms are examined. We asked each country team to identify the variables which they believe do not have direct impacts on farmers' production or Y, but have indirect impacts on farmers' vegetable production or Y through their impacts on farmers' marketing channel choices. For example, in the case of China, the study aimed to examine the impacts of farmers' marketing choices among small brokers, wholesalers and modern channels, and the impacts of farmers' marketing choices on production of tomatoes or cucumbers, and the income from the crop. The meso study (Huang et al., 2008) identified the following variables as IVs in China:

a) distance of household from the nearest wetmarket (km);

b) distance from the nearest wholesale market (km);

c) years after the establishment of the nearest wholesale market;

d) tax on sales of products in local periodic market (traditional channel); and

e) local government regulations on vegetable marketing.

The above variables were used as instrumental variables in farmers' marketing-channel choices. While they do not have a direct impact on vegetable production inputs and outputs, they may have an indirect impact through their impact on farmers' choices of marketing channels.

3. Observed patterns in and determinants of marketing choices by farmers

This section summarizes empirical findings on the first set of research questions examined in the micro study of Component 1 (or the second set of questions in Component 1, Table 1.1). That is, what are the observed choices of market channel by farmers? What are the determinants of those choices? Recall that the samples consist only of small farmers. Medium and large farmers, when present in the sector, were not sampled. Therefore the questions ask to what extent inclusion or exclusion is dependent on the size of small farms, and whether farmers with few or no non-land assets are excluded?

3.1 Observed patterns in marketing choices by farmers

Because the definitions of modern and traditional marketing channels vary across countries, it is not possible to have a uniform definition. Therefore, we have adopted definitions of modern and traditional according to the separate country studies. Modern channels have then been disaggregated into two sub-channels: sold to industry or processing firms; and sold to modern retails and others (e.g., specialized suppliers and exporters). Details of definitions for each country are provided in footnotes to Table 3.1.

Based on these categories, Table 3.1 presents a summary of the observed market channel choices by farmers in eight countries. Several interesting findings emerge from the changes in marketing patterns within countries, and differences in marketing patterns between commodities and across countries.

a) Across continents, there is large difference in observed market restructuring. However, there is less variation among countries within the same continent.

In the dairy sector, the marketing share of industry/processing in India is much less than that in Poland, which is to be expected given the large difference in stage of restructuring, of economic development and level of urbanization in each country as presented in Table 1.1. For the four tomato studies, the level of market restructuring at the farm procurement point differs substantially between Turkey and the other three countries, China, Indonesia and South Africa (Table 3.1). In Turkey, farmers sell 20 per cent of their tomatoes to processors (as reported in the meso study), 1 per cent

to supermarkets, and 79 per cent to traditional (wholesale) chains. Thus, the tomato sector in Turkey is slightly more restructured than China, where 1 per cent is sold to modern channels; than Indonesia where 13 per cent is sold mainly through specialized/dedicated wholesalers working for supermarkets; and South Africa where 17 per cent is sold mainly to national fresh produce markets and processors, Table 3.1.

However, it is interesting to note that the market shares of vegetables sold by farmers are very similar between potato farmers in China and Indonesia, but less so in the case of tomato farmers, where more downstream restructuring in the wholesale segment has taken place than in the potato sector in Asia. In both countries, traditional market channels procure most of vegetables produced by farmers. Huang et al. (2008) and Natawidjaja et al. (2008) attribute this pattern mainly to the dominance of small farming and the existence of competitive markets.

Table 3.1: Shares of products sold to market channels by farmers in eight countries in 2001-2006

| Country: product | 2001[a] | | | 2006 [a] | | |
| | Traditional channels[b] | Modern channels | | Traditional channels[b] | Modern channels | |
		Industry/ processor [c]	Modern retails and others[d]		Industry/ processor [c]	Modern retails and others[d]
India: dairy	63	37	NA	63	37	NA
Zambia: beef			NA	27	73	NA
Poland: dairy	39	61	NA	13	87	NA
China: cucumbers	99 (73)	0.6	0.4	98 (80)	1	1
China: tomatoes	100 (78)	0	0.03	99.6(80)	0.1	0.3
Indonesia: potatoes	99 (97)	1	0.2	97 (91)	2.6	0.4
Indonesia: tomatoes				87 (86)	0	13
S. Africa: tomatoes				82	5	(3+9)
Turkey: tomatoes (from meso study)				79	20	1
Mexico: strawberries				41	50	9

a: All data are averages of samples in each country. The 2001 data for India are in 2002, and for Indonesia are in 2000; the 2006 data for South Africa and Zambia are in 2007. The figures in the parentheses are the shares of products sold to traditional wholesalers in China and Indonesia. The data for Turkey come from the meso study only.

b: Traditional market channels: milk vendors, sweet shops and directly to local consumers in India; street vendors and local butcheries in Zambia; collection points for milk in Poland; small brokers and small wholesalers in China; traditional wholesalers and local collectors in Indonesia; hawkers on foot, hawkers with bakkies and the local open markets in South Africa; traditional markets in Turkey; traditional wholesalers (20%) and traditional processors (21%) in Mexico.

c: Industry/processing firms: industry and processing firms (ZAMBEEF) in Zambia; direct deliveries to processing firms in Poland; co-operatives and organized private sector in India, processing firms in China; farm-group to vendor to industry in Indonesia; agro-processors in South Africa; processing firms in Turkey; modern agro-processors in Mexico.

d: Modern retail and others: special suppliers, supermarket and exporters in China; farm-groups and then to supermarkets in Indonesia; national fresh produce markets (9%) and supermarkets (3%) in South Africa; supermarkets and exporters in Turkey; modern processors and exporters in Mexico.

b) Across commodities, market restructuring in dairy, meat (beef), processed tomatoes, and strawberries is much more significant than that in fresh vegetables. The nature of commodities matters.

