TRADE REFORMS AND FOOD SECURITY

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Preface

Between 1999 and 2002 FAO undertook a series of 23 country case studies to evaluate the impact of the WTO Agreement on Agriculture (AoA) on agricultural trade and food security in developing countries.[1] The objectives of these studies were to assess the extent to which the AoA commitments had led to changes in domestic agricultural policy, to evaluate the impact on trade flows (imports and exports) of developing countries and to assess whether implementing the AoA commitments had had any impact on food security. An important finding was that for most of the countries in the sample, the implementation of AoA commitments did not imply any major change to domestic agricultural policy, including trade policy. The main reason was that most of the countries had implemented during the 1980s and early 1990s unilateral reforms including the liberalization of international trade, often as part of the conditionality of adjustment loans. Some of these were bound as part of their multilateral commitments in Uruguay Round. In other cases, commitments were made in terms of ceiling bindings or reduction from bound rates which diverged considerably from existing applied levels. It became clear that in order to make a realistic assessment of the impact of trade-related policy reforms on food security, it was necessary to extend the analysis over a period that included the implementation of substantial unilateral reforms.

It was in this context that FAO launched in 2002 a further series of 15 country case studies on the experience more broadly with trade-related reforms and food security. The coverage included countries at different states of development with the main focus on low-income countries that are likely to be at greater risk of food insecurity.[2] The purpose of this analysis was forward looking: to draw lessons from past policy reform processes at the country level in order to inform future national and multilateral policy reform efforts about likely implications for food security. It was anticipated that the studies would help to clarify broadly some of the following questions:

- What trade and associated economic reforms affecting the agricultural sector were implemented over the past 20 years or so?
- What were the institutional setting and policy environment in which these reforms took place?
- How did the reforms affect the incentives (e.g. output and input prices, access to credit, etc.) facing agricultural producers?

[1] FAO, *WTO Agreement on Agriculture: the implementation experience – developing country case ctudies.* Rome, 2003.

[2] The case studies covered the following countries: in *Asia:* China, India; in *Latin America and the Caribbean:* Chile, Guatemala, Guyana, Peru; in *North Africa/Near East*: Morocco; and in S*ub-Saharan Africa:* Cameroon, Ghana, Kenya, Malawi, Nigeria, Senegal, United Republic of Tanzania, Uganda.

- What was the response and impact on the agricultural sector's performance (e.g. production, productivity, trade)?
- What was the impact on small and resource-poor farmers?
- What was the impact on food security at the national level and for rural households?

In the context of policy reform efforts at the multilateral level, of immediate relevance are the current WTO negotiation on agriculture and actions to achieve the Millennium Development Goals (MDGs). The mandate for the Doha Round of multilateral trade negotiations, and the WTO framework agreement of 1 August 2004 on modalities for the negotiations in agriculture, specified that operationally effective and meaningful provisions for special and differential treatment for developing countries are to be provided to enable them "to pursue agricultural policies that are supportive of their development goals, poverty reduction strategies, food security and livelihood concerns". These goals and concerns are also reflected in the set of eight MDGs (and 18 targets),[3] the first of which is that of reducing by half, by the year 2015, the proportion of the world's people that live in extreme poverty as well as those who suffer from hunger.

Therefore, an immediate issue of interest in the context of these case studies is the identification of appropriate trade-related policies that would support such multilaterally agreed goals, strategies and concerns.

As a prelude to undertaking the country case studies, several papers were commissioned, and an expert consultation was held in Rome in July 2002, to review critically the existing relevant literature on trade and food security developments, including assessments of the outcome of past policies on national and household food security, e.g. trade liberalization and related economic reforms. The stock-taking of existing relevant research also included a review of alternative methodological approaches and conceptual frameworks for investigating the relationship between trade and food security. A volume based on the papers and the debate that took place during the expert consultation was published in 2003.[4] This volume is a sequel to that publication.

Any study attempting to analyse the impact of policies faces a number of methodological issues. While it is relatively straightforward, where data exist (including at the household level), to track changes over time in economic and policy variables including food security indicators at the national and household levels (and, hence, in the 'before' and 'after' reform situations), it is more difficult to disentangle the effects of specific policy reforms from other factors (other policy actions, events and shocks) that have contributed to the observed economic and food security outcomes. It is for this reason that most of the existing relevant

[3] See: *In larger freedom: towards development, security and human rights for all,* report of the Secretary-General (UN General Assembly, A/59/2005, 21 March 2005).

[4] See: FAO, *Trade reforms and food security: conceptualizing the linkages,* Rome, 2003.

studies (e.g. on the impact of trade reforms on economic growth or the relationship between economic growth and poverty reduction) use simple correlation analysis or simulation models.[5]

The analytical approach taken in the 15 FAO studies is an adaptation of the case-study methodology which combines both qualitative and quantitative analyses in a framework designed to capture more completely the micro-level factors that influence the direction and strength of the relationship between agriculture-related reforms and food security in country-specific contexts. Country-level research and analysis was undertaken by national consultants to investigate the various linkages and the influence of modifying factors. The method adopted for examining a particular aspect of the linkage differed from country to country depending upon the data and expertise available and the complexity of the particular relationship being investigated. Both quantitative and qualitative methods were used, including key informant interviews and rapid appraisal surveys.

A study of this scope would have been impossible without the collaboration of many able researchers, particularly those who prepared the country reports, and also those who acted as resource persons in the review of the draft studies. The countries included in the project and the researchers who prepared the country studies were as follows:

Cameroon — Ernest Bamou and Jean Pierre Tchanou, Department of Economics, University of Yaounde II-Soa; François Honoré Mkouonga, Ministry of Agriculture, Cameroon and Dominique Njinkeu, Consortium pour la Recherche Economique en Afrique (CREA)

Chile — Eugenia Muchnik and Rosa Camhi, Fundación Chile, Agribusiness Department

China — Jikun Huang, Center for Chinese Agricultural Policy (CCAP), Chinese Academy of Sciences; Scott Rozelle, Department of Agricultural and Resource Economics, University of California, Davis; Hongxing Ni Office of Agricultural Trade, Ministry of Agriculture, and Ninghui Li, Agricultural Economics Institute, Chinese Academy of Agricultural Sciences. The authors would like to acknowledge the research assistance provided by Ping Qin Ping and Haomiao Liu from CCAP

Ghana — Abena D. Oduro, Centre for Policy Analysis, Accra and George T-M Kwadzo, Department of Agriculture Economics and Agribusiness, University of Ghana, Legon

Guatemala — Pablo Rodas-Martini with Luis Gerardo Cifuentas and Juan Pablo Pira, and the assistance of Claudia Garcia – Research and Social Study Association, Guatemala

[5] For further discussion, see: FAO, *Trade reforms and food security: conceptualizing the linkages,* FAO, Rome, 2003, chapter 11; L.A. Winters, N. McCulloch and A. McKay, Trade liberalization and poverty: the evidence so far, *Journal of Economic Literature,* 42(1): 72-115.

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Malawi	Ephraim W. Chirwa, University of Malawi, Chancellor College, and Christina Zakeyo, Ministry of Commerce and Industry, Malawi
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Nigeria	T. Ademola Oyejide, E. Olawale Ogunkola and Olumuyiwa B. Alaba, Trade Policy Research and Training Programme and Department of Economics, University of Ibadan, Nigeria
Peru	Jorge Torres Zorrilla and Julio Paz Cafferata, Departamento de Economía, Universidad Católica, Peru
Senegal	Abdoulaye Diagne, François Joseph Cabral, Ben Omar Ndiaye, Mamadou Danskho, Malick Sane (CREA), and Ndioba Diene (DAPS)
Tanzania	Flora Mndeme Musonda, East African Community, Tanzania and Godwill George Wanga, Daima Associates –Tanzania
Uganda	Jacob Opolot, Augustine Wandera and Yusuf Atiku Abdalla, Research Department, Bank of Uganda

Several persons contributed to the review of the country reports in two meetings with country team leaders held in Rome. These included: Roger Norton (International Consultant, Panama), Anna Strutt (University of Waikato, New Zealand), Richard Pearce (Imperial College London), Julio Paz Cafferata (International Consultant, Peru), Jamie Morrison (Imperial College London), Jean-Louis Arcand (Université d'Auvergne, France), Alexander Sarris (Director, Commodities and Trade Division, FAO) and Ramesh Sharma (Senior Economist, Commodities and Trade Division, FAO).

Many other persons helped to bring the project to a successful conclusion. These included the FAO Representatives in each of the countries covered in the studies, the coordinator of the country teams, Julio Paz Cafferata, who handled a voluminous flow of communications between Rome and the country teams, Hansdeep Khaira who provided statistical assistance and the secretaries of ESCP who provided administrative support to the project.

This volume was prepared under the direction of Harmon Thomas, Chief of the Economic Policy and Projections Service in the Commodities and Trade Division of FAO until 31 December 2005, who was the project coordinator and editor of this volume. Jamie Morrison, in addition to co-authoring the synthesis chapter, assisted

in reducing the length of the studies for publication. Olwen Gotts, Emily Carroll and Hansdeep Khaira provided invaluable assistance during the editing process and in preparing this volume for printing.

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Abbreviations and acronyms

ACP	Africa, Caribbean, Pacific
ADMARC	Agricultural Development and Marketing Corporation
ADP	Agricultural Development Project
AFC	Agricultural Finance Corporation
AIC	Agricultural Inputs Corporation
AOV	Total agricultural output values
APC	Agricultural Prices Commission
APEC	Asia-Pacific Economic Cooperation
APIP	Agricultural Productivity Improvement Programme
ASAC	Agriculture Sector Adjustment Credit
ASAL	Arid and semi-arid land
AUF	Area Used for farming
BANDESA	National Bank for Agricultural Development
BNDS	National Bank of Development of Senegal
CAFTA	Caribbean Free Trade Area
CAPSiM	China's Agricultural Policy Simulation and Projection Model
CARICOM	Caribbean Common Market/Caribbean Community
CARIFTA	Caribbean Free Trade Area
CBK	Central Bank of Kenya
CCI	Cotton Corporation of India
CDO	Cotton Development Organisation
CEMAC	Economic and Monetary Community for Central Africa
CERP	Multipurpose Role Expansion Centres
CET	Common external tariff
CFA	Communauté Financière Africaine
CIDR	Cereal import dependency ratio
CIP	Central Issue Prices
CMB	Uganda Coffee Marketing Board
CNCA	National Agricultural Credit Fund
CNSB	China's Statistical Yearbook
COFCO	China National Cereals, Oils and Foodstuffs Import & Export Corporation
COMESA	Common Market for Eastern and Southern Africa
COPI	Cereals output price index
CPI	Consumer price index
CRAD	Regional Development Assistance Centres
CSPR	Cereal self provision ratio

DP	Direction de la Prévision
EAC	East Africa Community
EBA	European Union Everything but Arms agreement
ECA	State Marketing Agency
ECASA	Enterprise for Rice Marketing
EDDRP	Entrepreneurship Development and Drought Recovery Programme
EDF	European Development Fund
ENCI	National Enterprise for Input Marketing
ENNVM	Enquête Niveau de Vie au Maroc
ERP I	Economic Recovery Program
ERP II	Economic-Social Action Program
ESAF	Extended Structural Adjustment Facility
ESAP	Economic-Social Action Program
EU	European Union
FCI	Food Corporation of India
FDA	Agricultural Development Fund
FDI	Foreign direct investment
FMD	Foot and mouth disease
FONADER	National Fund for Rural Development
FONCODES	National Fund for Compensation and Social Development
FONDEAGROS	Regional financial institutions
FPDD	Fertilizer Procurement and Distribution Department
FPI	Food production index
FRDP	Fiscal Restructuring and Deregulation Programme
GAHEF	Guyana Agency for Health Sciences Education, Environment and Food
GAIBANK	Guyana Agricultural and Industrial Development Bank
GAPEX	General Agricultural Products Export Company
GCC	Ghana Cotton Company
GCDB	Ghana Cotton Development Board
GDP	Gross domestic product
GMC	Guyana Marketing Corporation
GMP	Official guaranteed minimum price
GNI	Gross national income
GNPA	Ghana National Procurement Agency
GRB	Guyana Rice Board
GRDB	Guyana Rice Development Board
GRPA	Guyana Rice Producers Association
GUYSUCO	Guyana Sugar Corporation
HCDA	Horticultural Crops Development Authority
HIPC	Heavily Indebted Poor Countries

HRS	Household responsibility system
IANSA	State-owned sugar manufacturing monopoly
INDECA	National Agricultural Marketing Institute
IPED	Institute of Private Enterprise Development Limited
IRAD	Research Institute for Agricultural Development
ITPAC	Industry and Trade Policy Adjustment Credit
KCC	Kenya Co-operative Creameries
KDB	Kenya Dairy Board
KTDA	Kenya Tea Development Agency
LCU	Local currency unit
LDC	Least developed country
LIDCO	Livestock Development Company
LMB	Lint Marketing Board
MASAF	Malawi Social Action Fund
MFN	Most Favoured Nation
MIDEVIV	Food Crop Development Authority
MINEFI	Ministère de l'Économie et des Finances
MINTP	Ministry of Public Works
MOFA	Ministry of Food and Agriculture
MOFTEC	Ministry of Foreign Trade and Economic Cooperation
MPRSP	Malawi Poverty Reduction Strategy Paper
MRFC	Malawi Rural Finance Company
MSP	Minimum support prices
MTADP	Medium term agricultural development programme
NAFED	National Agriculture Cooperative Marketing Federation of India
NAPB	National Agricultural Products Board
NARP	National Agricultural research programme
NASFAM	National Association of Smallholder Farmers of Malawi
NCPB	National Cereals and Produce Board
NESP	National Economic Survival Program
NFRA	National Food Reserve Agency
NGO	Non-governmental organization
NIB	National Irrigation Board
NPF	National Programme on Fertilizers
NPMB	National Produce Marketing Board
NPR	Nominal protection rate
NRP	Nominal rate of protection
NSDP	Net State Domestic Product
NTB	Non-tariff barrier
OCA	Agricultural Marketing Office
OCE	Marketing and Export Office

OCTs	Overseas countries and territories
ODEPA	Oficina de Estudios y Políticas Agrarias
OGL	Open general licence
ONCAD	National Office of Cooperation and Assistance for Development
ORIT	Wheat Imports Regulation Office
ORMVAT	Office Régional de Mise en Valeur Agricole
PAGI	Large scale irrigation improvement schemes
PAMLT	Medium and Long Term Economic and Financial Adjustment Programme
PAMTSA	Medium Term Adjustment Programme for the Agriculture Sector
PASA	Structural Adjustment Programme for the agricultural sector
PASIS	Assistance Pension
PDS	Public Distribution System
PISA	Agriculture investment schemes
PMB	Produce Marketing Board
PNAC	Health Control and National Feeding Programme
PREF	Economic and Financial Recovery Plan
PRONAA	National Food Programme
PRONAMACHS	National Project for Basin Management and Soil Conservation
PRSA	Regional Programme for Food Security
PSE	Producer Support Equivalent
QR	Quantitative Restriction
RBDA	River Basin Development Authorities
RFHH	Rural Farm Household
RFRP	Regional Fiscal Reform Program
SACA	Smallholder Agricultural Credit Administration
SADC	Southern African Development Community
SAL	Structural Adjustment Loan
SAP	Structural Adjustment Programme
SATEC	Technical Assistance and Cooperation Corporation
SDA	Social Dimensions of Adjustment
SFP	School Feeding Programme
SODECAO	Cocoa Development Corporation
SODECOTON	Cotton Development Corporation
SODEVA	Agricultural Development and Extension Society
SOE	State-owned enterprise
SONACOS	Senegalese National Oilseeds Marketing Corporation
SPFS	Special Programme of Food Security

SPIF	Special Programme for the Importation of Fertilizers
SPS	Special Preferential Sugars
SPS	Sanitary and Phytosanitary standards
SSFRP	Sub-Sector Fertilizer Reform Programme
SUF	Family Subsidies
TDL	Tanzania Dairies Limited
UCDA	Uganda Coffee Development Authority
UDEAC	Central African Economic and Customs Union
USAID	United States Agency for International Development
VAM	Minimum Customs Value
WAEMU	West African Economic and Monetary Union
WPI	Wages price index
WTO	World Trade Organization

Part 1

Trade-related reforms and food security: a synthesis of case study findings

Harmon Thomas and Jamie Morrison[1]

[1] Harmon Thomas, Chief, Commodity Policy and Projections Service, Commodities and Trade Division, FAO, Jamie Morrison, Economist, Commodities and Trade Division, FAO. The authors would like to thank Roger Norton and Anna Strutt for inputs and Tim Josling and Gérard Viatte for their extensive comments on an earlier draft, without implicating them in any remaining shortcoming of this synthesis. The statistical assistance of Hansdeep Khaira is gratefully acknowledged. Annex D was prepared by Suffyan Koroma.

1

Introduction to the study

RATIONALE AND APPROACH

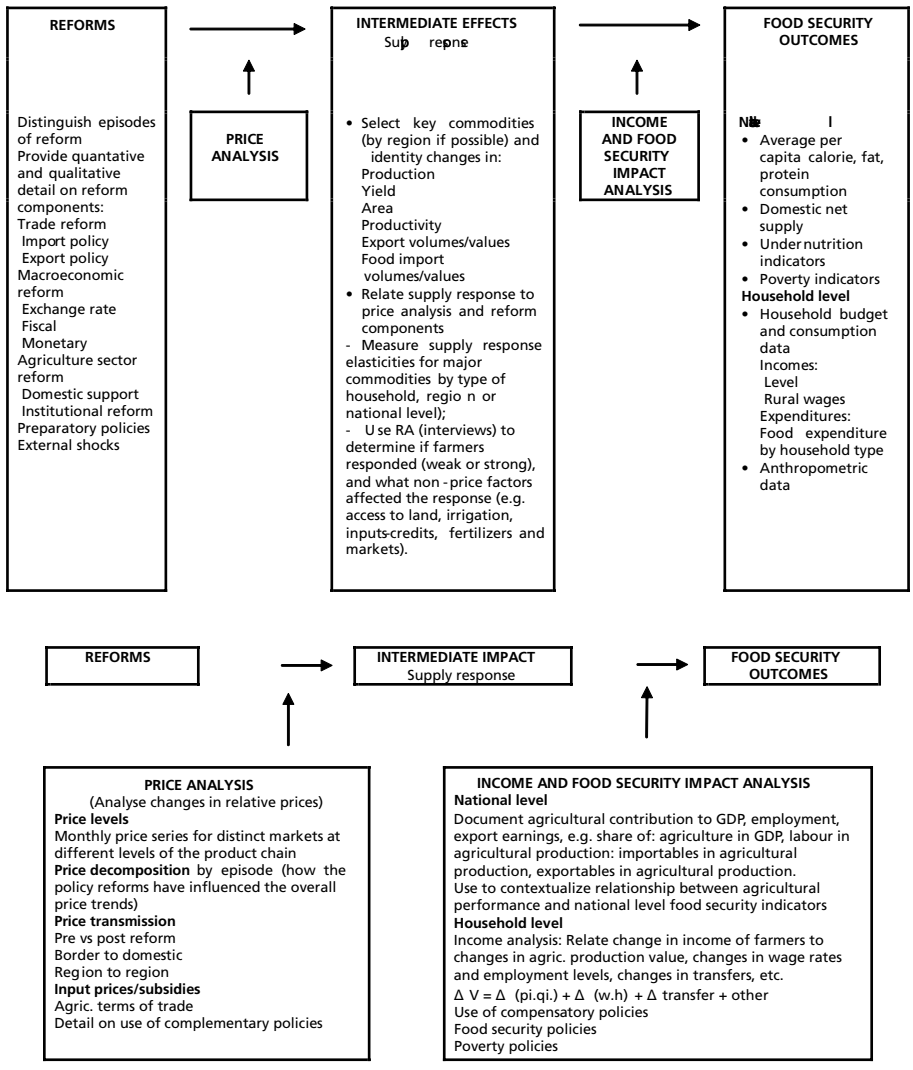
The linkage between trade-related policy reforms and food security is of vital concern to many developing countries. The first part of this volume summarizes the results of a study designed to show how trade and associated economic policy reforms have affected the agriculture sector and food security of farmers in a range of developing countries. It brings together insights from country case studies, each of which analyses the reform process over time and identifies economic changes associated with the reforms as well as other factors that may have contributed to the observed outcomes.

Trade reforms are in most countries an integral part of a package of policy measures implemented to correct perceived imbalances in an economy and/or to achieve specific sectoral objectives. It is therefore necessary to consider both trade and associated economic reforms, particularly those at the macroeconomic level, that have occurred over an extended period of time.

In spite of the prevalence of reform packages in developing countries over the last two decades, relatively little has been done to try to identify the consequences for food security and in particular, the factors that may influence those consequences. Existing reviews of experience point out many uncertainties, even with regard to issues as basic as the effects of policy reforms on economic growth: "while there is fairly convincing cross-country evidence that exports are associated with growth, the evidence that liberalization increases growth is much weaker" (FAO, 2003a, p. 47). The same volume also argues that in Africa "substantial controversy remains over the effects of agricultural market reform" (p. 182). It attributes the mixed nature of the results to the fact that reforms often have been implemented only partially and inconsistently. On the other hand, Kydd (idem, Chapter 8) concludes that poor performance following reform has been the result of inappropriate design. For Latin America, Valdés and Foster link improvements in food security to the presence of programmes targeted on the poor as well as trade reforms, concluding that "trade policy instruments [alone] are now seen as being inadequate to deal with the goal of increasing household income and food security" (FAO 2003a, p. 219). Similarly, for Central and Eastern Europe and the ex-Soviet Union, "trade was only one of several key reforms that affected agricultural performance and food security in transition countries" (p. 229). The present study represents an attempt to provide further empirical evidence on these vital unresolved issues at a country level.

The approach taken is to observe actual performance in fifteen countries that have undergone policy reform in the past few years, and to search for explanatory factors, rather than to project the presumed consequences of reforms through models of economic behaviour. Focusing on the country-specific socio-economic,

FIGURE 1
Policy reforms and food security outcomes: a conceptual framework



Source: Adapted from FAO (2003a), p. 237.

developmental and institutional context of reform highlights the difficulty of drawing simple conclusions from diverse experiences: what works in one country may not work in another. But understanding the range of options and the different ways that countries have tried to implement reforms helps to broaden the debate from overly general policy advice about the benefits of trade reform to more

sophisticated discussion of the importance of appropriately sequenced and paced reforms to minimize the adjustment costs.

The analytical framework for the study is developed in detail in the FAO publication *Trade Reforms and Food Security, Conceptualizing the Linkages* (2003a). Figure 1 identifies the factors responsible for mediating the transmission of international prices to domestic prices, and influencing the extent of agricultural supply response. In addition, this framework identifies other changes that influence household incomes, especially the incomes of poorer groups in the population and their ability to access adequate food.

The policy instruments employed in the reform experiences have been numerous and diverse, especially at the sectoral level. However, they all contribute to shaping a few basic variables, most notably the relative prices of traded goods, and hence create incentives for producers and consumers to respond. The analysis in this study distinguishes between the policy reforms themselves, the intermediate indicators of the impact of reforms (e.g. changes in patterns of production and trade) and the target indicators of interest (in this case, food security indicators) and focuses on the linkages between them.

The linkage through the price effects (Figure 1, column 2) of policy reforms and changing external conditions (column 1) to intermediate indicators (column 3) is fundamental. Prices provide signals and incentives for production, consumption and investment. However, these relative prices also determine real incomes and purchasing power, and are therefore central to determining food security. Even if no agriculture supply response occurs after a relative price change, a redistribution of purchasing power will take place, among both producers and consumers.

Policy variables affecting the domestic price of a commodity and its transmission to domestic producers are multi-faceted and include instruments such as tariffs, exchange rates and subsidies. In the case studies, price changes are analysed to identify their determinants. Accompanying this analysis is a review of the nature of domestic markets and institutional factors that influence price changes and supply responses. Much of the analysis is carried out at the level of commodities, differentiating between export commodities and those produced for the domestic market. The effects of policy changes on prices, output levels, exports and imports, and other intermediate variables are examined. Different institutional factors and resource constraints mean that the linkage between prices and behaviour is generally country-specific.

The consequences of reform for food security are analysed both in the aggregate and at the household level. Changes in agricultural performance (column 3) are related to food security indicators (column 5) in an analysis of changes in household incomes, consumption expenditures and quantities consumed. The extent to which the two are related is determined in large part by the role that the agriculture sector plays in the economy and in household livelihood mechanisms (column 4). The analysis of this part of the relationship was especially problematic given the scarcity of data at appropriate points in time, pre- and post-reform. Nevertheless, many of the key variables related to food security have been identified and their changes over time explained with respect to qualitative information.

In spite of methodological and data difficulties, the advantage of the approach used in this study is that it draws upon local expertise in the countries concerned – the knowledge of analysts, operators and policy-makers who lived through these

events – and it utilizes diverse sources of information that could not be used if the methodology required complete time series for all variables. The richness of the insights obtained, particularly in highlighting reasons for responses that have been counter to *a priori* expectations or which demonstrate differential responses by different sets of producers in different environments, compensates for some of the limitations of the study.

The remainder of this chapter outlines the key parameters characterizing the selected countries. Chapter 2 discusses the motivations for, and the types of, reform implemented in these countries. Chapter 3 examines evidence of the impact of reform on intermediate variables in order to draw out possible reasons for the different responses between countries. Chapter 4 uses the case study evidence to examine the relationship between changing agriculture sector performance and national level and household level food security indicators. Finally, Chapter 5 draws policy implications from the findings, and concludes by suggesting areas for future research.

It is hoped this will stimulate discussion and further work on the linkages between reform and food security. The aim is to help forge a clearer understanding of not simply what happened during the periods of reform, but why it happened and how future policy reforms may be designed in a way that they will make a stronger contribution to enhancing agricultural performance and hence food security in developing nations.

COUNTRY SAMPLE AND PROFILES

The 15 countries selected are representative of different regions of the world and different stages of development, with the main concentration on low-income countries that are likely to be at greater risk of food insecurity (Table 1). They range from developing countries with large economies (e.g. China and India) to those that are amongst the smallest (e.g. Guyana). Eleven of the countries remain at a per capita income of less than $1 000/year, many significantly so (e.g. Malawi). Over the period of reforms, per capita GDP has fallen in seven of the countries (all African) and increased in the remaining countries, particularly so in the selected Asian and Latin American countries.

The agricultural share of GDP in these countries ranges from under 10 percent (Chile, Peru) to over 40 percent (Cameroon, Tanzania). Whereas this share would be expected to decrease as an economy develops, it has increased in five of the selected countries. In some, this has been the result of relatively high agricultural growth rates and relatively weak growth in other sectors; while in others, growth in all sectors has been disappointing. Sometimes agriculture has grown rapidly (Chile in the 1980s, Malawi and Guyana in the 1990s); at others, it has cushioned an otherwise declining economy (Nigeria, Guyana and Peru in the 1980s; Cameroon in the 1990s). The sample also shows that sustained rapid growth in agriculture is possible, if not typical. Of the 30 observations (two time periods and fifteen countries), in six cases agriculture grew by more than 4.5 percent per annum, and in six more it grew by at least 3.5 percent.

Table 2 indicates that in all the selected countries there has been a decline in the share of the labour force employed in the agriculture sector. However, only in Chile and Guyana has it fallen below 20 percent and in six other countries it remains at

TABLE 1
Key development indicators in the selected case study countries, 1980-2001

	GDP (billion US$)			GNI per capita (US$)			Agriculture, value added (as percent of GDP)			Real GDP growth (average annual percent)		Growth in agriculture, real value added	
	1980	1990	2001	1980	1990	2001	1980	1990	2001	1980-90	1990-2002	1980-90	1990-2002
Africa													
Cameroon	6.7	11.2	8.6	620	950	570	31	25	43	3.3	1.9	2.4	4.9
Ghana	4.4	5.9	5.3	420	380	290	58	45	35	2.2	4.3	0.3	3.4
Kenya	7.3	8.6	11.2	440	380	350	33	29	19	4.1	1.6	3.7	0.7
Malawi	1.2	1.9	1.7	190	200	160	44	45	36	2.2	2.6	1.4	5.4
Nigeria	64.2	28.5	42.7	780	270	300	21	33	35	1.1	2.4	1.9	3.5
Senegal	3	5.7	4.6	530	720	490	19	20	20	3.1	3.4	2.8	0.3
Tanzania	-	4.3	9.3	-	190	270	-	46	45	-	3.5	-	3.5
Uganda	1.2	4.3	5.6	-	320	250	72	57	37	-	6.6	-	3.9
Morocco	18.8	25.8	33.9	970	1 030	1 190	18	18	16	3.9	2.7	3.8	0.4
Asia													
China	188.2	354.6	1175.7	220	320	900	30	27	16	9.3	9.7	6.2	3.7
India	181.2	316.9	478.5	270	390	460	39	31	25	5.8	5.4	3.4	2.2
Latin America													
Chile	27.6	30.3	66.5	2 250	2 190	4 600	7	9	9	3.8	5.8	5.6	2.4
Guatemala	7.6	7.7	21	1 220	970	1 700	25	26	23	0.9	3.8	1.3	2.6
Guyana	0.6	0.4	0.7	780	380	860	23	38	30	-3.4	4.3	-1.3	5.2
Peru	20.7	26.3	53.6	1 050	780	1 970	10	9	8	-0.8	3.7	2.3	4.7

Source: World Bank, 2003 and 2004.

TABLE 2
The role of agriculture in employment and trade, 1980-2001

	Agricultural employment as percentage of total employment			Share of agricultural exports in total merchandise exports		
	1980	1990	2001	1980	1990	2001
Africa						
Sub-Saharan Africa						
Cameroon	73	70	58	52	28	24
Ghana	61	59	57	65	46	20
Kenya	82	80	75	50	63	56
Malawi	87	87	83	88	90	93
Nigeria	54	43	32	2	2	2
Senegal	81	77	73	24	29	13
Tanzania	86	84	80	71	69	53
Uganda	87	85	80	100	91	31
North Africa						
Morocco	56	45	35	25	15	10
Asia						
China	74	72	66	12	8	3
India	70	64	59	30	17	12
Latin America						
Chile	21	19	15	9	14	18
Guatemala	54	52	45	70	69	52
Guyana	27	22	17	43	39	30
Peru	40	36	30	8	9	9

Source: FAOSTAT, (FAO, 2004).

TABLE 3
Poverty incidence in the selected countries

	Survey year [a]	International poverty line (percent)		Prevalence of under nutrition (percent of population)	
		Pop. below $1 a day	Pop. below $2 a day	1990-92	1999-2001
Africa					
Sub-Saharan Africa					
Cameroon	1996	33	64	33	27
Ghana	1999	45	79	35	12
Kenya	1997	23	59	44	37
Malawi	1997-98	42	76	49	33
Nigeria	1997	70	91	13	8
Senegal	1995	26	68	23	24
Tanzania	1993	20	60	35	43
Uganda	1996	3	46	23	19
North Africa					
Morocco	1999	<2	14	6	7
Asia					
China	2000	16	47	17	11
India	1999-2000	35	80	25	21
Latin America					
Chile	1998	<2	9	8	4
Guatemala	2000	16	37	16	25
Guyana	1998	<2	6	21	14
Peru	1996	16	41	40	11

[a] Reference year varies between countries.
Source: World Development Indicators CD-ROM 2003, World Bank; FAO, 2003b (SOFI, 2003).

two thirds or more. In all cases the share of employment in agriculture exceeds its contribution to GDP.

Table 2 also indicates the significant variation among countries in both the agricultural export shares, ranging from 2 to 3 percent in Nigeria and China to 93 percent in Malawi; and in the rates at which the share has changed. In Malawi, Chile and Peru the share has increased, but in most other countries, the share has decreased rapidly.

Other indicators describing the countries studied are shown in Table 3. The share of the rural population in total population varies from 14 percent (Chile) to 85 percent (Malawi and Uganda). Poverty levels remain high in many of the sample countries, and poverty is more widespread in rural than urban areas in all countries.

The level of undernourishment in Kenya, Malawi and Tanzania, all at greater than 33 percent, is significant. At the other end of the spectrum, Nigeria, Morocco and Chile all record prevalence rates of less than 10 percent. At an aggregate level, the incidence of food insecurity, using the proportion of the population undernourished as an indicator, appears to have fallen in all but four of the selected countries (see Table 19). However, the four countries where the proportion of undernourishment has risen during the 1990s include Senegal and Tanzania, which have amongst the lowest levels of population living on less than $1/day among the sample countries. One of the questions for this study is whether this lower poverty rate has a bearing on the relationship between policy reforms and improved food security. To address this question the investigation in Chapter 4 focuses on the household, as opposed to national, level food security.

2

Policy reforms in the case study countries

COMPONENTS OF REFORM

Economic reforms in the countries studied tended to concentrate on restoring fiscal health, liberalizing the foreign exchange and trade regimes, and reducing what were perceived to be unproductive state interventions in the economy (Table 4). Emphasis was placed on reducing direct government controls over prices, production and marketing. Usually the reforms were supported and encouraged by international lending operations of the Bretton Woods institutions, through advice and policy conditionality. In the case of Malawi, for example, policy reforms have been supported by eight structural adjustment loans (five of them sectoral) from these institutions.

Sectoral reforms accompanied these economy-wide measures. In most cases, macroeconomic reforms were initiated before sectoral and institutional reforms, although notable exceptions are the West African countries of Cameroon and Senegal where the significant macroeconomic reforms came later, and Ghana and Malawi where reforms occurred simultaneously.

Macroeconomic and trade instruments of policy reform

The major instruments of reform identified in the case studies have been the following:

1) exchange rate regime liberalization;
2) foreign exchange liberalization: elimination of restrictions on foreign exchange earnings;
3) tariffication of quantitative restrictions on imports and removal or reduction of import licensing requirements;
4) lowering of tariffs and reduction of their dispersion;
5) reduction or elimination of the use of export prohibitions, licensing requirements and other export restrictions;
6) reductions of export taxes and surcharges;
7) loosening of controls on interest rates and, generally, an increase in real lending rates. Financial sector reform has often been accompanied by a widening of financial intermediation margins;
8) reducing the rate of expansion of the money supply through instruments of monetary policy;
9) increasing the government's revenue base, strengthening tax collection efforts, and raising tax rates, especially tariffs on public services;
10) reducing real government outlays.

TABLE 4
Episodes and components of reform in case study countries

Sample country	Period of change	Fiscal policy	Monetary policy	Exchange rate policy	Agricultural				Institutional change		
					Output price policy	Input price policy	Import policy	Export policy	Marketing boards	Land policy	Credit policy
Africa											
Cameroon	1988 - 1993	x	x	x		x					
	1994 - 2000	xx		xx			x		xx		
Ghana	1983 - 1986	x	x	xx	x cocoa	xx	xx	x	xx		x
	1987 - 1991	xx		xx	x cotton	x		x	x		
	1992 - 2000			xx	x cotton		x	xx			
Kenya	1980 - 1984	xx					x				
	1986 - 1992	x					x				
	1993 - 2000	x		xx	xx	x	xx		xx		x
Malawi	1981 - 1989	x	x	xx	x	x	x	x	xx		
	1990 - 1994		x	xx	x	xx	xx	x	xx		xx
	1995 - 2000		x		xx	x	x	xx	xx	x	
Nigeria	1984 - 1985	x			x		x				
	1986 - 1993	x	x	xx		x	xx	x	x		x
	1994 - 2000			x		x					
Senegal	1979 - 1984					x			xx		x
	1985 - 1993						x		x		
	1994 - 2000	x	x	xx			x	x	x		
Tanzania	1980 - 1985	x	x								
	1986 - 1992			xx		x	xx	x	xx		
	1993 - 2000				x		x		x		
Uganda	1981 - 1984	x		x					x		
	1987 - 1993	x		x		x	x	x	xx		
	1994 - 2002	x	x				x	x		x	
Morocco	1980 - 1985							x			
	1986 - 1991			xx	xx			xx			
	1992 - 2000				xx		xx				
Asia											
China	1978 - 1984	x	x	x	x	x				xx	
	1985 - 1993		x	x	xx				x		
	1994 - 2000			x	x		x	x	x		x
India	1991 - 1995	x	x	xx	x			x	x		
	1996 - 2000			x	x	x	x	x	x		
Latin America											
Chile	1974 - 1983	xx	xx	xx	x	xx	xx	x	x	xx	xx
	1984 - 1989	xx		x	xx		x	xx	x		
	1990 - 2000						x				
Guatemala	1986 - 1990	x	x	xx	x		x				
	1991 - 1995	x	xx					x			
	1996 - 1999		x				x	x	xx	x	x
	2000 - 2000	x	x				x	x			
Guyana	1988 - 1995	x	x	x	x		x		xx		
	1996 - 2000		x					x			
Peru	1990 - 1993	x	x	xx	x		xx		x		x
	1994 - 1997						x				x
	1998 - 2000						xx				

Note: "x" implies a significant policy change and "xx" a more radical policy change.

Of these instruments, the ones that most favour agriculture and agro-industry in the short and medium term are likely to be the liberalization of the exchange rate and export regimes. These measures tend to raise prices to farmers and open export markets to them, or to agro-industries that purchase their harvests. Often, but not always, this has meant a real devaluation at the beginning of a reform process, with a revaluation occurring later in several cases. In Kenya, the real exchange rate appreciated until 1998. In Peru, the new policy stabilized the real exchange rate at a level which resulted in a substantial real appreciation of the currency with respect to its average level in the pre-reform period. Exchange rate reform has sometimes meant moving temporarily from a fixed exchange rate to a dual or multiple rate system, and more commonly from multiple rates to a unified floating rate. However, the case of Peru illustrates the tendency of the multiple exchange rate systems to be highly unfavourable for agriculture. More subtle forms of exchange rate liberalization include reduction or elimination of requirements for making advance deposits in the central bank for the right to draw foreign exchange for imports.