As shown in the meso report (Reardon and Huang, 2008), there is a large variation in food market restructuring across the eight countries. In a comparison of the share of products sold by market channels (commodities across countries), the different stages of market structure is clearly shown across the eight countries.

For dairy in India and Poland, and beef in Zambia, most of the raw product is processed before being sold on to retailers.

However, there is already substantial processing in traditionally fresh products: for example, 20 per cent of tomatoes in Turkey and 60 per cent of strawberries in Mexico are processed, but in most of the countries, the share of vegetable processing is low. For table tomatoes, cucumbers and potatoes, the traditional markets dominate in China (98-100 per cent) and Indonesia (97 per cent). Even in South Africa, 82 per cent of tomatoes are sold to hawkers on foot, hawkers with bakkies and the local open markets (Chikazunga et al., 2008).

c) Over time, market restructuring upstream or at farm level is less than that observed at retail level (or downstream). This confirms most of the meso study hypotheses.

In the meso study (Reardon and Huang, 2008), it was found that rapid market restructuring has been occurring downstream and midstream in nearly all countries studied, but that in most instances, the restructuring at those downstream levels was not expected to affect farmers. Specific hypotheses emerging from the meso studies were, in terms of expected impact on farmers:

a) China: very little impact because restructuring is nascent at the wholesale market level and wholesalers deal with farmers in spot relations;

b) India dairy: impact was expected not in terms of exclusion of small farmers, but rather exclusion of those with few non-land assets;

c) Indonesia tomatoes: the restructuring in the wholesale sector is nascent, with the emergence of specialized wholesalers sourcing to meet part of the demand of supermarkets. Because the tomato farms are small, farm size was not expected to be associated with exclusion. However, exclusion on the basis of non-land assets such as irrigation was expected;

d) Indonesian potatoes: there is little to no restructuring yet in the fresh potato wholesaling segment (although there is massive restructuring in the processing segment but it affects only a small share of potato producers in the study area); thus, very little or no effect was expected on potato producers in the study area;

e) Mexico strawberries: while the meso study showed rapid downstream and midstream restructuring, the meso local study showed that this translated into mainly spot-market wholesale sourcing from the farmers; and the meso study's hypothesis was that wholesalers and processors, who were more linked to the downstream restructured market, would tend to source from farmers with more non-land assets.

f) The Poland dairy sector is also restructuring rapidly downstream and midstream, but faces a farm sector that consists mainly of small farms. It is therefore expected that the modern channel would favour farmers with non-land assets like cooling tanks and larger herds;

g) South African tomatoes; as reported in the meso study, the leading chains in South Africa source from large commercial farmers in preferred supplier relationships; thus, the micro study looked at a zone in the far north of the country where small farmers grow tomatoes and primarily sell to the local market, including to local processors and local smaller supermarket chains, as well as to the traditional market.

h) Turkey tomatoes: the meso study noted three key findings: firstly, by law supermarkets must buy either from wholesalers or from co-ops (in fact, this is the case for all buyers when the volume is more than 1 ton, but supermarkets need vouchers for their budget); secondly, that there are extremely few co-ops effectively marketing produce; and thirdly, the majority of tomatoes are sold to the fresh, not the processed, market. Consequently, the meso study for Turkey expected that

downstream medium restructuring, and the midstream lack of restructuring would have very little impact on farmers.

i) Zambia beef: the meso study found that the nascent supermarket sector, as well as the larger processing sector and export sectors in Zambia, source beef mainly from the huge ranches that dominate one side of the very polarized Zambian beef industry. The study avoided sampling from the huge ranches (20,000 ha) and instead sampled only from the smallholder areas. However, the study also showed that the restructured, processing/slaughterhouse segment buys from small ranchers without regard for non-land assets, except for the ownership of a vehicle, making it possible for the farmer to avoid the wholesaler as intermediary with the slaughterhouse.

The meso studies, combined with the sampling procedure in the micro studies, led to a number of hypotheses:

a) No study posited exclusion of small farmers *per se*, although cases where supermarkets source from large farmers were noted in the meso analysis, but not in the micro analysis;

b) Many studies posited exclusion of the subset of small farmers who are poor in non-land assets, and inclusion of small farmers endowed with non-land assets (Indonesian tomatoes, Mexican strawberries, Poland dairy, South African tomatoes, Indian dairy, and to some extent Zambian beef);

c) However, in the cases of China's tomatoes and cucumbers, Indonesia's potatoes, and Turkey's tomatoes, it was posited that neither land nor non-land assets would be a basis for exclusion from modern channels.

In general, the micro results confirmed the expectations put forward by the meso studies (with the exceptions of the India and Zambia studies, discussed below).

On the one hand, in the potato meso studies of China and Indonesia, neither variations in farmland over small farmers, nor non-land assets, had significant effects on farmer participation in restructured markets. In fact at the local level the markets the farmers faced were hardly restructured at all.

On the other hand, there is clear evidence of non-land assets being an important determinant of inclusion or exclusion among small farmers in the other countries – except India, as noted below.

a) Indonesia tomatoes: irrigation capital is a determinant of inclusion of small farmers; this confirms the qualitative study which points to irrigation as a key investment for quality and consistency, thereby providing access to modern channels;

b) Mexico strawberries: the productive asset index (over time) is an important determinant, as is farm size (within the small-farm category), again confirming the qualitative analysis of the meso study which showed that modern buyers (almost exclusively large wholesalers and processors, as supermarkets do not buy directly from the farmers) require consistency and quality that in turn translates into necessary equipment and minimum land size;

c) Poland dairy: the key non-land assets of dairy herds, such as cooling tanks, again confirmed the meso study's point that modern channel buyers (large processors, as supermarkets do not buy milk directly from farmers) want a minimum volume of milk per farmer (herd size) and require that it is kept cold while it is being collected.

d) South African tomatoes: given that these are all small farms, and are producing with the option of selling to local processors or local supermarkets, the key non-land asset variable is whether they can produce in greenhouses, thus attaining the multiple seasons and the quality required by the modern local channel. This was also a key point from the meso study.

However, there were several cases where the hypotheses from the meso study were not confirmed. These are discussed here for India and Zambia.

In the case of India there was no exclusion based on non-land assets found in the regressions, although higher education was associated with inclusion in one of the two non-traditional options (co-ops or private market channels). In India's dairy sector marketing choices by farmers in 2006 were the same on average as those in 2002 (row 1, Table 3.1). In both 2002 and 2006, Indian farmers sold 63 per cent of their milk through traditional channels such as milk vendors, sweet shops and directly to local consumers, and sold the remaining 37 per cent to the co-operatives and organized private sector. After examining the trend of farmers' marketing choices, Sharma et al (2008) concluded that "despite restructuring in (the) milk processing sector, the downstream restructuring has not penetrated into farm procurement. Farmers' milk marketing channels in the study area are still dominated by unorganized sector. Nearly two-thirds of milk is marketed through traditional supply channels…". This is not surprising given that only 1 per cent of the milk in India is marketed via supermarkets, so there is essentially no downstream restructuring. Moreover, the meso study shows that the private sector processors are making inroads into the co-op share of the dairy sector, but

the growth of the two modern segments combined is small. That explains the result shown here.

The second exception was for Zambia. Rather than selling to supermarkets and exporters, the small farmers sell to the likes of ZAMBEEF, defined as the modern channel. The meso study hypothesized that having a truck would allow a small farmer to sideline the traditional wholesalers and sell to ZAMBEEF and the slaughterhouses of other large processors. But the 'own truck' variable, the key non-land asset, was not significant. However, distance to ZAMBEEF was found to be quite significant, suggesting that lower transaction costs to access ZAMBEEF increases the probability of selling to such firms. This would the most plausible hypothesis from this study.

In China, traditional marketing channels (small wholesalers and brokers) bought almost all vegetables from farmers in 2001, and this situation did not change until 2006 (rows 4-5, Table 3.1). As stated by Huang et al.(2007), "Clearly, the small trading firms and individuals that make up China's wholesale markets are small enough that they are able and find it profitable to either send an agent to procure from China's small cucumber and tomato farmers or go themselves or purchase from farmers that come to the wholesale markets".

One country which recorded large changes in farmers' marketing choices is Poland, where farmers shifted 26 per cent of their milk from traditional marketing channels to direct deliveries to processing firms (down from 39 per cent in 2001 to 13 per cent in 2006, Table 3.1). The shift is due to a combination of factors including policy changes (EU standards), processing modernization, and price premiums provided for quality by processors to producers (so that processors can meet supermarket standards and EU standards for export).

d) There is little direct penetration of downstream changes, or the modern retail revolution into upstream farm-level procurement. Penetration largely ends at the midstream segments, such as wholesale, processing firms and other intermediates.

While modern market channels have been rising gradually in some countries in the past five years, (e.g., Mexico and Poland), the rise has been marginal in Mexico and rapid in Poland due to a combination of changes in public (EU) and private standards (by large processors and supermarkets). In the case of tomatoes in Indonesia, only 13 per of the tomatoes are procured from specialized/dedicated wholesalers working for supermarkets, but this is up from 0 per cent a decade ago. In Mexico and Indonesia the penetration of the fresh produce sector has been relatively recent (in the past five years), with very little marketing of produce by supermarkets before that (reflecting an

international pattern).

In the case of China, modern channels, which include special suppliers, processing companies, farmers' associations, supermarkets, restaurants and export companies in Shandong province, altogether accounted for only 1.5 per cent of cucumber sales and 0.2 per cent of tomato sales between 2001 and 2006. A similar marketing pattern is observed in potatoes in Indonesia. In the study on China, it was concluded that "The penetration has stopped at wholesale level, an indication of a very competitive wholesale market, efficient small wholesalers in linking downstream and upstream, and high transaction costs of modern retails and exporters with millions of small producers." (Huang et al., 2008).

e) Finally, there is evidence of penetration from downstream to midstream (e.g., processors and wholesalers) and also of a response at midstream to the changes downstream.