The reduction of import barriers, by contrast, might be expected to have negative effects on agricultural incentives, at least in the short run, but the net effect depends on what happens to industrial protection rates and to tariffs on agricultural inputs as well, i.e. what happens to effective protection for agriculture. India's tariff reforms in the early 1990s improved agriculture's effective protection rates.

The economic argument in favour of import liberalization is that it eventually helps push a country's allocation of economic resources into areas of greater comparative advantage, and out of areas with a comparative disadvantage. In the long run, this strengthens growth prospects. However, the issue concerning these instruments is that low-income producers may not be in a situation to alter their cropping mix in the short term, or even in the long term, and in the meantime their incomes may be reduced. As discussed later in the report broader agricultural and rural growth can be negatively affected by tariff reduction in some situations.

Table 5 shows that over the past decade most countries have seen reductions in the levels of average bound and applied tariffs in agriculture and in the wider economy. Additionally, there have been radical changes in the use of non-tariff barriers, with reductions in the use of quantitative restrictions and in import and export licensing regimes. Figure 2 provides information on changes in the nominal rate of protection (NRP) over time for major agricultural products in the sample countries. In most cases the NRP for key exportables and importables has declined over time.

In terms of openness to trade, the agricultural sectors of the four countries of Latin America appear to be more linked into the world economy than those of many African countries and of the Asian countries. Although the latter appear to be the most inward-looking, the two Asian countries selected are the world's largest in population and hence have large domestic markets, and thus lower levels of international trade in relation to the size of the economy.

From the viewpoint of food security, an advantage of import liberalization is that it tends to make food products less expensive. This advantage has to be weighed against its tendency to reduce farm incomes, as in rural areas food security also depends on income levels of poor households who depend on the sale of farm products. Which of the two effects predominates is an empirical question and, as shown below, the outcome varies between countries.

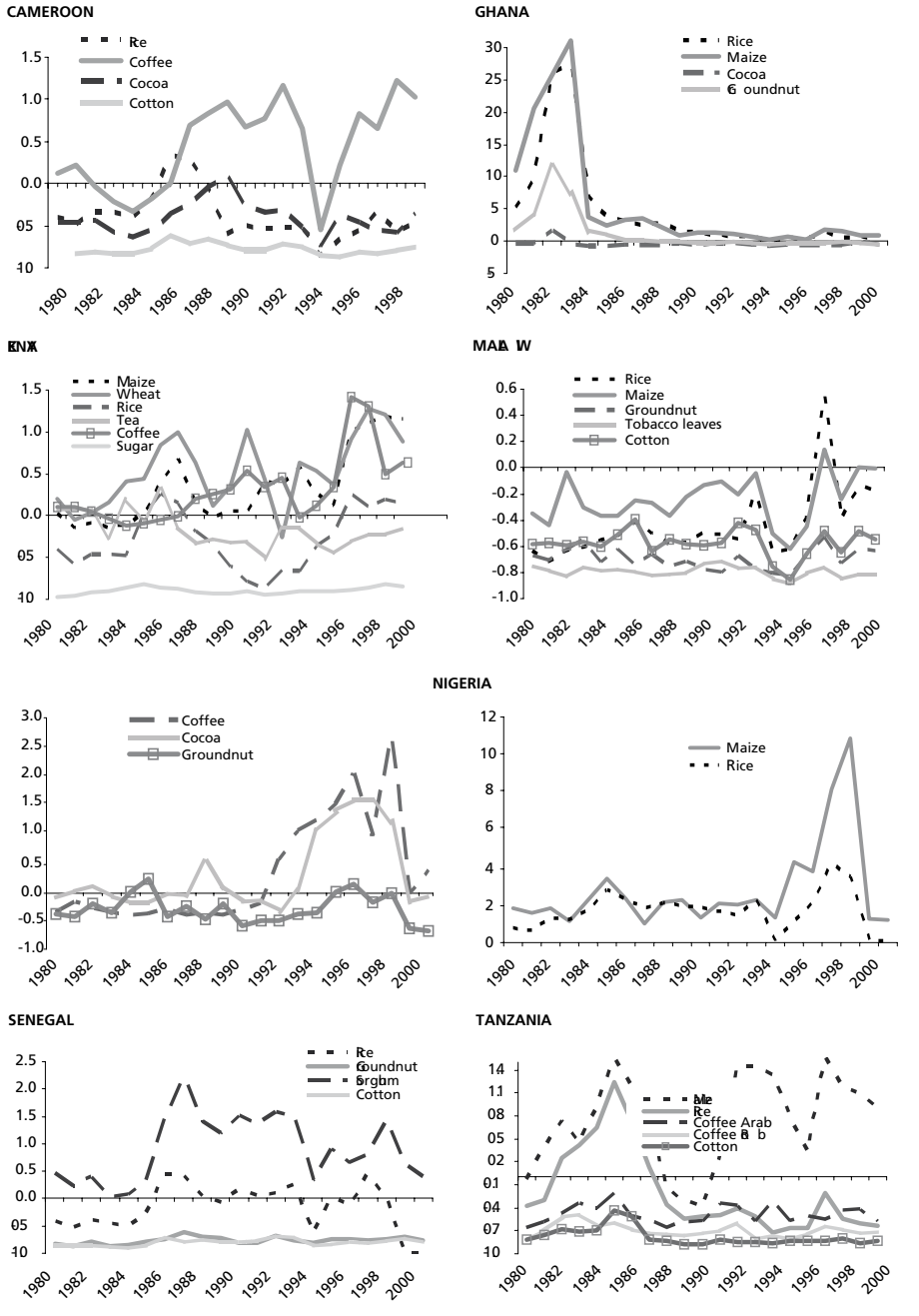
TABLE 5
Applied and WTO bound average MFN tariffs by year of application

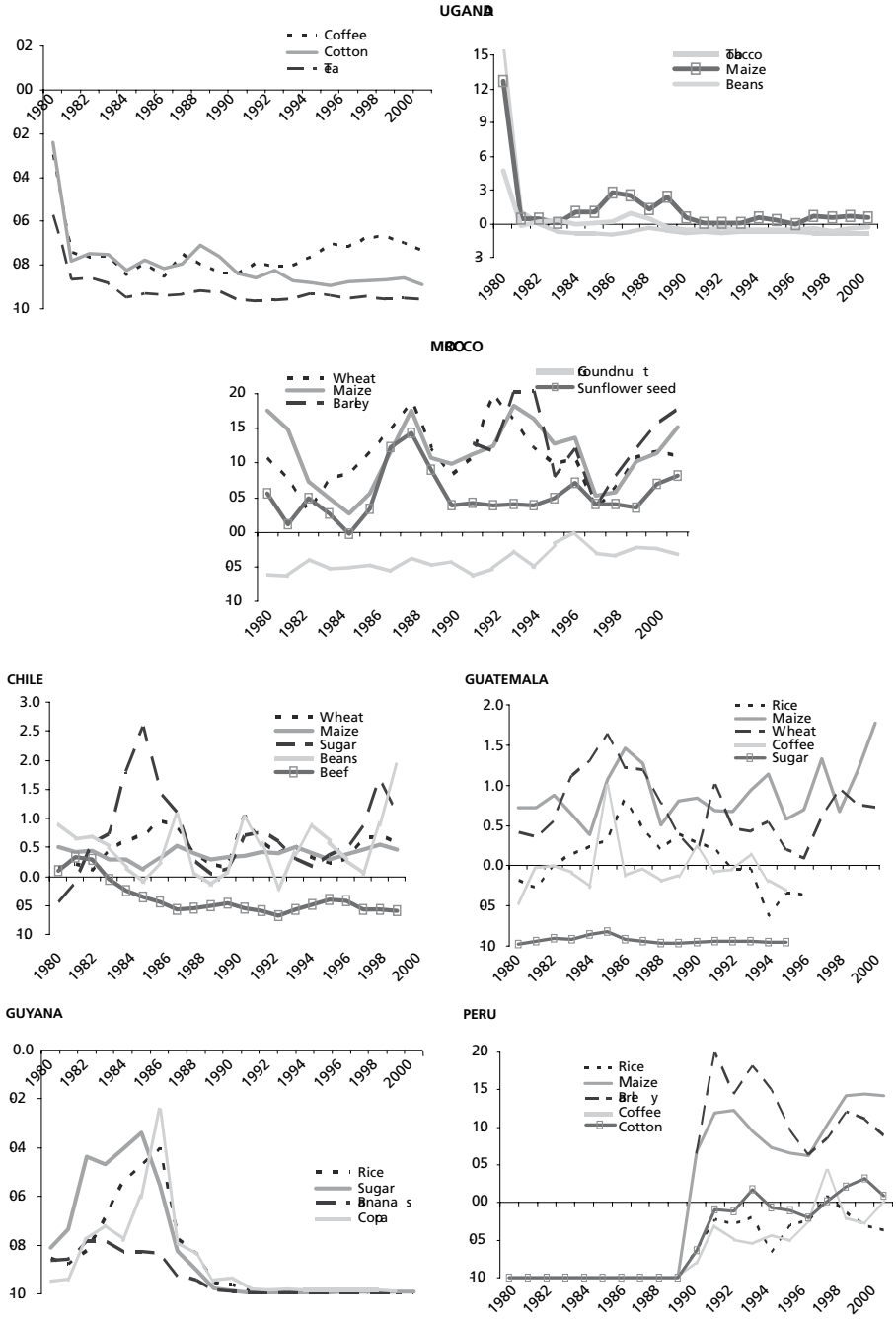
	Applied MFN tariffs (percent)			Bound MFN tariffs (percent)		
	Year	Agricultural products	All products	Year	Agricultural products	All products
Africa						
Cameroon	1994	24	19			
	2002	24	18	1998	80	-
Ghana	1993	20	15	1995	97	92
	2000	20	15			
Kenya	1994	43	35	1996	97	96
	2001	23	19			
Malawi	1994	31	31	1996	111	76
	2001	16	13			
Nigeria	1988	37	34			
	2002	53	30	1995	150	119
Senegal	2001	15	12	1996	30	30
Tanzania	1993	28	20	1995	120	120
	2003	20	14			
Uganda	1994	25	17	1996	77	73
	2003	13	9			
Morocco	1993	29	25	1997	66	43
	2003	52	33			
Asia						
China	1992	46	43			
	2001	19	16	2001	14	10
India	1990	66	66			
	2001	42	32	1996	115	49
Latin America						
Chile	1992	11	11			
	2002	7	7	1999	26	25
Guatemala	1995	14	10			
	2002	11	7	1999	51	38
Guyana	1996	23	12	1998	93	58
	2003	23	12			
Peru	1993	18	18			
	2000	17	14	1998	31	30

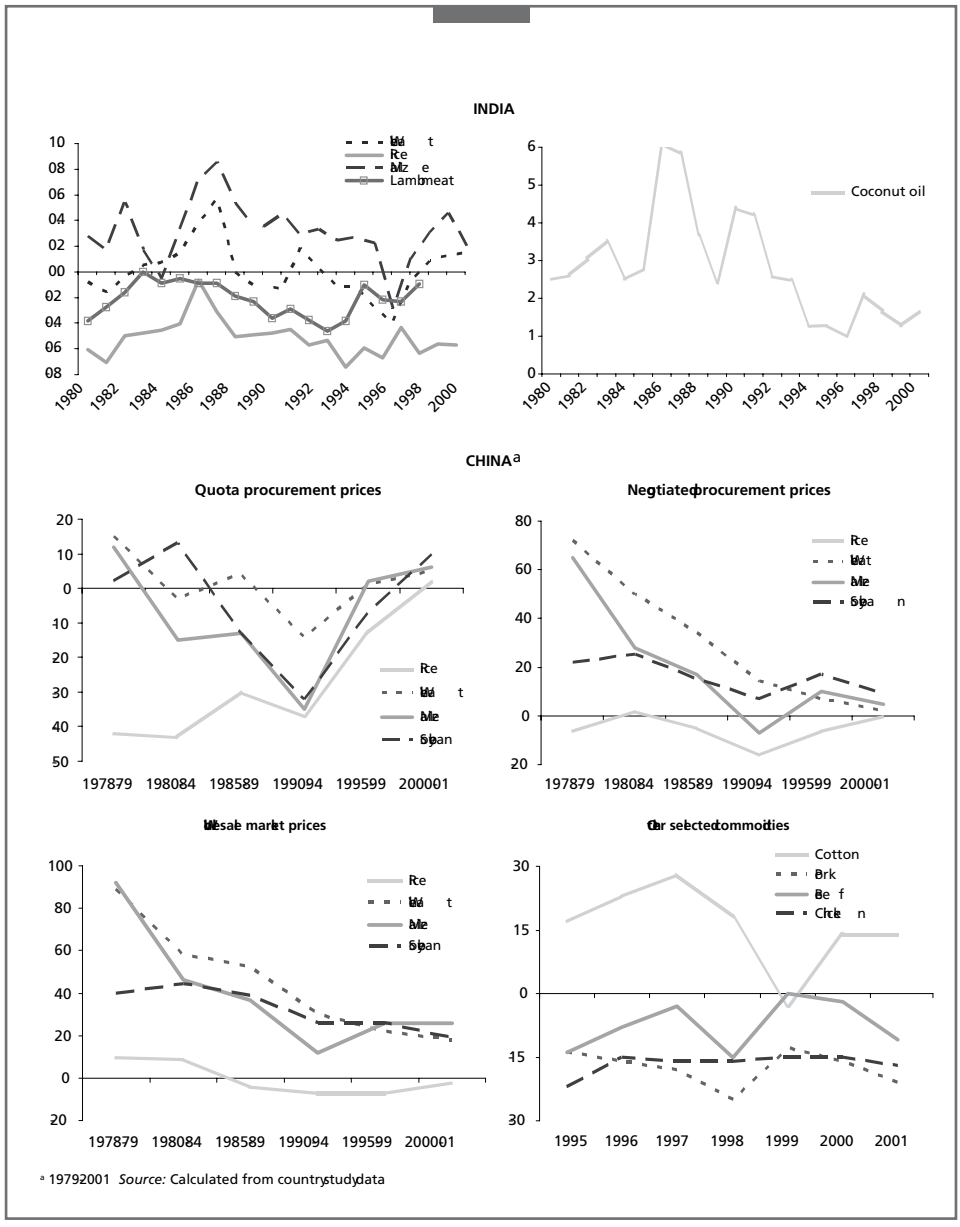
Source: WITS, 2003.

Policies aimed at strengthening a country's financial sector can result in restricting credit to agriculture. In spite of widespread emphasis on building microfinance institutions, reform of financial institutions has often left agriculture with substantially less access to credit than before. In the case of Uganda, financial sector reforms have led to a reduction of the flow of credit to the agricultural sector. In Peru, the estimated number of small farmers (less than 10 ha) served by the formal financial system has been reduced dramatically from 184 920 in 1989 to 21 457 in 2000. However, it should be noted that in Nigeria mandatory credit allocations to agriculture were increased in the 1980s and early 1990s, grace periods for repayment were lengthened, and other measures were implemented to increase the flow of credit to the sector. In Senegal agricultural interest rates were reduced substantially for the crop year 1997/98.

FIGURE 2
Nominal rate of protection, 1980-2000




UGANDA
Coffee
Cotton
Tea
Tobacco
Maize
Beans
MOROCCO
Wheat
Maize
Barley
Groundnut
Sunflower seed
CHILE
Wheat
Maize
Sugar
Beans
Beef
GUATEMALA
Rice
Maize
Wheat
Coffee
Sugar
GUYANA
Rice
Sugar
Bananas
Copra
PERU
Rice
Maize
Barley
Coffee
Cotton



[a] 19792001 *Source:* Calculated from country study data

Fiscal reforms often imply greater tax and fee payments for producers and this can mean less funding for infrastructure investments, agricultural research and extension, and other public sector activities in agriculture. Hence the short-run effects of such reforms are often negative for the sector. A typical experience was that of Tanzania where the budget savings associated with the elimination of input subsidies and loss-making government commercial activities have not been redirected to vital public support for the agricultural sector.

In part, the net effect of economic policy reforms on rural incomes and food security depends on which instruments have the strongest effects, and how soon their consequences are felt. The impact also depends on how the sector responds to changes in agricultural and other policies as well as on exogenous factors outside the control of governments.

Sectoral instruments of policy reform

The key agricultural sector policy and institutional reforms in the countries studied include the following:

1) elimination of state monopolies on agricultural marketing in specified inputs and outputs. Sometimes the monopoly had controlled both internal and external trade, and in other cases either one or the other only.
2) elimination of price controls on foods. Interpretation of the effects of reforms is complicated by the fact that pricing reforms were sometimes ambiguous. For example, in Kenya price controls on sugar, maize and wheat were replaced with a set of floor prices and variable import levies designed to enforce the floor prices.
3) elimination of pan-territorial pricing and support prices for farmers;
4) elimination of subsidies on agricultural inputs;
5) privatization or closure of state agricultural banks, or reduction of their lending activities (along with elimination of credit subsidies and restructuring of loan portfolios);
6) privatization or closure of state-owned agroprocessing and storage facilities and of state agricultural marketing boards and trading companies.

MOTIVATION FOR REFORMS

One significant motivation for economic policy reform was the slowdown of growth in the 1980s accompanied by growing debt and the poor performance of traditional export markets. Many of the countries in the study had experienced periods of relatively rapid economic growth in the 1960s and 1970s, but economic deterioration had emphasized the need for policy reforms in more recent decades. Cameroon's economy grew at 7 percent per annum between 1970 and 1987 before subsequently declining. The Tanzanian economy grew at an annual rate of 6 percent in the 1960s, as did Uganda's, whose balance of payments was also in surplus, but where national income declined in the 1970s. Malawi, China and Guatemala experienced a long-term annual growth rate of 5 percent or more between 1960 and 1982. Kenya's growth rate was in excess of 5.5 percent during that period but then dropped markedly.

Some countries studied did not however experience any period of rapid growth, and for the most part suffered declines in per capita real income throughout the 1960s, 1970s and 1980s (e.g. Ghana, Senegal, Guyana). In the case of India and Peru, per capita income levels did not actually decline but neither was growth very rapid. Sometimes the most evident cause of economic decline was internal conflict (e.g. Uganda in the 1970s, Guatemala in the 1980s). More often, the proximate causes of crises were macroeconomic imbalances that became a drag on the economy (e.g. Kenya, India, Peru), unsustainable exchange rates (Nigeria), and the gradual but definite undermining of economic efficiency as a result of interventionist policies.

For many countries, the early post-independence burst of growth proved difficult to maintain.

In some cases the reforms were precipitated by a specific crisis in the economy, often signalled by a spike in inflation, shortages of foreign exchange and imported goods, declines in export commodity prices, a worsening of unemployment and underemployment, or a combination of these occurrences. In other cases cumulative concern over continuation of poor economic performance made reform seem inescapable. External payments crises, in the sense of explicit inability to service foreign currency obligations, did not characterize this group of countries, although sometimes instruments of foreign exchange rationing were employed in the pre-reform period. India had to pledge its gold reserves to assure payment of foreign obligations during the economic crisis of 1991, and in Nigeria a sudden and sharp decline in petroleum export revenues was the main cause of the crisis that began in 1981. These two events each precipitated economic reforms.

THE PACE AND SEQUENCING OF REFORMS

The process of reform has often taken place over a long period, in some cases more than twenty years. Nevertheless, it is possible to identify periods when reform intensified. Table 4 indicates the significant policy change during the periods of reform identified for each country in terms of macroeconomic and sectoral policy and institutional reforms.

The sequence of reforms generally began with macroeconomic measures (especially exchange rate and trade liberalization as well as fiscal reforms) and then moved to sectoral measures, although sometimes both kinds of reform were included in a single package. The reform process is still underway in most of the countries in this sample. In some cases, components of reform common in other countries have not been undertaken. In China, for example, grain trading is still controlled by state enterprises and export subsidies are still significant – as high as 34 percent for maize in 2001. For India, domestic trade is still regulated by various provisions that restrict the movement of goods among states.

Most of the policy reforms in this sample of countries have taken place over extended periods of time, and periods of inconsistencies and policy reversals were not uncommon. Stability of import tariff regimes, which is important for providing clear, stable expectations to producers and investors, has often been an elusive goal.

Another common problem in agriculture has been the liberalization of input prices before output prices. In Malawi, the removal of subsidies on inputs came in advance of increases in maize producer price. Agricultural produce price controls were still in place until 1995 while subsidies on fertilizers were completely removed in 1990. This sequence of reforms squeezed producer incomes and often resulted in declines in the use of purchased inputs.

1) *Ghana*: the initial emphasis of the reform was on stabilization. The World Bank pushed for liberalization of the cocoa sector, but the Government had concerns about the weakness of the financial system and the poor state of road infrastructure in most of the cocoa growing areas. A compromise was reached, with partial reform of the sector in the early phases of the economy's

transformation. A gradualist approach was also followed with respect to changes in the formula for pricing cotton.

2) *Malawi:* the Government has tended to be hesitant in implementing policy, at times leading to policy reversals. Such actions created uncertainties about the direction of reforms and the degree of government commitment to the process, thus creating an unfavourable environment for private sector-led development and growth. The case of Malawi demonstrates the importance of implementing an appropriate sequence of market reforms. For example, agricultural price controls were left in place, while input subsidies were removed and a large currency devaluation implemented that put fertilizer prices out of reach of most smallholder farmers. Controls on the marketing system were lifted in 1987, but price controls along with import and export licensing requirements were still in place in the first half of the 1990s. This resulted in limited price incentives for the private sector to engage in agricultural trade.
3) *Nigeria:* the policy environment has also been unstable, with policy reversals and a lack of internal consistency generating confusing signals. For example, the sudden decision to disengage the state from the Commodity Boards and encourage the private sector meant that farmers were exposed to sharp fluctuations in world commodity prices and exchange rate risk without any compensating policies. Also, without quality control services provided by the Commodity Boards, there was some deterioration in produce quality that adversely affected export sales, particularly in the case of cocoa. Fertilizer subsidies were reduced in the 1980s but then reintroduced in 1997 (but without achieving the goal of reducing fertilizer prices for most farmers). In 1980, import duties were reduced significantly for agricultural inputs at the same time that several food products were placed under import licence. In 1984, duties on selected agricultural imports were raised while duties on wheat and tea were reduced. Two years later, the importation of vegetable oil was banned; this was followed in 1989 by the banning of imports of poultry products, fruit and vegetables, rice and rice products, as well as wheat and wheat products. The inconsistency was also marked at the macro level, where the country's progressive abandonment of its reform programmes accelerated in 1993, in the restoration of the fixed exchange rate system. It was completed in 1994 with further foreign exchange and financial market controls as well as the forfeiture of fiscal discipline.
4) *Uganda:* the reforms were initiated in 1980-84 but confusion on macro-policies and reversals of exchange rate reforms occurred between 1984 and 1987. From 1981 to 1984 there was a managed float of the exchange rate and an attempt to unify it, but during the period 1984-1987 a fixed exchange rate was re-instituted. Then from 1987 to 1993 the exchange rate was devalued in real terms and unified. The period 1994 to 2002 was characterized as the unified exchange rate regime. The real exchange rate fluctuated around a stable trend and then depreciated again in 1999 and 2000.
5) *China:* after increasing food prices in 1994, the Government re-imposed a production quota system in 1995, under which farmers were required to sell part of their harvests to the Government. More drastically, it initiated in 1998 a controversial policy of prohibiting individuals and private companies

from procuring grain from farmers, but the policy failed because public grain bureaus did not have sufficient financial resources to purchase all the harvests. On the whole, reforms in China have followed a gradual approach that appears to have worked well. In the initial stages, measures providing incentives to rural institutions were implemented. As reform experience was gained, broader reform policies followed.

6) *India:* customs duties on agricultural commodities have varied considerably in the last decade, and after the freeing up of cereal imports in 1999, a surge of wheat imports caused the Government to re-institute a variable wheat tariff for the express purpose of regulating volumes of wheat imports.
7) *Chile:* after the severe economic crisis of 1982-83, previous sharp tariff reductions were reversed and tariff levels raised, although subsequently they were put on a downward path.
8) *Guyana:* radical reforms from 1986 to 1995 re-oriented the state-led and inward-looking economy, to a market-driven and deregulated one in a relatively short period. However, the social consequences of a massive compression of national expenditure and the rapid increase in the cost of living caused by currency devaluations were underestimated. More recently, the currency was allowed to appreciate again in real terms, with deleterious consequences for the competitiveness of agriculture, which in Guyana is particularly exposed to international market forces. In several reform experiences real devaluation was a key element of the early stages of the process, but subsequently the exchange rate appreciated in real terms, undermining the initial achievements.

The mid-1980s saw a widespread tendency to institute or increase export taxes, which could be justified on fiscal grounds but which had markedly deleterious effects on producer incomes and the efficiency of resource allocation. However, these taxes were subsequently removed. Examples of countries where export taxes were imposed or increased in this period (with the support of international institutions) include Ghana (1985) and Guatemala (1986).

Another common source of disruption to the reform process was a temporary loss of macroeconomic stability, owing mainly to increases in fiscal imbalances (e.g. Nigeria, Uganda and Guatemala).

3

The impact of reform on agricultural prices, production and trade

METHODOLOGY

Causal relationships between changes in policies and changes in the level and structure of economic activities are complex and often difficult to identify unambiguously. However, prices are recognized as being the key channels of transmission of policy effects because they represent incentives that influence production and investment decisions. In the policy reforms studied here, the principal avenues of causality flow through output and input prices, but both their transmission and the ability of agricultural producers to respond to those incentives are modified by the institutional and policy environment. This environment is characterized by the rules and regulations that shape factors such as the validity of contractual relationships, the functionality of markets, the access to and availability of credit, and access to land.

Food security implications depend on the reaction of producers to these incentive changes. The principal intermediate variables of relevance to the agricultural sector that are affected by trade and economic policy reforms are agricultural product prices, production levels and international trade flows. This chapter discusses their relevance as indicators and explains the methods adopted for examining their relationship with policy change. The evidence from the case studies is then presented and analysed.

It is important to note that for reasons elaborated in Annex A, and in the companion volume *Trade reforms and food security: conceptualising the linkages*, that the studies use a before and after approach rather than a with and without approach. A difficulty in adopting the former is that causal relationships can be inadvertently implied. As far as possible, the synthesis of case study results attempts to avoid such attribution from a simple reading of the evidence presented on trends in key indicators.

Price analysis

To understand the influence of policy reforms on the relative prices faced by producers and consumers, the case studies examined changes in real prices by episode of reform and then investigated the determinants of domestic price change, and the extent of price transmission and of market integration.

Domestic prices are influenced by a number of factors, notably world prices, exchange rates, tariffs, domestic marketing margins and the institutional environment. Price decomposition analysis was used to determine the percentage contribution of these various factors to changes in market prices in order to draw conclusions about the relationship between changes in price incentives and the reform process. The method used and tabulated results are presented in Annex B.

If reform increases the openness of the economy, then one may expect the transmission of changes in international price levels to be more fully reflected in changes to domestic prices . Where feasible, the country studies use price transmission analysis to determine the degree of integration of two or more markets, notably the world and domestic markets, but also spatially separated markets within a country (see Annex D). For example, changes in world market prices would be more strongly reflected in domestic prices following the removal of quantitative controls on trade. Similarly, competitive procurement and free internal trade following the removal of the monopoly rights of marketing boards is often claimed to result in much stronger transmission of price signals across domestic markets.

Production analysis

Production responses to price changes are strongly influenced by relative prices, but also by a range of other factors, including market opportunities, the functionality of these markets, credit availability, and the effectiveness of the agricultural technology system. Thus the production response to policy reform is conditioned in part on policies that influence markets, both domestic and foreign. Different sets of producers will be more or less responsive to identical changes in output prices depending on the policy and institutional environment that they face and upon agro-climatic constraints. Establishing the determinants of such differential supply response is critical in explaining the impact of reforms on income levels and on food security status.

Because in most cases the quantification of supply elasticities was not feasible, insights were gained through other techniques, such as interviews with farmers, key informants and extension workers to reveal whether producers responded to incentives following a policy change, whether the response was weak or strong, and what non-price factors were important for facilitating the response.

In order to identify potential constraints to production response, several studies decomposed production change into area and productivity changes. Data on aggregate commodity production were analysed to determine the proportion of changes in the level of production that can be attributed to changes in the harvested area and the proportion attributed to changes in yield. The reasons for agricultural production growth vary widely across commodities and across countries as a result of the different incentives, opportunities and constraints faced.

Trade responses

International trade flows can be as much a consequence as a cause of other changes in the economy. Imports, for example, respond rapidly to changes in the ratio of domestic to foreign prices, and that relationship in turn is strongly influenced by the real exchange rate, tariffs and movements in international prices. Quantitative restrictions imposed by policy also influence import levels. Increases in import levels can contribute to greater food security, by making food available, but they can also tend to undermine it if they are associated with a decline in a country's real farm prices and a consequent reduction in real rural household incomes.

Exports respond to many of the same price signals that imports do, as well as to export incentive policies or quantitative restrictions on exports. Since increases in exports usually require a domestic supply response they also are affected by the factors that influence production. In addition, product quality control programmes

are increasingly important for the success of exports from developing countries, which need to meet increasingly stringent standards.

While the benefits of higher export levels are clear, export markets can be vulnerable to sharp international price fluctuations. Coffee and sugar are notable examples of this phenomenon. Also, in some cases, concerns are raised about the distribution of the benefits of export expansion: do they tend to remain with a small group of more sophisticated, better-off farmers, or are they widely distributed among smallholders? The answer varies considerably by crop and country. In the cases analysed here, tobacco in Malawi and coffee in Guatemala are mainly smallholder crops, while sugar in Peru has been mostly a plantation crop.

In light of these considerations, the level of import and export activity may be considered to be an intermediate variable in the sense that it is part of the chain of transmission of policy effects to target variables. Their levels are reflections of changes in relative prices, domestic production and some types of trade policies.

Other variables

The level of investment is another intermediate variable that is central to an economy's response to policy reforms. However, time series data on investment in agriculture are not available in most developing countries, so this variable could not be included in the analysis. Where there is partial or anecdotal evidence about the response of investment, it is mentioned in the case studies. Other intermediate variables are important as well. For example, it has been observed that investment in capacity building and skills is critical. Whilst it was beyond the scope of these case studies to investigate all of the relevant variables and policies, the importance of complementary and compensating measures was recognized and clear gaps are identified and discussed later in this chapter.

THE IMPACT OF REFORM ON DOMESTIC PRICES

The impact of world prices

The past twenty years have seen a secular downward trend in the real international market prices of many agricultural commodities, particularly maize, rice, coffee, cocoa, groundnuts and cotton (Figure 3). These declines have, however, been periodically reversed. For example, coffee prices increased in the mid 1990s, as did tobacco prices at the end of the decade. Tea prices have been an exception to the general trend, remaining relatively static in real terms since the early 1980s.

The movement in international prices over the past 20 years is due to many factors. For most tropical commodities such as coffee, cocoa and tea – typically the export agricultural products of most of the sample countries – oversupply in relation to demand at the global level (due to increased productivity and the emergence of major new producers) has been the principal cause of the downward trend in international prices. However, for basic foodstuffs such as cereals, meat, dairy products and edible oils, which are typically import-competing in the sample countries, depressed international prices have been partly due to the high levels of domestic and export subsidies applied by developed countries. Between 1980 and 2002, an estimated US$6.5 trillion of support was provided to the agricultural sector in OECD countries (OECD, 2003). The international agricultural markets most distorted by

FIGURE 3A
Price index for commodity groups

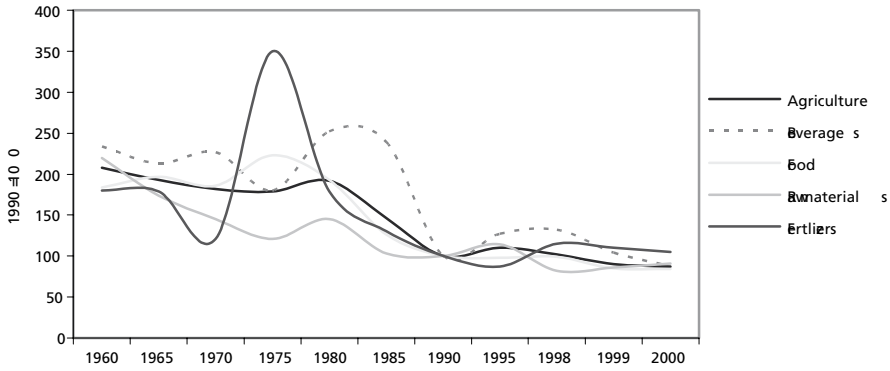


FIGURE 3B
World market prices for selected commodities

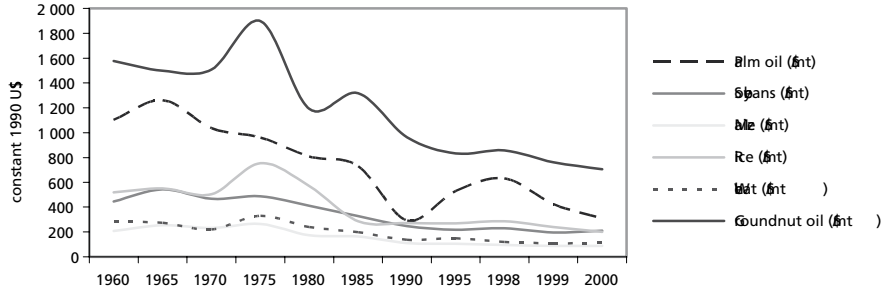
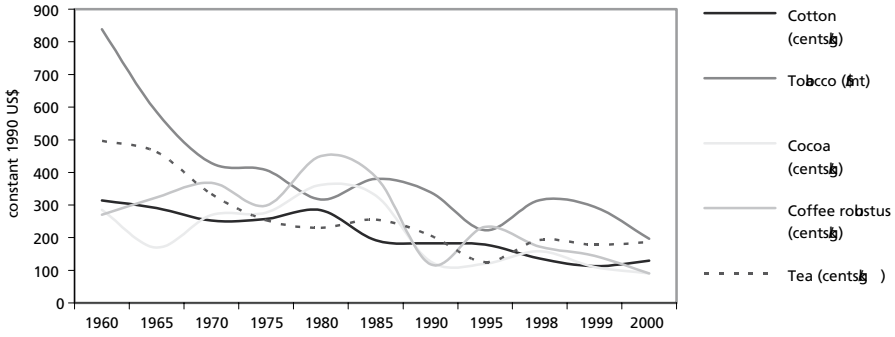


FIGURE 3C
World market prices for selected commodities (continued)



Source: World Development Indicators 2001, World Bank

high levels of support and protection, included cereals (wheat, maize and rice), sugar, dairy products, meats and oilseeds.

In the absence of domestic policy measures aimed at maintaining agricultural prices, the downward trend in international prices of tradable farm products such as grains and tropical beverages would translate to a downward trend in real farm gate prices. This can also apply to semi tradable products like sorghum, millet, cassava and yams, whose prices tend to follow those of grains in the longer run. As depicted in Annex C, domestic prices did not always follow international prices.

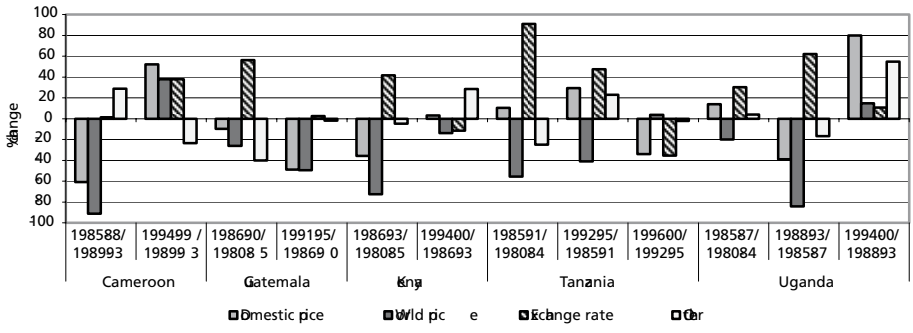
A wide number of possible explanations for these results are suggested in the studies. The periods of rising real prices were generally associated with real exchange rate devaluations. Relaxation of government controls over prices and market systems also led to gains in producer prices in some cases. In other instances, import liberalization appears to have contributed to a decline in the real domestic prices of some commodities.

To help investigate more fully the relationship between the components of policy reform and domestic price levels, the results of the decomposition analysis reported in Annex B are presented graphically for the following selected export and food crops: coffee, cotton, tobacco, maize and rice. Figures 4 to 8 show the relative importance of changes in world prices, exchange rates and other policies in influencing domestic prices. They demonstrate that although facing similar patterns of decline in world price levels, the levels of domestic prices were significantly and differentially affected by changes in other policies, and particularly by changes in national exchange rates.