Internationally, it is usual for supermarkets to source directly from fresh produce suppliers only where the latter are large and commercial, making the sourcing practicable. The typical pattern is for supermarket chains to source via specialized/dedicated wholesalers. The micro studies in the fresh produce cases of Indonesia, Mexico, South Africa, and Turkey, show that only in the case of Indonesia have the specialized/dedicated wholesalers gained a foothold (13 per cent). This does not yet occur in the other countries for the following reasons:

a) In Indonesia, potatoes are not a quality-differentiated or very perishable crop (unlike tomatoes), and so supermarkets just source this bulk commodity from wholesale markets where they easily get what they need.

b) In the case of strawberries in Mexico, supermarkets source from very large wholesalers in the wholesale market, often via specialized/dedicated wholesalers. Two direct sourcing measures were considered, but only one was successful: in the first, supermarkets source some of their fresh strawberries from Driscolls, a contract scheme run by a multinational, that mainly exports; this was covered in the meso study for Mexico, but not the micro study because the participating medium/large sized contract farmers were under confidentiality clauses in their contracts.

c) In the case of South Africa, the meso study showed that the great majority of tomatoes are sourced directly by the large chains from large commercial tomato producers. The micro study, however, sampled in the small farmer area, where direct sourcing is rare.

d) In the case of Turkey direct sourcing and the use of specialized/dedicated wholesalers (working for supermarkets) were not found, because Turkish law stipulates that when using the wholesale sector, supermarkets have to work through the traditional wholesalers in the wholesale markets, the commission agents, rather than sourcing directly (except in the rare cases of co-ops), or indirectly through agents from the farms.

Significant evidence of change in the midstream levels were found in the case of China when the country team conducted an intensive market survey on the second buyers of farmers' vegetables. Although the upstream segments of the market channel were found to be dominated by brokers and wholesalers, there was change over time in markets when one examined simultaneously the first and second segments of the supply chain (Huang et al., 2008). For example, the rise of modern market chains when the second buyers were considered is quite widespread across the samples [*including: i) brokers → modern; ii) wholesalers → modern; and iii) directly sold to modern channels*]. The most significant rise in percentage terms occurs in Shouguang county, one of the best known horticultural sites in China. Between 2001 and 2006, the share of tomatoes that passed through modern suppliers in the first two links of the supply chain rose from 45.9 to 58.7 per cent. The share of tomatoes passing through such supply chains also rose in three of the other four counties in the sample (Huang et al., 2008). The study also indicated that, although modern buyers have not penetrated to the farm-household level (or into China's rural villages), in the case of tomatoes in Shandong province, they are increasingly present in the supply chain, at least at the second link (Huang et al., 2008).

3.2 Determinants of marketing choices by farmers

Module 3 of Component 1 identifies a list of variables that are hypothesized to have impacts on farmers' marketing choices, including incentives, land assets or farm size, non-land assets, local policies, and many others. Instead of discussing the impacts of each variable on farmers' marketing choices in each country, in this section, we synthesize the major empirical findings and synergies that may have important policy implications (Tables 3.2 and 3.3). Details of determinants of marketing choices by farmers can be found in each country report (Huang et al., 2008 for China; Sharma et al., 2008 for India, Natawidjaja et al., 2008 for Indonesia; Berdegué et al., 2008 for Mexico; Milczarek-Andrzejewska et al., 2008 for Poland; Bignebat et al., 2008 for Turkey; Chikazunga et al., 2008a and 2008b for South Africa and Zambia). A discussion of the

non-land asset determinants was presented above and in the table in the econometrics section.

Major results from the country studies and inter-countries comparisons are:

a) Overall, the evidence that farm size in small farms (e.g., land area for crops and herd size for livestock products) is correlated with exclusion from market restructuring, is mixed.

b) Of the ten case studies in eight countries, and controlling for the impacts of other factors, the multivariate analysis in the determinants of marketing channel choices showed that small farms (measured by farm-land size in horticulture, or herd size dairy and beef) are likely to be excluded from emerging modern markets (Table 3.2). These case studies include dairy in Poland, tomatoes in one of two regions studied in Indonesia, tomatoes in South Africa, and strawberries in Mexico. In these case studies, the estimated parameters for farm size in the modern market equation are positive and statistically significant (see Table 3.2, and also Natawidjaja et al., 2008 for Indonesia; Berdegué et al., 2008 for Mexico; Milczarek-Andrzejewska et al., 2008 for Poland; and Chikazunga et al., 2008a for South Africa).

Table 3.2: Impacts of farm size on farmers' participation in dynamic markets.

Country: product	Land size for crops and herd size for animals
India: dairy	-
Zambia: beef	0
Poland: dairy	+
China: cucumbers	0
China: tomatoes	0
Indonesia: potatoes	0
Indonesia: tomatoes	+ or -
S. Africa: tomatoes	+
Turkey: tomato (fresh/modern)	-/0
Mexico: strawberries	+

Note:'0', '-' and '+' represent no impact (or impact is not statistically significant), statistically significant negative impact, and statistically significant positive impact, respectively. Empty cells are the factors not examined in the countries. For China, because there is almost no modern channel, parameters presented in this table are for farmers selling to wholesalers (compared to brokers)

c) However, in six out of ten case studies there is no evidence of small farms being excluded from the modern market channels. These case studies include dairy in India (where there are only small farmers in the dairy sector), beef in Zambia (only small farmers were included in the sample), cucumbers and tomatoes in China, potatoes in Indonesia (where the large farm in the area was excluded from the sample), and tomatoes in Turkey (where the tomato farms are small). In fact the parameter of herd size in the case study for India is negative and statistically significant, implying that small farms actually participate in modern market channels more than rich ones (column 1, Table 1.1). Sharma et al. (2008) give the following explanations: "The possible explanation for this behavior could be that farmers receive the same price in coops irrespective of quantity of milk supplied to coops, while in case of private dairies and even traditional market channels, large producers get price incentive/higher price because of higher bargaining power as well as lower transaction costs for buyers. The results clearly show that modern private dairy plants and traditional channels preferred supplies from large farmers that can supply more quantities of quality and smallholder milk producers are excluded from these channels".