Coffee

1) *Cameroon*: the decline in the international coffee price since the 1980s was mirrored in the domestic price during the pre-reform period, but offset to some extent by the effect of other policies which acted to dampen the declines effect. As expected, with the CFA pegged to the French Franc, there was no exchange rate effect in the first reform period. However, in the following period, characterized by the significant devaluation of the CFAF, the decline in the world price was almost completely offset by the positive exchange rate effect, resulting in a much improved domestic prices vis-à-vis other, non CFA, case study countries.
2) *Kenya*: the pre-reform period was characterized by the suppressing effect of other policies, which offset the positive impacts of exchange rate movements. In the post-reform period, the other policies contributed to a small increase in domestic coffee prices. The liberalization of controls over domestic prices in the early 1990s in Kenya appears to have been the decisive factor for price trends, along with the real devaluation of the exchange rate that occurred during the period 1992-98. Real agricultural prices rose, for most crops, in response to these changes.
3) *Uganda*: the coffee price in both the pre- and post-reform periods benefited greatly from the depreciation of the currency. Before and in the first period of reform, this effect was offset to some extent by the falling international price and by other policy influences. However, these policies became favourable, with liberalization in 1991: private exporters were allowed to buy and export coffee, and the lifting of the withholding tax and the transport monopoly

FIGURE 4
Coffee price decomposition by country and reform episode (selected countries)



improved returns, contributing to a significant increase in the domestic price in 1987-93. In the final period of reform, the effect was more muted, due to the introduction of a stabilization tax to reduce inflationary pressures.

4) *Guatemala*: the domestic coffee price, although affected by a significant depreciation of the currency during the 1980s, was also negatively affected by other policy changes, which meant that the domestic price tracked the international price closely and the sector did not appear to benefit from the depreciation in terms of its competitiveness. This result is perhaps surprising given that coffee was relatively competitive in comparison with other domestic products, and as a result the transmission of international to domestic market prices was expected to be relatively complete.

Cotton

1) *Cameroon*: the impact of the exchange rate on cotton was similar to that on coffee. However, although the world price movement had limited effect on domestic price (limited transmission being consistent with significant state intervention) the negative impact of other policies was significant. In part, this may have been due to the continuation of the SODECOTON monopoly. It should be noted however that this parastatal also facilitated input provision, contributing to increased cotton production despite the fall in real domestic prices.
2) *Malawi*: the declining world price had a significant impact on the domestic price. In the early reform period, other policies and the depreciation of the exchange rate offset this impact to a large extent, but in later periods, the impact of other policy changes was progressively worse and the reduced competitiveness of the sector was only ameliorated to some extent by the continued depreciation of the exchange rate. Indeed, real domestic prices of three major commodities (groundnuts, cotton and maize) declined significantly in every five-year period from 1985 to 2000. There was a significant relationship of movements in the real exchange rate and world prices, with real domestic cotton prices,

FIGURE 5
Cotton price decomposition by country and reform episode (selected countries)

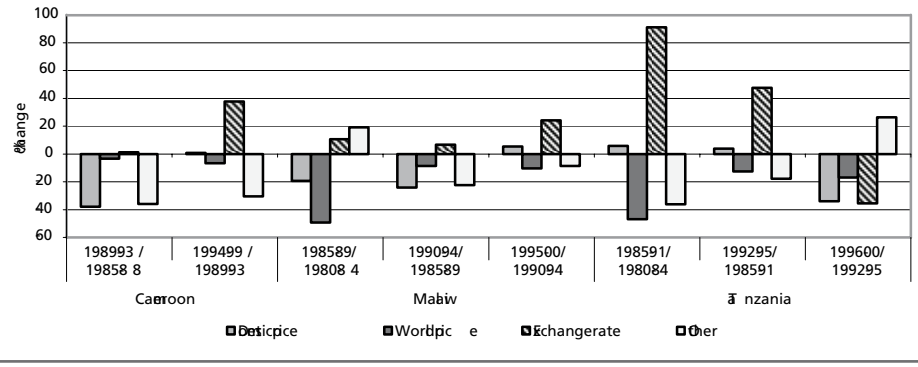
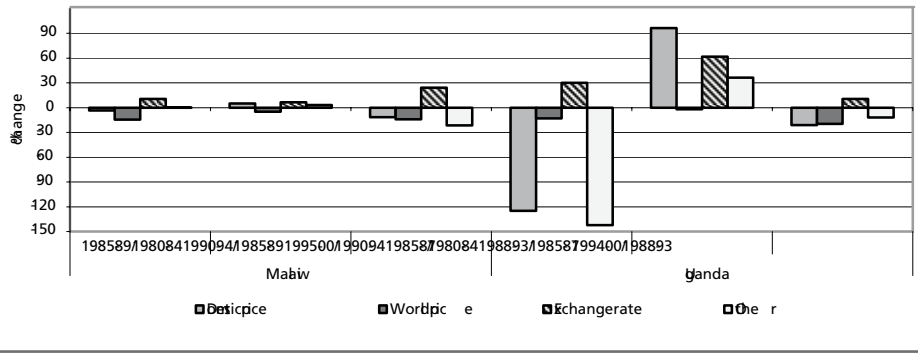


FIGURE 6
Tobacco price decomposition by country and reform episode (selected countries)



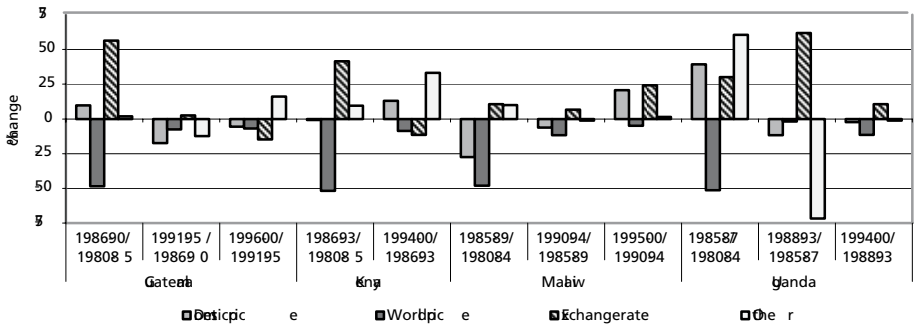
indicating transmission of the world price changes following the deregulation of the sector.

3) *Tanzania*: sharp fluctuations occurred in the real effective exchange rate during the period 1980 to 2001. From 1980 to 1985 it appreciated by about 50 percent, then from 1986 to 1993 it depreciated drastically. To some extent this appears to have averaged out over the period and may explain the lack of apparent impact on domestic prices. From 1993 to 2001 it appreciated again by almost 40 percent.

Tobacco

1) *Malawi*: a similar pattern was observed in tobacco prices as for its cotton prices. In all periods, the decline in the world price was to a large extent

FIGURE 7
Maize price decomposition by country and reform episode (selected countries)



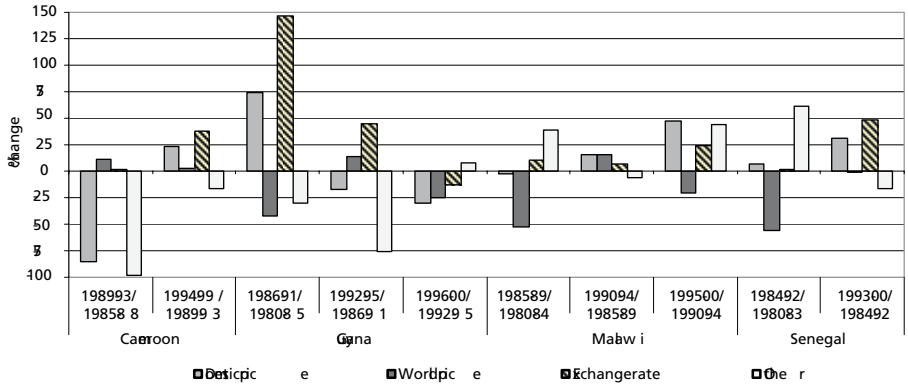
offset by a depreciation of the exchange rate such that competitiveness was maintained during 1985-94. In addition, the liberalization of domestic prices in 1991 helped to boost these prices. However, other policy changes, for example the introduction of an export levy in 1996, were not favourable to prices in the post-reform period.

2) *Uganda*: domestic price changes were significant in all periods. In the second period the increase was driven by the depreciation of the exchange rate and in the later periods, by a reversal of the negative effect of other policies. Notably, the falling international tobacco price did not appear to have much impact until the final post reform period.

Maize

1) *Malawi:* perhaps surprisingly in this landlocked country, the maize price followed the declining world price more closely, except in the post-reform period, when the significant depreciation of the currency offset this fall. The country study finds a significant relationship between the domestic price and the exchange rate, although the integration of domestic prices does not improve during the reform period, suggesting a weaker transmission of falling world prices to less well connected, or remote, maize markets.
2) *Kenya*: falling world prices had little effect during the reform period being offset by a depreciation of the exchange rate, but a reversal of the negative impact of other policies took place in the post-reform period.
3) *Uganda:* benefited from an increasing domestic price in the pre- and early reform periods initially due to the depreciating currency, and more favourable domestic policies. In the period of reforms, the other policies offset the positive contribution of the depreciating currency.
4) *Guatemala*: the falling international maize price did not dramatically affect the domestic price in the earlier period, being offset by a significant depreciation

FIGURE 8
Rice price decomposition by country and reform episode (selected countries)



in the currency. However, in the reform and post reform periods, the domestic price followed the world price more closely.

Rice

In all represented countries, other policies had a considerable impact. Changes in the exchange rate affected all countries, but *Guyana,* in the post reform period, positively.

1) *Cameroon*: other policies had a significant depressing effect on domestic prices.
2) *Guyana:* other policies had an important positive impact, ameliorating the negative exchange rate impact on the price in the post reform period. Rice was the primary beneficiary of the liberalization of domestic marketing. By the end of the 1980s, its domestic price, expressed in dollars, was about five times its level at the beginning of that decade.
3) *Malawi* domestic policy change appeared to enhance the positive impact of the exchange rate devaluations.
4) *Senegal*: the dismantling of state marketing institutions and other steps to liberalize agricultural markets began in 1980, well before the real devaluation of the exchange rate in 1994. Perhaps as a consequence of this timing, real prices for four principal products (groundnuts, cotton, millet and rice) fell from 1970-79 until 1980-93 and then recovered during the period 1994-2000. In the case of all except rice, the recovery more than compensated the loss of producers' purchasing power experienced during the period 1980-93. The report attributes the recovery of prices in recent years mainly to the exchange rate devaluation.

The impact of exchange rate and other policies

The apparently greater importance of exchange rate and other policies (as opposed to international price movements) in influencing the price of domestic food crops relative to import prices may suggest that imports were affected to a greater extent than exports by economic and trade reforms in the selected countries. This is borne out by qualitative investigation in a number of the studies:

1) *Ghana*: the reforms were associated with declines in real producer prices of import-substituting crops, cereals and root crops. Maize, rice, yams and cassava all experienced declines. The price of cocoa, a major export crop, moved upward. The exchange rate liberalization appears to have benefited cocoa but as a result of world price trends plus import liberalization, the opposite result occurred for import substitutes. Cotton prices continued to be dictated by negotiations because of the oligopolistic position of the processing industry.
2) *Nigeria*: a comparison of the pre-reform and reform periods shows that four of the six major food crops (garri, rice, yam, beans, millet, maize) experienced an acceleration in their real price movements between these periods (an increasing positive rate of change, or a shift from a decline to an increase), and for two of the crops the change was in the opposite direction. Comparing the reform period with the post-reform periods indicates a similar pattern: three crops had an acceleration of the rate of real price change but only one had a deceleration, and for two crops the rate of price change remained about the same. Thus on the whole, reform, even with its inconsistencies, delivered greater incentives for the production of food crops. For eight cash crops, largely exported, the reform period brought an even greater acceleration of real price increases. In fact, for six of those crops, the reforms led to a shift from a decline in real prices to a rapid rate of increase. Only one of the eight experienced a further acceleration of the rate of real price increase in the post-reform period. Nevertheless, the net change in real prices over the reform and post-reform periods together was strongly positive for all eight cash crops. Thus it seems clear that export agriculture benefited from the reforms, in absolute terms and vis-à-vis import substitution agriculture.
3) *India*: 1991 marked a clear break with past policies. The rupee was devalued by 23 percent and trade was substantially liberalized at a stroke. The trend in real agricultural prices was reversed in that year. The index of prices received by agriculture vs. prices paid by agriculture, declined from 1970/71 to 1979/80, increased very slightly from 1980/81 to 1989/90, and then increased more rapidly from 1990/91 to 1999/2000. The real price of cereals experienced a clear inflexion in 1990/91, declining before that year and increasing afterwards. For fruits and vegetables, real prices increased before and after the reforms but more rapidly afterwards. However, the reforms affected negatively the real prices of commodities that had been under strong controls prior to the reform, specifically, edible oils and dairy products. Pulses experienced real price increases before and after the reforms but at a slower rate afterwards.
4) *China*: nominal agricultural output prices tended to keep pace with the consumer price index from 1979 to 1996, and moved slightly faster than the CPI in the last three years of that period. However, from 1997 to 2000,

agricultural prices fell substantially in relation to the CPI, probably as a result of the exchange rate. The ratio of agricultural output to input prices rose by almost 30 percent between 1979 and 1988, declined until 1993, then rose again to a lower peak, only to fall once more. By 1999 and 2000 the ratio was below its 1979 level. On the whole, policy sustained agricultural incentives until the latter part of the past decade.

5) *Chile*: a system of state controls over prices and marketing was removed and the real exchange rate was devalued. In comparison with the pre-reform period, these changes brought about significant increases in real domestic prices of all major farm products, including wheat, maize, potatoes, beef, and sugar, although all those prices trended downward gradually during the 1990s. Milk continued to receive border protection and its real internal price rose steadily to a high level during the post-reform period. As an example of a new export product, output of apples grew rapidly, but because lower-quality fruit was retained for the domestic market, the increasing volume meant that real internal prices for apples declined very considerably. The reforms generally succeeded in improving transmission of international price movements to domestic prices, with the exceptions of the automatic adjustments in border protection brought about by the price band mechanism and the protection policies for milk.
6) *Peru*: a sharp reduction in import tariffs took place in the early 1990s. In combination with the devaluation, the effect on real agricultural prices was dramatic. Between 1987 and 1990, the ratio of the agricultural GDP deflator to the non-agricultural GDP deflator declined by almost 50 percent. After the real exchange rate stabilized and depreciated slightly, the ratio of deflators made up about one-third of the lost ground by 1994 but then lost the gains by 2000. When real agricultural price movements are measured by domestic agricultural prices deflated by the consumer price index, the decline is even more marked. Real prices of agricultural importables, exportables and non-tradables all fell by 80 percent or more between 1986 and 2001, in this case without an intermediate period of partial recovery.

Heterogeneity in domestic price responses

The reasons for heterogeneity in agricultural price reactions to reform are complex, but the studies point to a number of key determinants. These can be broadly categorized as those that affect prices at the border, and those that modify the price with the domestic economy, whether these be explained by direct price interventions or by institutional factors. Reforms in exchange rate policy appear to have been one of the main determinants of changes in border prices, although the degree of price responsiveness to the exchange rate varied by product group, according to the corresponding market structures. This point is investigated systematically in Annex D through regression analysis, and the following hypotheses are drawn out of that analysis.

For import competing crops, trade barriers – particularly licensing and specific tariffs – can have the effect of restricting the extent to which reductions in world market prices are transmitted to local price reductions. Although net consumers may gain from falling food prices in the short run, producers, and in the longer term rural

economic growth, can be negatively affected by changes in trade policies that allow greater levels of exchange between world and domestic markets. In many smaller economies (e.g. Malawi) it is, however, unclear as to how effective border policy will be, given the significant proportion of output that is informally traded across borders.

It is not just changes in trade policy that affect domestic prices. In the 1980s, substantial amounts of food aid were allowed onto domestic markets, resulting in reduced food import bills. However, downward pressure on local market prices reduced incentives to local producers to invest in intensification of food crop production. Following the implementation of the Uruguay Round agreement, a greater proportion of food imports have been made on a commercial basis, increasing the food import bill, but potentially offsetting the downward pressure on producer prices.

For export crops in particular, profitability is not driven simply by world market prices. Market structures and conditions are increasingly important. For example, the role of transnational corporations in determining both world market prices and domestic prices is increasing (FAO, 2003a). For instance, three companies now control 90 percent of world exports of coffee, and whilst in 1990, the world coffee economy was worth US$30 billion, of which producers received $12 billion, in 2002 it was worth $50 billion, but producers received only $8 billion. In such cases, relaxing export controls does not necessarily benefit the producer or the domestic economy.

Within the domestic economy, market functionality, or lack of it, underpins many of the factors that modify the extent of transmission to domestic producers. Pre-reform price controls in many countries were assumed to have inhibited the efficient workings of agricultural markets, and many state activities related to these markets were assumed to be inefficient and to have discouraged the entry of the private sector. However, as the experiences reviewed in the case studies indicate, the private sector has not always been ready to step fully into the breach, because of lack of capital, lack of prior experience, and/or lack of confidence that the government would not change its policy. Hence the transition to a more efficient grain trading system, for example, has often taken many years and is sometimes still incomplete. This is reflected in the fact that prices may not have moved as expected in some countries.

In Kenya, after years of government monopolies in production and marketing, private entrepreneurs lack the managerial skill, financial capacity, and physical infrastructure to take over. In Malawi, markets for agricultural produce do not seem to operate effectively and efficiently. Private traders continue to experience problems of transport due to the poor infrastructure, and lack of financial capital. As a result many private traders operate in local markets and behave oligopolistically, thereby taking advantage of the unorganized farmers.

China's experience was unusual in this regard. With surprisingly little disruption, privatized fertilizer markets supplanted planned distribution networks. Rising competition raised the efficiency of markets, made traders more responsive to consumer demands and reduced transaction costs. In a number of cases, the reduced role of the state in input and output markets has caused farmers to pay higher prices for their inputs while receiving lower prices for their outputs (e.g. Cameroon). Such an outcome may be defended in that prices move toward market levels, but in these

circumstances complementary measures could have been designed to cushion the impact of the reforms on low-income producers.

Institutional reforms that provide more scope to the private sector generally make economic activities more efficient, but in the short or medium run they can affect different groups of producers differently, giving greater price incentives to some and lower incentives to others. This kind of mixed result is exemplified in the case of Malawi and Tanzania, where reforms in agricultural marketing and other related activities by the private sector assumed the non-existence of infrastructural and other constraints. Because of very high transport and marketing costs due to the lack of good roads or marketing and distribution facilities, private traders have concentrated their businesses only in those areas with better infrastructure facilities. Areas lacking infrastructure are thus deprived of marketing services, which makes it difficult for products from these areas to be sold in higher return markets.