Two explanations are put forward for these mixed results:

i. There is greater variation in farm size (land or herd size) in Poland, South Africa, and Mexico than the rest of eight counties countries studied. If this is so, equal land distribution should be one of key proposals for inclusion of small-scale producers in dynamic markets. In China's case, the study noted that equitable distribution of land among farmers, and a competitive market, were critical for all farmers to benefit from market expansion and prevent some of them being left behind when market restructuring occurred. Similar evidence is also found in the case study on potatoes in Indonesia (Huang et. al., 2008; Natawidjaja et al., 2008).

ii. There is substantial evidence that the ownership of non-land assets positively affects the participation of small farmers in restructured channels.

Controlling for farm size (shown in the earlier section), and using the asset categories from the above model section, we see that of the nine cases:

a) Four show impacts of human capital, only one of which is education and thus amenable to policy intervention.

b) Consumption capital was modelled in only three studies, and only in the case study on China was it significant (and negative);

c) Productive capital is the clearest and strongest parameter – and also one that can be affected by policy. In eight of the nine cases it was modelled, and in six of the eight cases, it was significant. As noted in the introduction, this mirrors the existing literature (for Guatemala). The types of productive assets that were found to have a significant effect include cooling tanks, herds, greenhouses, irrigation investments – things that affect quality, consistency, and volume.

d) Co-op membership was factored into most of the studies, but only in two cases (India and Mexico) was it found to have a positive effect; in other cases it had a decidedly ambiguous and weak showing, neither negative nor significant. All eight countries examined the impacts of farm associations or co-operatives on farmers' participation in the modern market. While about half of them show that farm associations or co-operatives facilitated the participation of their members in modern markets, the other half show either no impacts or negative impacts. Again, this is surprising and may need further investigation as most case studies in Component 2 show important, positive impacts of farm associations and co-operatives on inclusion of farmers in dynamic markets.

The Turkish case study provides an explanation of the negative impact of co-operatives on modern marketing choices (Bignebat et al., 2007): "In fact, marketing co-operatives are rare and are, more often then not, not efficient as regards their marketing strategy. They are used by their members as cheap input suppliers and as a way for them to get subsidized investment from the government. They are not progressive modes of organization for producers. Insofar, the village in which they are located may remain oriented to the traditional markets."

In the case of Poland, a significant negative impact was also found for co-operatives on modern market choices. "What seems to matter here then is practical rather than theoretical knowledge. Worth noting is also negative and statistically significant impact of COOPERATION. This observation shows that potential costs of remaining in the traditional channel (e.g. lower prices, higher risk of milk refusals, lower quality premiums etc.) may be outweighed by benefits created by co-operation. This result is the more interesting since it may incline towards statement that farmers' collaboration, often commonly advised as a tool having great potential for stimulating further restructuring, does not need to have the desired effects" (Milczarek-Andrzejewska et al., 2008).

Table 3.3: Non-land assets in country case study regressions, and signs (where significant) on modern market channel participation; if there is a sub channel of modern, it is specified in parentheses

	Human Capital	Consumption Capital	Productive Capital	Organizational Capital	Financial Capital
China: tomatoes/ cucumbers	Age; Education	Lagged onsumption assets/capita (-)		Co-op membership	
India: dairy	Age (- on private); education (+ on both)		Lagged herd (- on coop)	Co-op membership (+ on co-op, + on private)	
Indonesia: tomatoes	Age; Education; Experience (- modern wholesale)		Lagged Irrigation(+ supermarkets)	Lagged Co-op membership	
donesia: potatoes	Age; Education types (university = -)	Number of rooms in home lagged	Irrigation lagged (+ wholesale, - modern)		
Mexico Strawberry	Age (-); Education; household size (+)	Livestock lagged	Productive assets index, lagged (+)	Co-op membership (+)	
Poland Dairy	Experience (+); Age; Education		Herd lagged (+); milk equipment; general machinery	Co-operating with other farms (-); co-op membership	Credit lagged (+)
South Africa Tomato	Age; Gender; Experience; Education (-); Training		Tractors; Greenhouses (+); Packing houses; Transport; Cell phones (-) lagged	Co-op membership current (-)	Credit; Non-farm income lagged
Turkey tomato	Age (+); experience (-)		Glasshouses lagged; irrigation method lagged (+)	Co-op (-)	Credit lagged; Non-farm income
Zambia beef	Education; Gender; Age; Experience; Training (-)		Transport herd current; breed lagged	Co-op	Non-farm income (+)

Generally, better road and marketing infrastructure facilitates the participation of farmers in modern market channels, though the impacts in some country studies are not statistically significant.

Of the eight countries studied, four found that the distance to roads, markets or dairy collection points had a significant impact on farmers' ability to sell products to modern channels (Table 3.4). As expected the sign on this variable is negative, meaning that the further farmers live from roads or markets, the more likely it is that they will sell to traditional market buyers, who, in their search for opportunities to purchase products from farmers for resale onto second buyers, are apparently willing to travel further afield than farmers are willing to transport their goods; Huang et al., 2008).

Table 3.4: Impacts of rural infrastructure on farmer's participating in modern channels in eight countries

Country: product	Road and market infrastructure
India: dairy	-/+
Zambia: beef	0
Poland: dairy	+
China: cucumbers	+
China: tomatoes	+
Indonesia: potatoes	-/+
Indonesia: tomatoes	0
S. Africa: tomatoes	0
Turkey: tomatoes	0
Mexico: strawberries	0

Note: '0', '-' and '+' represent no impact (or impact is not statistically significant), statistically significant negative impact, and statistically significant positive impact, respectively. Empty cells are the factors not examined in the countries. For China, because there is almost no modern channel, parameters presented in this table are for farmers selling to wholesalers (compared to brokers).

Other country-specific factors have been found to have significant impacts on farmers' participating in modern market channels.

For example, in the study on China, it was found that the government 'Vegetable Base' programme and local tax on sales have affected farmers' marketing choices (Huang et al., 2007). Competition between commissioners in Indonesia (Natawidjaja et al., 2008) and relaxed credit constraints in Mexico (Berdegué et al., 2007) facilitate farmers engaged in modern channels in these two countries. A new milk quota system in Poland restricts not only more advanced farmers, but also those lagging behind in terms of the process of farm modernization (Milczarek-Andrzejewska et al., 2007). In South

Africa market risks are found to be positively correlated with engaging in modern channels (Chikazunga et al., 2007a).

4. Impacts of marketing choices on farmers

This section provides empirical evidence for the following research questions: What are the impacts of farmers' market channel choices on farmers? In particular, what are the impacts of farmers' market choices on their net incomes and production practices?

The major impacts of market choices on farmers in ten case studies from eight countries are summarized in Table 4.1. Several interesting findings can be derived from the results.

a) In general there is no strong evidence that choosing the modern market channel has a positive or negative impact on the income and production technology of the farm.

In two cases (dairy in Poland and strawberries in Mexico), it was found that participating in marketing choice had positive impacts on the net income of farmers (Table 4.1). In the case of tomatoes in Indonesia it was found that choosing the modern channel had a positive impact on capital inputs. In the remaining seven cases, the impacts are not statistically significant (zero in six cases and statistically negative in one case). Similar results are also found for the impacts of the modern market choice on production inputs or technology (columns 2-4, Table 4.1).

b) There is strong evidence that where farm size is an important determinant of modern market channel choice, participating in the modern market has a positive impact on farmers' income and production technologies.

This was found across all eight countries. In contrast, participating in alternative market channels was found to have no impact on farmers' income and production. For example, as shown in Table 3.2, the case studies for dairy in Poland, tomatoes in Indonesia and strawberries in Mexico provide strong evidence of small-farm exclusion. In the impact studies, we also found that only in these three cases did the modern market choice have a positive impact on farmers' income and production inputs (Table 3.2).

c) There is also evidence of a correlation between market penetration and the impacts of modern market channels on farmers' income and production technologies.

The micro studies revealed that in the early stage of market restructuring in the cases of dairy in India, beef in Zambia, and vegetables in China, Indonesia and South

Africa, there was little penetration (Table 3.1). Consequently, it was also found that the modern market choice had little impact on farmers' income and production (Table 4.1). This is interesting because it suggests the time when policy intervention might be needed, namely, during the early stage of market restructuring when there is little penetration of market restructuring from retail to farm procurement, and when inclusion or exclusion in the modern market chain does not affect farmers' income or production.

However, for countries such as Poland and Mexico where market restructuring has reached a relatively high level and penetration from downstream to upstream has been occurring, there are significant positive impacts of choosing the modern channel on farmers' income. In this situation, inclusion or exclusion will have cost and benefit implications for farmers.

Table 4.1: Impacts of the participation of farmers in modern channels on income and production technology in eight countries

Country: product	Farm income	Capital inputs	Pesticide inputs	Labour Inputs
India: dairy	-			-
Zambia: beef	0	0		0
Poland: dairy	+			
China: cucumbers	0	0	0	0
China: tomatoes	0	0	0	0
Indonesia: potatoes	0	-	-	+
Indonesia: tomatoes		+ supermkt + M. whlsale	0 supermkt - M. whlsale	0 supermkt + M. whlsale
S. Africa: tomatoes	0	0		0
Turkey: tomatoes	0			
Mexico: strawberries	+		+	+

Note: "0", "-" and "+" represent no impact (or impact is not statistically significant), statistically significant negative impact, and statistically significant positive impact, respectively. Empty cells are the factors not examined in the countries. For China, because there is almost no modern channel, parameters presented in this table are for farmers selling to wholesalers (as opposed to brokers). Capital inputs are total material inputs in all countries except for tomatoes in Indonesia and South Africa, the later two countries limited to fertilizer inputs.

5. Concluding remarks and policy implications

The retail food market has undergone rapid restructuring in many developing countries since the early 1990s. In recent years, a great deal of attention has been focused on the likely impacts of restructuring on the entire food market chain and on small farms. This synthesis report summarizes the empirical findings of ten case studies in eight countries and for six different commodities, on the patterns and determinants of food market restructuring and their impacts on farmers. In all case studies, similar sampling, survey instruments and analytical framework were developed and adopted.