THE IMPACT OF REFORM ON PRODUCTION

The effect of price changes on production

At an aggregate level, the data show significant increases across a range of agricultural production indices for all sample countries over the two decades of reform. In most countries, this is associated with significant productivity increases, as shown by both yield increases and by value added per worker. Declines in worker productivity were only observed in Ghana, Kenya and Guatemala, although there have been notable declines in cereal yields in Malawi and Nigeria. However, when considered on the basis of periods of reform and by commodity, the picture is much more mixed than depicted in Table 6. The case studies provide insights into the quite different responses to changing domestic prices in terms of supply response. To better understand the relationship between price and production changes, it is useful to consider the response by individual countries in the study to changes in commodity prices. The path of output is shown in Figure 9 for selected commodities in the studied countries. Some of the main observations are as summarized here:

1) *Cameroon*: cotton production rose steeply, in contrast to the trend in other cotton producers in the study, encouraged by exchange rate movements. Rice production, however, fell over the reform period, reflecting domestic price declines, though recovering after 1998. Coffee price declines kept production stable or falling.
2) *Ghana*: following a reduction in rice production associated with both area and yield decreases pre-reform, production increased dramatically in the early years of reform, mainly via area expansion, and maintained a declining rate of increase until 2002. In the second period of reform, the increase in production was primarily productivity related. Maize output changes followed a similar pattern to rice output changes in Ghana, with a fall before reform, followed by an immediate recovery, primarily based on increased productivity, but latterly on increased area expansion.
3) *Kenya* experienced strong growth in tea production, but for most commodities included in the study the level of production was not greatly different at the end of the reform period. Real domestic prices were not rising for tea over this period, but some devaluation of the exchange rate helped to encourage exports.

TABLE 6
Aggregate indicators of agriculture production trends, selected countries, 1979-2001

	Crop production index (1989-91=100)		Food production index (1989-91=100)		Livestock production index (1989-91=100)		Cereal yield (kg per ha)		Agriculture productivity (agricultural value-added per worker) US$, 1995	
	1979-81	2001	1979-81	2001	1979-81	2001	1979-81	2001	1979-81	2001
Africa										
Sub-Saharan Africa										
Cameroon	87	141	80	138	61	123	849	1 709	826	1 242
Ghana	67	183	69	175	79	127	807	1 186	671	575
Kenya	75	124	68	125	60	118	1 364	1 606	265	212
Malawi	86	170	93	191	78	125	1 161	1 098	96	119
Nigeria	51	153	57	153	84	145	1 265	1 047	417	742
Senegal	77	122	74	130	66	148	690	834	336	363
Tanzania	82	108	77	113	69	128	1 063	1 483	-	190
Uganda	68	141	70	139	82	134	1 555	1 641	-	350
North Africa										
Morocco	55	93	56	104	60	123	811	895	1 146	1 693
Asia										
China	67	156	61	186	45	227	3 027	4 801	161	342
India	71	127	68	134	63	150	1 324	2 429	269	411
Latin America										
Chile	71	135	72	143	76	155	2 124	4 936	3 488	6 412
Guatemala	87	134	68	137	76	129	1 578	1 825	2 143	2 104
Guyana	126	171	138	188	167	176	2 953	3 917	2 310	4 267
Peru	82	176	77	173	78	158	1 946	3 262	1 273	1 851

Source: World Development Indicators, 2003, World Bank; World Development Indicators CD-ROM 2003, World Bank.

4) *Malawi*: production of export crops such as tobacco and cotton expanded in spite of world price weakness, and stronger domestic prices for rice and maize did not translate into significant production growth.
5) *Nigeria* experienced a significant increase in maize production, peaking in 1995, reflecting a depreciation of the real exchange rate over that period. Groundnut output increased strongly through the period of reforms, and rice and cocoa also performed well, although coffee output did not appear to respond to the higher import costs.
6) *Senegal*: rice production responded most to price incentives, along with cotton for much of the period, but groundnuts and sorghum output was stagnant. A depreciating real exchange rate helped to make Senegalese farm products more competitive with imports and in export markets.
7) *Tanzania*: real exchange rates also helped to lift domestic prices in the 1990s, benefiting rice and maize production in particular, though coffee and cotton production stagnated.
8) *Uganda*: productivity levels in maize production fell in the early- to mid-1980s, despite a significant increase in the domestic maize price, but recovered in the late reform and post-reform periods. From 1980 to 1984, the output

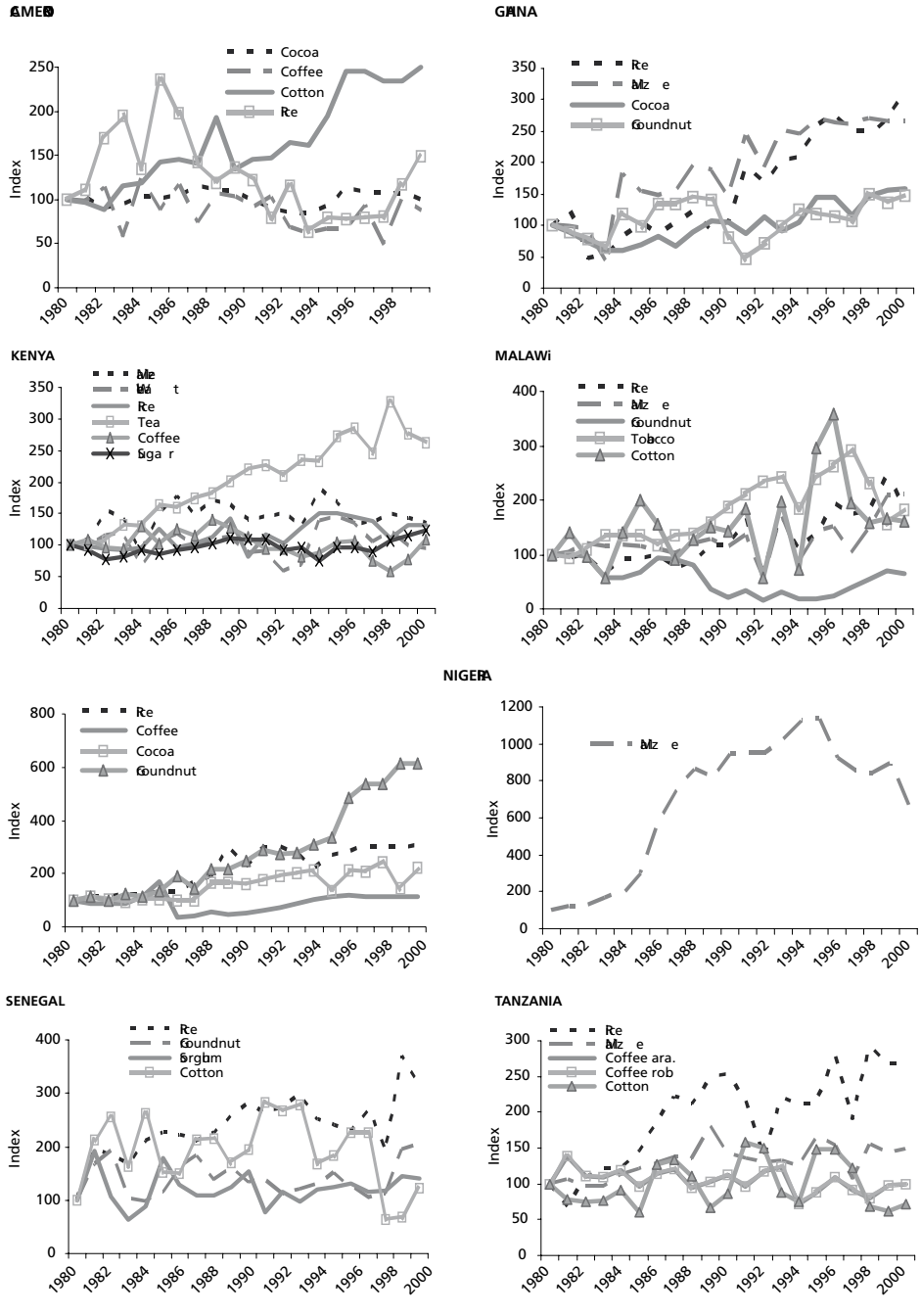
of coffee, tea and tobacco increased following price increases. Whilst cotton saw a significant decline in area, this was more than compensated for by increased productivity. Expansion in tea production resulted from both area and yield increases, but for tobacco this came exclusively from productivity improvement. The 1984-87 period was characterized by a fall in cotton output (fall in yields) and in tobacco (area decrease), but a modest growth in tea production as a result of yield increases. By contrast, 1987-93 saw a return to growth, with significant increases in the areas of tea and tobacco, and the shift away from cotton area compensated for by productivity increases. In the final period, there was limited change in area but significant yield increase. Relating this back to the price analysis, it is notable that the 1984-87 period was associated with negative impacts of other policies in both coffee and cotton which suppressed the positive impact on price that would have been brought about by the exchange rate devaluation. In the periods where the output of these crops increased, domestic price increases were significant.

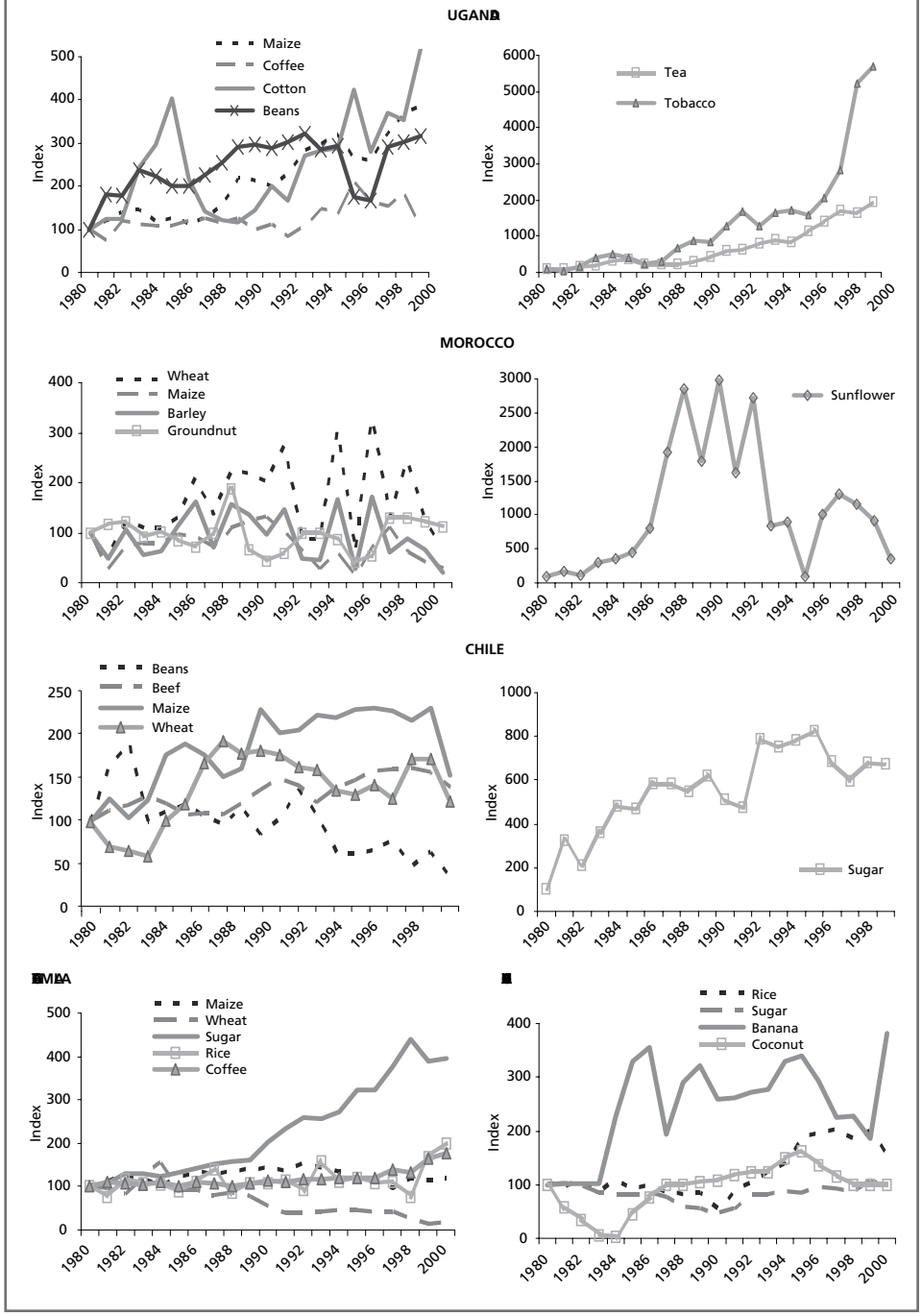
9) *Morocco* experienced relatively stable agricultural output growth (except for the growth of sunflower production from a small base), but wheat has expanded at the expense of maize. In contrast to several other countries in the study, real exchange rates have not given Moroccan farmers a competitive edge, and domestic prices have declined in real terms.
10) *India* has shown a significant rise in production of wheat, rice, maize and coconut despite weaker real domestic prices. Production of sheepmeat has responded to increases in real prices. Tradable goods have benefited from a steady depreciation of the real exchange rate until the mid-1990s.
11) *Chile* has seen significant output shifts, with maize increasing until the late 1990s, and wheat also showing periods of output gain. Some traditional crops, such as beans, have declined in importance, as the growth of export commodities has dominated Chilean agriculture. Real prices of staple commodities have fallen steadily and exchange rate benefits to agriculture in the 1980s have been offset by a steady appreciation in the real exchange rate since 1990.
12) *Guatemala* also experienced a period of lowered real domestic prices for the commodities studied here, and this has contributed to a relatively stable level of production. An exception to this is steady growth in sugar output, responding to emerging export opportunities.
13) *Guyana*: rice production rose significantly during the period of reforms, as did the output of bananas (from a limited base). The data show significant reductions in rice area during the reform period, with some recovery after the reform period, indicating substantial yield increases. As there was limited change in domestic prices, the area decrease is most likely explained by a change in the relative price of rice.
14) *Peru* has experienced more general growth, particularly of rice, maize and barley, despite a significant fall in real domestic prices from the mid 1980s.

Given the heterogeneity in price movements across countries, it is unsurprising that the countries in the sample showed markedly different behaviour in regard to changes in the level and structure of agricultural production, particularly during the 1990s when the effects of policy reforms and world market conditions were most felt.

FIGURE 9

Growth in production of selected commodities, 1980-2000 (1980=100)




UGANDA
Maize
Coffee
Cotton
Beans
Index
Tea
Tobacco
MOROCCO
Wheat
Maize
Barley
Groundnut
Sunflower
CHILE
Beans
Beef
Maize
Wheat
Sugar
Rice
Coffee
Banana
Coconut
1980
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1990
1992
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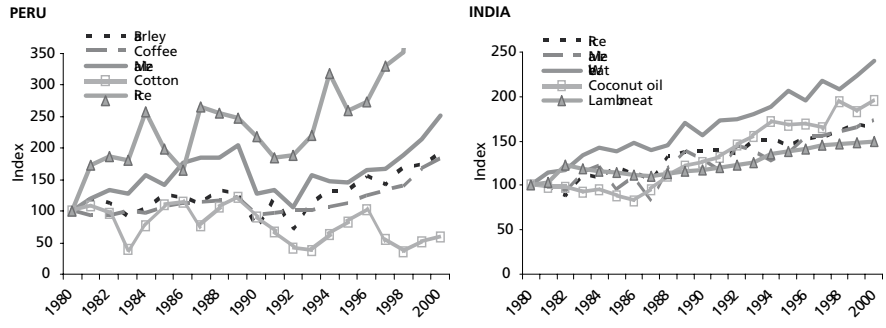
1998
2000



Source: Calculation based on data from FAOSTAT, 2004

While there is some evidence that output has responded positively to real price increases and negatively to decreases, this was not always found to be the case. Indeed, of the 150 episodes for which data are presented on both price and production changes, in only 66 percent of cases is the response in the direction expected, with 34 percent of cases either reporting an increase in production when prices are falling, or a decrease in production in face of increasing prices. In Kenya and Tanzania, sectoral output dropped in spite of real price increases. Malawi shows the opposite effect of increasing output across a range of products in spite of declining prices.

Thus overall, the picture is mixed regarding the apparent output response to price changes. This suggests that producers respond to a combination of price incentives (determined both internationally and domestically) and non-price constraints, and that the evaluation of these is critical in determining whether a response occurs within the reform period (taking into account that lags in response may partly explain these unexpected responses) and also the extent of the response.

Reasons for the heterogeneity in production response

Of the many reasons for heterogeneity in production responses, some have to do with changing world market conditions. Where export opportunities increase as a consequence of the opening of a previously protected market, export expansion can occur, despite falling international prices being more fully transmitted to domestic producers that might result from concurrent reductions in local export restrictions. Similarly, increases in domestic prices may not reflect farm gate prices, as more powerful actors in the supply chain extract the increased rent associated with an increase in world prices.

In other cases, domestic policy and institutional change can help to explain the production response. For example, substantial rises in input prices have dampened the potential stimulus of increases in output prices, while in other cases the withdrawal of support for rural credit has affected production.

The Tanzanian case study eloquently points to some of the reasons why farmers sometimes cannot respond in the face of higher price incentives:

> *"The role of public institutions in the supply of inputs and the marketing of crops has been left to the private sector. The efficiency and capability of the private sector to fill this role has been impaired by several factors. ... there is no incentive for committing resources for longer term investment in such things as storage facilities, processing plants, quality assurance systems, marketing capabilities and farmer support programmes. ... some smallholder farmers have failed to purchase the required quantity and quality of seeds, pesticides, equipment and chemicals due to the removal of subsidies. Educational crop promotion seminars and extension services for peasants have largely been weakened by cuts in the budgetary allocations for such activities. ... Since infrastructure difficulties may lead to very high transport costs hence increased prices, private traders have concentrated business only in those areas with better facilities. Any area with ailing infrastructure has been deprived of marketing services..."*

These remarks would be applicable at least in part to several of the countries studied.

The output increases in Uganda were significantly greater than in many other countries (in part this may be explained by a recovery from a low base before reform). However, the more recent flattening off in output is symptomatic of the fact that in Uganda, as in many of the other countries, there are severe constraints to both the expansion of, and to the modernisation of, agricultural production.

Physical constraints to increased production

Smallholder agricultural production dominates in Uganda, where farmers with an average land holding of less than two hectares produce more than 90 percent of total food production. Their activity is often characterized by the use of low productivity technology, minimal use of inputs including fertilizers, problems with marketing systems, and high crop losses. The 1998 Land Act in Uganda was intended to improve land tenure security through issuance of certificates of customary ownership and certificates of occupancy for tenants. However, the institutional framework for its effective implementation is not yet in place.

Similar observations are made in the Guatemalan study, where a large proportion of the country's population works in subsistence farming or derives its income from the sale of farm products or on-farm work. Smallholder farmers using rudimentary technology produce about 80 percent of agricultural production in Ghana. Population pressure has resulted in fragmentation of land holdings in Malawi and land holding in Nigeria is also fragmented, with only about 30 percent of the country's arable land currently under cultivation.

Whilst production increases in many African countries are the result of area expansion, net sown area in India has increased little since the early 1970s and area expansion is unlikely to be an option to increase output. A similar pattern is observed in China.