5.1 Observed patterns of change in the food market chain

Key findings on the patterns of change in the food market chain are as follows:

a) There is a large variation in the market restructuring of developing countries. Relatively more food market restructuring has taken place in North America (Mexico); this is followed by Eastern European transitional economies (Turkey and Poland), South Africa, Southeast Asia (Indonesia), East Asia (China), South Asia (India), and less developed African countries (Zambia).

b) There is also a large variation in market restructuring between commodities. On the whole, market restructuring has been more rapid in the livestock sector (e.g., dairy) and in fruit than in vegetables.

c) Market restructuring upstream has ranged from somewhat less to much less than market restructuring downstream. There is little evidence of penetration in the entire food market chain. Penetration from downstream changes or the modern retail revolution to other segments of the food market chain has often been stopped at the midstream level, in wholesale, processing, and other intermediates.

d) There is also evidence of midstream responses to downstream changes in several case-study countries. The appropriate responses from intermediates to retail market restructuring have often served as buffers, softening the shocks of retail changes on farms.

e) When there is little penetration from downstream changes to upstream channels of the food market chain, and the market is dominated by traders in traditional market channels, it is difficult to meet the growing demand for food safety. Increased

regulation and testing might help, but if regulations become too strict they might act as a barrier, keeping small farmers out of the market. Evidence from the determinants of market participation shows that the policies which foster non-land assets may help to improve the system.

5.2 Determinants of inclusion or exclusion in modern channels, with policy implications

The key findings on the determinants of farmers' market choices and the inclusion or exclusion of small producers in the dynamic market, are as follows:

a) There is no strong evidence that small producers are excluded from food market restructuring; at most, the results are mixed. This is qualified somewhat because in countries where the meso studies noted that supermarkets source from large producers (such as South Africa, to some extent Indonesia and Mexico, and strongly in Zambia), the large producers were often excluded from the random sampling. It is clear that where downstream companies had no choice but to work with small farmers, the propensity to do so was high. Equal land distribution is one of key policies for inclusion of small producers in dynamic markets.

b) It is far more usual for non-land assets to be a determinant of inclusion than farm size or ownership of land. Rather than consumption or human capital, it is the productive assets such as irrigation, greenhouses, cooling tanks, and so on that act as determinants. This is good news for policy makers as these areas are amenable to changes in policy and programming.

c) Rural transportation and market infrastructure have also played important roles in facilitating the participation of farmers in modern market channels. The implications for infrastructure programmes are clear.

d) Many country-specific policies in food production and marketing also have significant impacts on the inclusion or exclusion of farmers in modern market channels.

5.3 Costs, benefits and other impacts of inclusion or exclusion

There are three major findings on the impacts on farmers' income and production technologies of participating in modern market channels:

a) No consistent differences were found between the impacts of choosing modern channels and the impacts of choosing traditional channels on farmers' income, production inputs and technology uses.

b) However, the exclusion of small producers from the dynamic modern market has a major impact on farmers' income and production technology. Whether market restructuring has impacts on farmers' income and technology used depends to a large extent on whether small producers are excluded from the dynamic modern market.

c) The impacts of the modern market channel on farmers' income and production technologies are also related to the degree of market penetration from downstream to upstream. This may imply that in the early stage of market restructuring when there is little penetration, inclusion or exclusion in the modern market chain has little effect on farmers' income or production technology.

References

Berdegué, J.A., F. Balsevich, L. Flores, and T. Reardon. (2005). "Central American Supermarkets Private Standards of Quality and Safety in Procurement of Fresh Fruits and Vegetables", Food Policy. 30(3): 254-269.

Berdegué, Julio, Ricardo Hernández, Jorge Ortega, and Thomas Reardon. 2007. "Strawberry Growers and Modern Market Channels in Mexico", Micro Report Module 3 of Component 1, Regoverning Market Programme, IIED, London.

Balsevich, F., J. Berdegue and T. Reardon, (2006). "Supermarkets, New-Generation Wholesalers, Tomato Farmers, and NGOs in Nicaragua", Staff Paper, 2006(3).

Bignebat, Céline, A. Ali Koç, Rana Demirer, Ayca Aksoy, Nisa Mencet, and Sylvaine Lemeilleur. 2008. "Turkey Micro Report Module 3 of Component 1, Regoverning Market Programme, IIED, London.

Carter, M.R. and D. Mesbah. 1993. "Can land market reform mitigate the exclusionary aspects of rapid agro-export growth?", *World Development*, 21 (7): 1085–1100

Chikazunga, Davison, Andre Louw, Leah Ndanga, and Estelle Bienabe. 2008. "Smallholder Farmers Participation in Restructuring Food Markets: A Case of the Tomato sub-sector in South Africa," Micro Report Module 3 of Component 1, Regoverning Market Programme, IIED, London.

Chikazunga, Davison, Andre Louw, Orient Muloongo, and Choolwe Haankuku. 2008. "Smallholder Farmers Participation in Restructuring Beef Value Chains: A Case of the Beef Sub-sector in Zambia", Micro Report Module 3 of Component 1, Regoverning Market Programme, IIED, London.

Dolan, E. and J. Humphrey. 2000. Dolan, C. and J. Humphrey. 2000. "Governance and Trade in Fresh Vegetables: The Impact of UK Supermarkets on the African Horticulture Industry," *Journal of Development Studies* 37 (2): 147-176.