There has been some success in the support of technological development of agriculture. For example in Cameroon, a policy of actively promoting the use of inputs is considered important in maintaining soil fertility and increasing production. Reform of the state monopoly over imported inputs started in 1987. Problems that have led to low use of chemical fertilizers relative to the average for African countries include the lack of a credit mechanism and, above all, high input costs resulting from

price decontrol. The Research Institute for Agricultural Development (IRAD) was created for the purpose of supporting research and development in Cameroonian agriculture and assessing the quality of agricultural inputs. However, problems including the poor state of equipment and a shortage of adequately qualified personnel have been obstacles to its proper functioning.

Low productivity also tends to characterize agriculture in Kenya, Malawi, Nigeria, Tanzania and Uganda, a common constraint being low levels of irrigation. In Nigeria agricultural yields have remained relatively unchanged, with much farming conducted by the aged with little or no knowledge of modern farming practices. Input use by smallholders in Kenya remains low and constrains productivity. However access to inputs has improved with reforms: there are more licensed dealers and inputs are available for purchase in smaller quantities.

Productivity in the food crop sector is also low in Ghana because of significant constraints to the adoption of improved technologies, such as shortage of locally improved seeds, planting materials and other inputs. In Tanzania, technological development in agriculture is poor, with rudimentary equipment and weak extension-research linkages. Removal of subsidies on inputs in Tanzania has led to some smallholder farmers not purchasing adequate seeds, chemicals and equipment. A lack of support has discouraged cultivation of cash crops such as cotton and encouraged a movement into food crops, which do not require such high usage of expensive imported inputs. In the majority of these countries, the incentives for investment in terms of adequate and stable levels of profitability have been lacking.

Research and extension

Research and extension programmes have the potential to improve agricultural productivity. The extension system in Cameroon was launched in 1990 by the government, with World Bank assistance, which has improved rural information, communication systems and transfer of appropriate technologies to farmers. In Ghana, research and extension has had limited success, with the extension service still severely constrained. A project aimed at improving the research-extension-farmer linkage was funded by external donor support from 1995 to 1999. But the end of this external funding has led to difficulty in sustaining the project. In Uganda, the National Agricultural Research Organization was established in 1992 to undertake, promote and co-ordinate research in various aspects of agricultural development. The benefits of this are slowly trickling to the smallholder farmers; for example, most rural smallholder coffee farmers have adopted improved coffee varieties.

Infrastructure

Development of physical infrastructure appears to be of particular importance in many of the countries. Well-developed infrastructure can facilitate the marketing of output, purchase of inputs and shift of labour from one geographical area to another. The China case study notes that during the 1980s and early 1990s one of the major constraints on the stability of the food supply was the poor marketing and transportation infrastructure.

Deficiencies in transport infrastructure are a major constraint to the agriculture, limiting access to domestic and international markets. In Cameroon, the railway is the oldest in Africa and the infrastructure has seriously deteriorated with the

monopoly enjoyed by the private operator, leading to a low quality and expensive service. Despite restructuring of the marine transport sector, costs remain relatively high, with the main port of Douala the most expensive on the West African coast. Storage and processing infrastructure for food crops in rural areas is inadequate and largely responsible for food insecurity in some regions of the country, such as the North. The few major rural and urban markets are poorly equipped and managed.

Ghana has been described as a "footpath economy" because of the poor feeder road network, with the World Bank identifying the poor transportation network as a constraint on agriculture production. Market access has improved for those communities where the road network has been upgraded but actual annual achievements of rehabilitating 212 -1080 km fall well short of the target of 1 200-2 000 km per annum.

Infrastructure in Tanzania is noted as a particular constraint to agricultural performance, with inadequate roads probably one of the factors most limiting economic growth. Of the total road network in the country, only 5.5 percent are paved and most of the unpaved roads are in poor condition. This weak base of infrastructure reduces the country's competitiveness since transport costs add significantly to production costs. In addition, some areas have inadequate telephones, electricity and storage facilities.

Issues related to market infrastructure have not been adequately addressed in the reform process in Uganda. The Government has invested substantial resources over the past decade in the construction and maintenance of rural feeder roads to open up rural areas, but, it is estimated that a quarter of the country's feeder roads are still impassable during the rainy season, limiting the opportunities for rural farmers to deliver their produce to the market. Transport costs are also high because of the high cost of fuel and a lack of competition. Other post-harvest costs, including storage, processing and handling costs, are also so high that they affect the sector's competitiveness. Although rural markets operate in most parts of the country, they lack basic facilities such as roof cover and secure storage.

In Malawi, infrastructure is inadequate and was given low priority during the adjustment period. Agricultural opportunities in India are also hindered by poor infrastructure including power, roads, markets, warehousing and processing facilities. Much improvement is also required for Nigeria in developing an efficient and effective transportation system and in the provision of storage and distribution facilities.

Credit availability

Credit markets facilitate production, consumption smoothing, and the development of new enterprises. They are an important mechanism to assist the poor to adjust to a changed economic environment. Limited access to financial services (both credit and savings) has exacerbated vulnerability to shocks. However, most structural adjustment programmes have reduced the availability of credit to rural households and raised its cost.

Many of the case studies report difficulties for rural farmers in accessing credit. Rural small-scale farmers in Cameroon have little access to credit. Micro finance institutions were set up in 1992, but they remain poorly distributed throughout the country and sometimes lack credibility and professionalism. Smallholder farmers in Malawi face credit constraints, with micro finance institutions tending to emphasize

finance for off-farm business activities, and much of the available agricultural credit is confined to the tobacco sector. Small- and medium-scale traders in Tanzania cannot access the credit that would enable them to purchase stocks of produce and sell out of season at higher prices. Some farmers shifted away from the production of cash crops such as cotton because food crops can more easily be sold on cash terms. In Uganda, the only source of credit for rural dwellers is the micro finance industry, which favours non-agricultural activities. Attempts are currently underway in Uganda to develop financial services that meet the needs of the rural population and integrate them into the national financial system. In Guatemala, agricultural credit availability is low and declining. Most available credit is channelled towards export products (traditional and non-traditional) with little support for basic grains production.

Guyana attempted to overcome the problems in obtaining acceptable forms of collateral security faced by many small farmers. The Institute of Private Enterprise Development Limited (IPED) was established in 1986 as a local NGO to provide loans to small entrepreneurs. It uses a cross guarantee system, whereby each member of a small group is liable for the debts of the others. IPED has been instrumental in facilitating output increases for a number of small producers. On the other hand, the experience with government credit provision schemes in Peru has been disappointing, with massive losses in capital reported. Most of the credit to the agricultural sector now comes from commercial banks and there was a dramatic reduction in the number of small farmers supported by the formal financial system during the 1990s.

Climatic conditions

Not all factors are under the control of policy makers. Adverse climatic conditions can have devastating effects, particularly when poverty levels are high, making it difficult for producers to protect against risks through means such as irrigating land or insuring against losses. For example, India has not developed effective mechanisms for crop insurance to reduce the impact of crop failure on farm incomes.

While climatic events can affect all sectors of an economy, the impact on agriculture is often relatively large. Too much rain caused by the El Niño phenomenon was a problem for Kenya, with heavy rain destroying infrastructure. But too little rain has also been a problem, with droughts a major factor reducing agricultural production in 1980, 1984, 1994 and 1999. This problem is particularly serious given the country's dependence on rainfed agriculture. Climatic risks are sometimes relatively region-specific, for example, in Nigeria, the northern half of the country is much more susceptible to drought and only one crop per year can be grown under rainfed agriculture. Interviews in Tanzania confirm that food production has deteriorated due to poor climatic conditions, with many interviewees also mentioning that the El Niño rainfalls of 1997/98 were a critical factor interrupting food security.

Almost 60 percent of the cost of the 2001 drought in Guatemala was estimated to have fallen on agriculture. Other recent adverse climatic events include severe hot spells in 1991 and 1994, prolonged droughts in 1997 and hurricane Mitch in 1998. The effects on agriculture of these events were not homogenous, with self-consumption hardest hit, particularly in basic grains such as maize or beans. It is suggested that climate changes in Guatemala have become the principal determinant of agricultural production, with a more significant impact than prices. Peru and Uganda are also vulnerable to adverse weather and natural conditions.

While production risk remains an important source of risk affecting the rural population in China, the risks are thought to be lower than for many other nations, since a relatively high proportion of China's land is irrigated. Also a high proportion of households are diversified, with on average at least one family member in off farm employment. This is a rather different situation from most of the other countries that tend to be heavily dependent on rainfed agriculture and not so diversified in terms of sources of income.

Terms of trade

At the aggregate sectoral level, as shown in Figure 10, there appears to be a positive if not strong correlation between changes in the agricultural terms of trade and the growth rate of the agricultural sector. However, the correlation is much weaker in the last decade or so, raising questions about the main determinants of agricultural output. Conditions in other sectors, along with productivity changes and investment decisions, may be as important as the agricultural terms of trade itself.

THE IMPACT OF REFORM ON TRADE FLOWS

This section examines trade flows in relation to the relative growth of agricultural exports and food imports, and to the dependence on primary commodities and changes in the structure of agricultural trade.

Relative growth of exports and imports

As discussed in the section on price analysis, most countries have seen a depreciation of their currency, which has had the effect of making their exports more competitive, and *ceteris paribus*, their food imports more expensive in local currency terms.

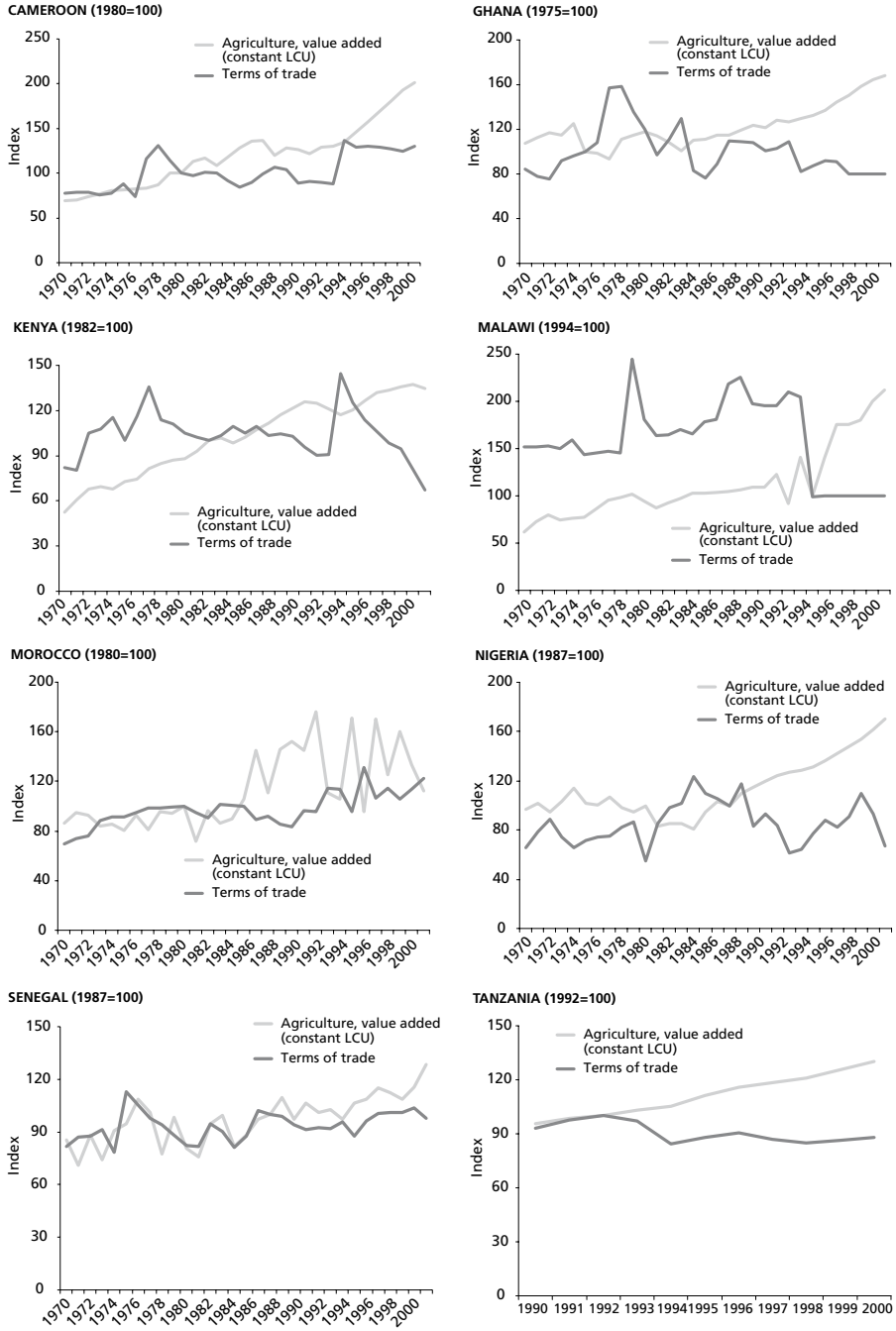
However, there have been significant differences in the direction of change of the ratio of food imports to agricultural exports (Table 7). In many African countries, food import bills have increased not only because of the exchange rate change but because in the 1990s, greater quantities of food grains have been imported on a commercial basis rather than as subsidized food aid. In most of these countries, the food import bill has increased at a greater rate than the increase in export earnings. By contrast, a declining trend was observed in a number of Asian and Latin American countries in the later years of the period of study.

In aggregate, food imports measured in current prices increased in all countries across the three decades illustrated in Table 8, but there were significant differences in the magnitude and direction of change between periods. Between the periods 1974-84 and 1985-94, food imports fell in Nigeria, Chile and Guyana and remained static in India, but increased significantly in Cameroon, Kenya and Malawi. In the period to 1995-2002 the pattern was quite different, with a decline in Malawi and a small increase in Cameroon, but significant increases in the majority of other countries, reflecting in part, the higher proportion of trade on commercial rather than food aid terms.

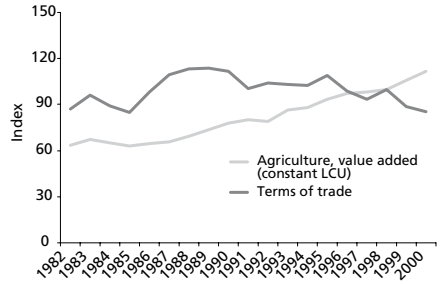
When examined in constant prices (Table 9), the broad pattern across countries remains the same. In all countries the percentage increase in imports was positive and significant, particularly those in sub-Saharan Africa.

The pattern of changes in export value across the period is much more mixed (Tables 10 and 11). Although both Kenya and Malawi appear to have increased

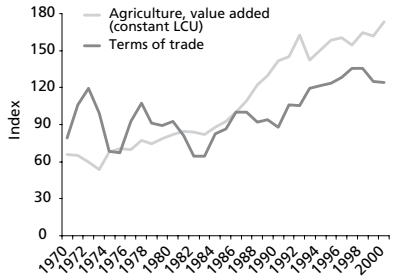
FIGURE 10
Agricultural terms of trade and agricultural growth by country, 1970-2000



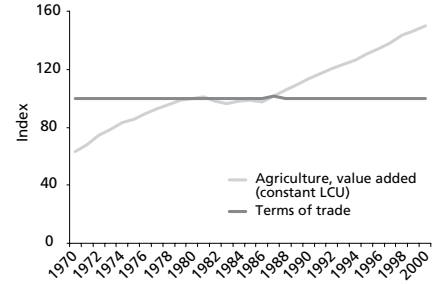
UGANDA (1998=100)



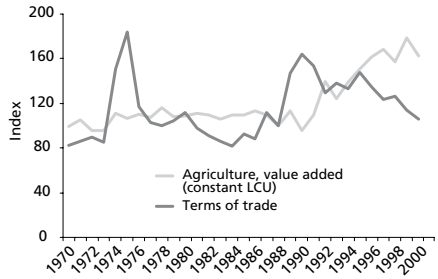
CHILE (1986=100)



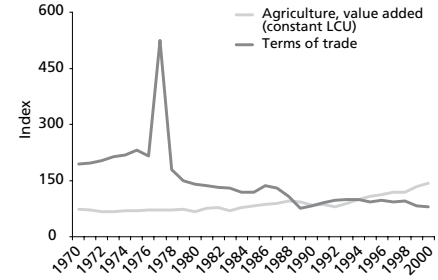
GUATEMALA (1980=100)



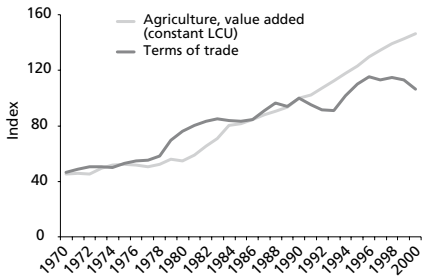
GUYANA (1988=100)



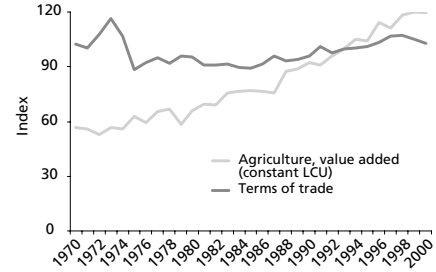
PERU



CHINA (1990=100)



INDIA (1993=100)



Source: Calculation based on data from World Bank, 2004.

TABLE 7
Ratio of total value of food imports to total value of agricultural exports, 1970-2002

Country	Average ratio		
	1970-84 (a)	1985-94 (b)	1995-2002 (c)
Africa			
Cameroon	0.2	0.3	0.3
Ghana	0.2	0.4	0.6
Kenya	0.2	0.2	0.4
Malawi	0.1	0.2	0.2
Nigeria	2.2	2.5	3.0
Senegal	1.2	2.1	3.7
Tanzania	0.2	0.3	0.5
Uganda	0.1	0.2	0.4
Morocco	1.3	1.1	1.6
Asia			
China	0.8	0.5	0.7
India	0.6	0.4	0.5
Latin America			
Chile	2.8	0.2	0.3
Guatemala	0.1	0.2	0.3
Guyana	0.3	0.2	0.3
Peru	1.2	1.9	1.4

Source: FAOSTAT, (FAO, 2004).

TABLE 8
Total food imports, 1970-2002 (current prices)

Country	Average annual value (in current prices) (US$ million)			Change between periods (percent) (current values)		
	1970-84 (a)	1985-94 (b)	1995-2002 (c)	(b-a/a)	(c-b/b)	(c-a/a)
Africa						
Cameroon	63	153	164	142	7	159
Ghana	76	139	282	83	103	271
Kenya	77	180	388	134	115	403
Malawi	15	77	71	412	-7	375
Nigeria	1 045	666	1 287	-36	93	23
Senegal	162	271	424	67	57	162
Tanzania	80	86	262	8	205	229
Uganda	21	34	135	63	297	543
Morocco	486	594	1 234	22	108	154
Asia						
China	2 822	5 296	9 321	88	76	230
India	1 072	1 069	2 403	0	125	124
Latin America						
Chile	357	286	872	-20	205	145
Guatemala	67	163	479	142	193	615
Guyana	29	27	68	-7	152	134
Peru	325	605	971	86	60	199

Source: Computed from FAOSTAT, (FAO, 2004).