Dong, X, H. Wang, J. Huang, S. Rozelle, and T. Rearton (2006) "Small Traders and Small Farmers: The Small Engines Driving China's Giant Boom in Horticulture" Working Paper ,Center For Chinese Agriculture Policy, Chinese Academy Of Science, Beijing, China.

Dries, Liesbeth, Thomas Reardon, and Johan Swinnen. 2004. "The Rapid Rise of Supermarkets in Central and Eastern Europe: Implications for the Agrifood Sector and Rural Development." *Development Policy Review* 22(5):525-556.

Farina, E.M.M.Q, G.E. Gutman, P.J. Lavarello, R. Nunes, T. Reardon. 2005. "Private and public milk standards in Argentina and Brazil," *Food Policy*, 30 (3), June: 302-315.

Henson, S., O. Masakure, and D. Boselie. 2005. "Private food safety and quality standards for fresh produce exporters: The case of Hortico Agrisystems, Zimbabwe," *Food Policy* 30: 371–384.

Hernández, R., T. Reardon, and J.A. Berdegué. 2007. "Supermarkets, Wholesalers, and Tomato Growers in Guatemala," *Agricultural Economics*, 36(3), May: 281-290.

Hu, Dinghuan, Thomas Reardon, Scott Rozelle, Peter Timmer, and Honglin Wang. 2004. "The Emergence of Supermarkets with Chinese Characteristics: Challenges and Opportunities for China's Agricultural Development." *Development Policy Review* 22(5):557-586.

Huang, J., S. Rozelle,, Dong, X., Wu, Y, Zhi, H, Niu, X., Huang, Z. (2006) . "Small Farmers and Agrifood Market Restructuring: The Case of Fruit Sector in China" FAO Project Report.

Huang, Jikun, Zhurong Huang, Huayong Zhi, Yunhua Wu, Xianfang Niu, and Scott Rozelle, 2008. "Production, Marketing and Impacts of Market Chain Changes on Farmers in China: Case Study of Cucumber and Tomato in Shandong Province," Micro study report (Module 3) of Component 1 (China), Regoverning Market Programme, IIED, London.

Maertens, Miet, and Johan Swinnen. 2006. "Trade, Standards and Poverty: Evidence from Senegal." LICOS discussion paper, Centre for Transition Economies, Leuven, Belgium.

Milczarek-Andrzejewska, Dominika, Agata Malak-Rawlikowska, Jan Fałkowski, and Jerzy Wilkin. 2008. "Restructuring Process at Farm Level: Evidence from Dairy Sector in Poland", Micro Report Module 3 of Component 1, Regoverning Market Programme, IIED, London.

Minten, Bart. 2007. "The food retail revolution in poor countries: Is it coming or is it over?" . Forthcoming in EDCC.

Minten, Bart, Lalaina Randrianarison, and Johan Swinnen. 2007. "Global Retail Chains and Poor Farmers: Evidence from Madagascar." *World Development*, forthcoming.

Natawidjaja, Ronnie S., Elly Rasmikayati, Kusnandar, Dian Purwanto, Thomas Reardon, and Huayong Zhi. 2008. "Impacts of Agrifood Market Restructuring in Indonesia: Case of Potato Farmers in West Java

Reardon, T. and C. P. Timmer (2005). "The Supermarket Revolution with Asian Characteristics." Paper Presented at the International Conference" Agricultural and Rural Development in Asian", Philippines

Reardon, T. and C.P. Timmer. 2007. "Transformation of Markets for Agricultural Output in Developing Countries Since 1950: How Has Thinking Changed?" chapter 55 in

R.E. Evenson, and P. Pingali. Handbook of Agricultural Economics, 3: Agricultural Development: Farmers, Farm Production and Farm Markets. Amsterdam: Elsevier Press: 2808-2855.

Reardon, Thomas, Peter Timmer, Christopher Barrett, and Julio Berdegué. 2003. "The Rise of Supermarkets in Africa, Asia, and Latin America." *American Journal of Agricultural Economics* 85(5):1140-1146.

Reardon, Thomas, and Peter Timmer. 2005. "Transformation of Markets for Agricultural Output in Developing Countries since 1950: How has Thinking Changed?" In (Eds.) Evenson, R.E., Pingali, P., and Schultz, T.P. 2005. *Handbook of Agricultural Economics: Agricultural Development: Farmers, Farm Production and Farm Markets*. Amsterdam: Elsevier Press.

Schwentesius, R., and Manuel, A. G., (2002), "Supermarkets in Mexico: Impacts on Horticulture Systems", Development Policy Review, 20(4): 487-502.

Sharma, Vijay Paul, Kalpesh Kumar, and Raj Vir Singh. 2008. "Determinants, Costs, and Benefits of Small Farmer inclusion in Restructured Agrifood Chains: A Case Study of Dairy Industry in India", Micro study report (Module 3) of Component 1, Regoverning Market Programme, IIED, London.

Swinnen, Johan. 2007. *Global Supply Chains, Standards and the Poor*. Wallingford: CABI Publishing.

Wang, H., Dong, X, J. Huang, S. Rozelle,, and T. Rearton (2006). "Producing and Procuring Horticultural Crops with Chinese Characteristics: Why Small Farmers are Thriving and Supermarkets are Absent in Rural China", the 26th Conference Paper of the International Association of Agricultural Economists, August 14-19, 2006.

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