TABLE 9
Total food imports, 1970-2002 (constant 1989-91 prices)

Country	Average annual value (in constant 1989-91 prices) (US$ million)			Change between periods (percent)		
	1970-84 (a)	1985-94 (b)	1995-2002 (c)	(b-a/a)	(c-b/b)	(c-a/a)
Africa						
Cameroon	76	145	170	90	18	123
Ghana	95	148	230	55	56	142
Kenya	75	195	382	161	96	409
Malawi	13	84	80	546	-6	515
Nigeria	617	585	1 175	-5	101	90
Senegal	217	279	410	29	47	89
Tanzania	107	109	292	2	169	174
Uganda	37	37	136	-2	268	268
Morocco	463	642	1252	39	95	171
Asia						
India	1 369	1 032	2 002	-25	94	46
Latin America						
Chile	500	295	833	-41	182	67
Guatemala	65	120	305	85	154	369
Guyana	21	22	29	5	32	38
Peru	381	661	961	74	45	153

Note: Data for China not available Source: Computed from FAOSTAT, (FAO, 2004).

TABLE 10
Total agricultural exports, 1970-2002 (current prices)

Country	Average annual value (in current prices) (US$ million)			Change between periods (percent) (current values)		
	1970-84 (a)	1985-94 (b)	1995-2002 (c)	(b-a/a)	(c-b/b)	(c-a/a)
Africa						
Cameroon	393	464	499	18	7	27
Ghana	478	412	543	-14	32	14
Kenya	498	784	1 071	57	37	115
Malawi	164	303	435	85	44	165
Nigeria	489	286	446	-42	56	-9
Senegal	165	138	119	-17	-14	-28
Tanzania	329	293	478	-11	63	45
Uganda	331	258	366	-22	42	10
Morocco	375	537	805	43	50	115
Asia						
China	3 262	10 475	13 323	221	27	308
India	1 727	2 723	5 322	58	95	208
Latin America						
Chile	219	1 142	2 810	422	146	1 185
Guatemala	620	817	1 409	32	72	127
Guyana	118	128	208	8	62	76
Peru	289	327	684	13	109	137

Source: Computed from FAOSTAT data, (FAO, 2004).

TABLE 11
Total agricultural exports, 1970-2002 (constant 1989-91 prices)

Country	Average annual value (in constant 1989-91 prices) (US$ million)			Change between periods (percent)		
	1970-84 (a)	1985-94 (b)	1995-2002 (c)	(b-a/a)	(c-b/b)	(c-a/a)
Africa						
Cameroon	333	430	553	29	29	66
Ghana	428	364	608	-15	67	42
Kenya	472	762	670	62	-12	42
Malawi	356	421	452	18	7	27
Nigeria	375	210	335	-44	60	-10
Senegal	244	168	119	-31	-29	-51
Tanzania	351	246	386	-30	57	10
Uganda	248	222	333	-11	50	34
Morocco	496	422	488	-15	16	-2
Asia						
India	1 761	2 406	5 257	37	118	198
Latin America						
Chile	288	866	1 642	200	90	469
Guatemala	502	731	1 507	46	106	200
Guyana	185	146	281	-21	93	52
Peru	464	251	521	-46	108	12

Note: Data for China not available. *Source:* Computed from FAOSTAT, (FAO 2004).

their export earnings by more than 100 percent in nominal values, the performance of most sub-Saharan African countries was poor. When examined in real prices, in sharp contrast to the increases in real import values, none of these countries increased export values by more than 66 percent across the period and many saw negative growth between sub-periods. On the other hand, substantial increases in export values (both in nominal and real terms) are observed in the Asian and Latin American countries.

At the commodity level, similar patterns are observed. In Cameroon, rice and cereal imports increased significantly, while the export of perennial crops fell. In Ghana, rice imports increased, but whilst the volume of cocoa exports increased, their value fell as a result of decreases in the international market price. This also contributed to a fall in agricultural export share of total exports from 70 percent to 31 percent over the period of reform. In Malawi, a similar pattern was observed, with groundnut exports declining significantly as a result of the state marketing agency's withdrawal from trade in this product. In Senegal, the import-export ratio increased from 1.7 at the start of the reforms to 4.2 following the devaluation of the CFAF. Groundnuts, despite the increase in competitiveness on the basis of the devaluation, remained uncompetitive on the world market. In Uganda, the value of coffee exports fell, but the import bill increased.

In other countries, the reverse has been the case. Guyana provides the most extreme example, with sugar exports increasing by 90 percent in the early 1990s, and rice exports also expanding rapidly, at the same time as food imports fell. In China, agricultural trade increased three fold between 1980 and 1995, with exports increasing at a faster rate than imports. Within the export growth however, it was

the higher value products that benefited at the expense of traditional crops such as grains, which saw export volumes declining.

In India, high value horticultural crops also contributed to export growth remaining at a higher rate than import growth until the mid 1990s. However, following the implementation of WTO commitments and falls in world prices, the pattern was reversed with the value of imports growing at a faster rate and for some products (for example sugar) a reversal from export to imports. In Peru, growth in exports also exceeded growth in imports, particularly following the Asian crisis that appears to have fuelled increased reliance on food aid.

Commodity dependence and structure of trade

Evidence from the country case studies suggests that high dependence on one or a small number of agricultural exports can be a significant short-term risk factor that may leave countries particularly vulnerable to weak international demand, declining commodity prices and adverse climatic conditions. As shown in Table 12, many of the case study countries are heavily reliant on a few key exports. For 10 of the 15 countries, at least 20 percent of agricultural export earnings come from a single commodity; for 6 countries the proportion is 40 percent or more. Of the countries listed, 3 rely on a single agricultural commodity for 20 percent or more of their total merchandise trade revenue. Malawi is a particularly striking illustration of this, with almost 70 percent of export earnings due to tobacco leaves.

The top three agricultural export commodities comprise more than 30 percent of agricultural exports for all of the case study countries with the exception of China. As a percentage of merchandise exports, the top three agricultural commodities contribute more than 15 percent for over half of the sample countries.

High levels of dependence on one or a few trading partners may also lead to risks, including changes in trade policy and economic conditions within the importing countries. For example, the UK, Pakistan and Egypt currently account for over 80 percent of Kenya's tea exports, adding a further potential risk factor. Guyana is said to be one of the most preference-dependent countries in the world and this has played a significant role in its traditional reliance on sugar and rice. These two commodities are heavily dependent on the European market, with administrative decisions having a greater effect on export earnings than do market forces. However, the EU has been implementing measures that will significantly erode the margin of preferences currently enjoyed by many ACP exporters. For instance, the granting of duty-free access to all LDCs means that other low cost rice producers such as Myanmar may move into a more competitive position in the EU market than Guyana.

While Table 12 suggests fairly high levels of agricultural export risk for many of the sample countries, Table 13 indicates that this vulnerability tends to be decreasing over time. From 1990/2002 to 2000/02 none of the sample countries appear to have had a significant increase in reliance on the exports of one commodity. Indeed, during this period covering most of the reforms, many of the countries experienced a substantial reduction in their degree of export specialization. In particular, Tanzania and Uganda reduced by more then 40 percent the proportion of agricultural exports contributed by one commodity. However, in both Kenya and Malawi, the reliance on exports of one agricultural commodity has remained relatively high and unchanged during the 1990s.

TABLE 12
Shares of leading agricultural exports in total exports, 2000-2002

	Export earnings of top single agricultural export			Export earnings of top three agricultural export commodities				
	Percent total agricultural exports	Percent total merchandise exports	Commodity	Percent total agricultural exports	Percent total merchandise exports	Commodities		
Africa								
Cameroon	29.7	6.7	Cocoa beans	67.9	15.3	Cocoa beans	Cotton lint	Coffee (green)
Ghana	75.5	26.9	Cocoa beans	83	29.5	Cocoa beans	Cocoa butter	Tobacco
Kenya	39.9	18.6	Tea	55.4	25.8	Tea	Coffee (green)	Pineapple-canned
Malawi	76.1	69.2	Tobacco leaves	95.5	86.9	Tobacco leaves	Tea	Sugar
Nigeria	58.6	1.3	Cocoa beans	74.4	1.6	Cocoa beans	Nat. rubber (dry)	Sesame seeds
Senegal	43.7	6.1	Groundnut oil	60.9	8.6	Groundnut oil	Ground-nut cake	Cotton lint
Tanzania	17.2	9.1	Cashew nuts	45.3	24	Cashew nuts	Coffee (green)	Tobacco leaves
Uganda	41.2	19.7	Coffee (green)	67.3	32.1	Coffee (green)	Tobacco leaves	Tea
Morocco	13.6	1.4	Tangerines etc.	37.8	3.8	Tangerines etc.	Oranges	Tomatoes
Asia								
China	7	0.2	Maize	13.9	0.5	Maize	Chicken meat	Rice
India	16.4	1.9	Rice	31.4	3.6	Rice	Cashew nuts	Cake of soybean
Latin America								
Chile	19.2	3.4	Wine	43.7	7.7	Wine	Grapes	Apples
Guatemala	27.9	15.5	Coffee (green)	57.3	31.7	Coffee (green)	Sugar (total)	Bananas
Guyana	61.1	20.1	Sugar (total)	93.2	30.7	Sugar (total)	Rice	Beverages dist. alcohol
Peru	28.2	2.7	Coffee (green)	41.8	4	Coffee (green)	Asparagus	Mangoes

Source: FAOSTAT (FAO, 2004).

A number of the country case studies note the emergence of non-traditional exports with reform.

1) *Kenya*: except for tea and crude vegetable materials, traditional export performance was poor in the 1990s, with growth averaging 7.4 percent compared to over 20 percent for non-traditional exports. The strong performance of non-traditional exports is attributed in part to the removal of restrictive trade policies by importing countries, particularly Europe under the ACP-EU Lomé Agreement.
2) *Malawi*: agricultural exports remain dominated by the traditional export crops of tobacco, tea and sugar, but new crops such as coffee, rice and pulses are emerging.

TABLE 13
Dependence on a single agricultural export, as a proportion of total agricultural exports, 1980/82-2000/02 (percent)

		1980-82	1990-92	2000-02	Change (percent) 1980/82-1990/92	Change (percent) 1990/92-2000/02
Africa	Cameroon	43	31	30	-27	-5
	Ghana	90	86	75	-5	-12
	Kenya	42	40	40	-6	0.6
	Malawi	53	77	76	46	-2
	Nigeria	61	60	59	-2	-2
	Senegal	53	53	44	0	-18
	Tanzania	34	29	17	-15	-41
	Uganda	98	75	41	-24	-45
	Morocco	31	20	14	-36	-31
Asia	China	8	11	7	38	-35
	India	20	16	16	-16	0
Latin America	Chile	19	23	19	23	-18
	Guatemala	43	36	28	-18	-21
	Guyana	72	78	61	9	-21
	Peru	44	31	28	-29	-9

Source: FAOSTAT, (FAO, 2004).

3) *Tanzania*: although dependence on income from agricultural exports has been a major source of short-term economic instability, due to fluctuations in both prices and output, exports remain dominated by seven primary agricultural commodities, which traditionally constituted more than half of total exports. However, non-agricultural exports have been increasing, particularly minerals and tourism.
4) *Uganda*: although the share of coffee, which constituted more than 90 percent of total export earnings in 1981, declined to 20 percent in 2001, the export sector remains highly concentrated in commodity exports.
5) *Guatemala* is in transition from specializing in a few to many crops, and in the future the country will no longer depend on the success or failure of one or two products for foreign exchange earnings. However, non-traditional exports have grown at the cost of production of basic grains such as the maize, rice and beans that are basic to the Guatemalan diet. This may have implications for food security in that households will depend increasingly on income, and hence on market participation, rather than production for their own food requirements.
6) *Peru*: the main traditional agricultural exports have been coffee, sugar, cotton and cocoa. However, the country study notes that exports of sugar and cotton have been decreasing in the post-reform period and replaced in importance by non-traditional exports such as fruits (mangoes, grapes) and vegetables (asparagus and onions). There has also been diversification into new export markets, including APEC countries.

In all these countries where exports have been diversified, the opening of market opportunities for non-traditional exports, and of greater access to technology for

TABLE 14
Openness of agriculture, 1980-2002 (ratio of the value of agricultural exports and imports to agricultural GDP)

		1980-85	1986-91	1992-97	1997-2002
Africa	Cameroon	0.31	0.26	0.18	0.18
	Ghana	0.24	0.22	0.26	0.45
	Kenya	0.38	0.36	0.61	0.64
	Malawi	0.54	0.49	0.85	0.82
	Nigeria	0.18	0.11	0.17	0.14
	Senegal	0.82	0.47	0.56	0.74
	Tanzania	n.a.	0.16	0.23	0.21
	Uganda	0.31	0.11	0.19	0.20
	Morocco	0.56	0.34	0.42	0.45
Asia	China	0.17	0.22	0.22	0.15
	India	0.05	0.04	0.06	0.08
Latin America	Chile	0.65	0.56	0.57	0.70
	Guatemala	0.43	0.46	0.44	0.46
	Guyana	1.26	1.10	1.22	1.30
	Peru	0.38	0.47	0.39	0.39

Source: FAOSTAT (FAO, 2004); World Bank, 2004.

producing and packing or processing them, may have been one of the most beneficial consequences of policy reforms implemented.

Export development in Guatemala and Peru tends to be an enclave development, in the sense that its benefits are not widely shared among the rural populations. At first glance, the same appears to be true to a lesser extent in Guyana, but other factors such as small farm size must also be responsible for the high degree of rural poverty there, since large numbers of rural families participate in producing the main export crops of rice and sugar. Malawi also has a degree of enclave development of its agricultural export sector. As in the case of Guyana, the main export crop (tobacco in Malawi) is widely grown but its profits have not been sufficient to lift significant numbers of rural households out of poverty. In Chile on the other hand, the export success has been associated with a significant reduction in rural poverty.

Changes in the degree of openness

Reforms in the sample countries have generally led to an increase in the openness of the agricultural economy, as measured by the significance of both imports and exports. The ratio of agricultural trade, both exports and imports, to total agricultural GDP in the period 1997-2002 exceeds 60 percent for 5 countries in the sample and has increased significantly for 9 countries since the second half of the 1980s (Table 14). Some notable cases of increases in openness are Kenya, Malawi, Senegal, Chile and Guyana (reaching 130 percent). China and India's low openness indices are understandable given the size of their domestic markets. The other countries' low openness indices suggest that their agriculture is relatively more oriented toward non-tradables. With the increase in openness, agricultural sectors become more exposed to world price movements and exchange rate changes, and to shifts in foreign market conditions generally.

4

Consequences of reform for food security

METHODOLOGY

The implications of economic and trade reforms for food security are difficult to gauge directly, and are best captured through a series of indicators that apply to both the national and household level. Such indicators may be usefully categorized according to the three main facets of food security: availability, stability and accessibility. Information on *availability* at the national level can be provided by data describing average nutrient availability (for example as contained in the FAO food balance sheets); and by data on domestic production, food aid and net imports. National indicators on the *stability* of supplies can include information on the seasonality of both prices and quantities; while an indication with respect to *accessibility* can be gained from food import price levels and the ratio of food imports to total export earnings. The latter describes the cost of maintaining access to food supplies through imports.

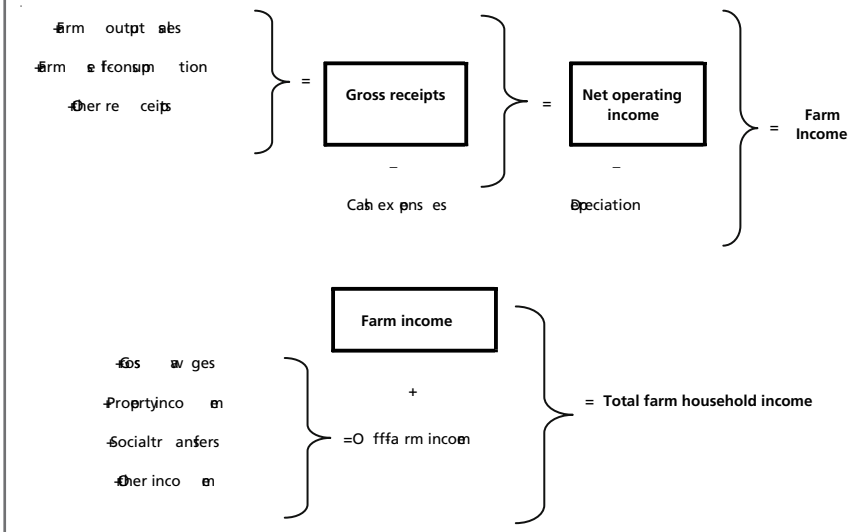
However, in many respects the most relevant definition of food security is at the household level rather than the national level. Household food security can be interpreted as the ability of individual households, particularly low-income households, to sustain adequate levels of calories, proteins and other essential nutrients. Key indicators here include local *availability*; including household production; the *stability* in real income from all sources, including their own production, and the *accessibility* that the level of real income provides.

The household level relationship between reform and food security can be considered in two stages: the impact of agriculture sector change on household income and expenditure of farmers, and the effect of changes in household income and expenditure on household food security.

To understand how households have been differentially affected by agriculture sector change brought about by reform, it is necessary to categorize household types. Though the most appropriate classification may vary among countries, it was decided to use a common system for comparison. Farm households were grouped under the following criteria:

1) degree of commercialization (subsistence, pre-commercial, commercial);
2) types of main products (export crops, import crops, non-tradables);
3) organization of farming (owner-operated, cooperative, contract farming, sharecropping, plantation);
4) mode of market access (e.g. how output and credit markets are accessed);
5) location;

FIGURE 11
Components of farm household income



6) scale of access to resources (particularly land);
7) other non-farm rural household types (e.g. rural labourers).

For each selected household type, data on income and expenditure would need to be collected. For farm households, information would have to be documented on the production of each commodity and on the proportion of each that is sold, as well as off-farm income (Figure 11). Ideally, the information should be collected for two or more discrete periods of time in order for changes to be identified. The rationale for searching for this data is to construct an accounting framework to record all income and expenditure of a household in order to compute the net change, and to incorporate quantity responses to price changes.

However, the majority of the case studies only partly implemented this method, because of lack of data (see Table 15). In most situations, household survey data could be used as the basis for household categorization and the analysis of changes in expenditure and income levels, but a particular constraint was data availability on rural labour markets, notably wages.

In general, information on household food security is far more difficult to obtain than national level data, and the case studies are no exception. Nevertheless, they do, in a number of instances, provide useful supportive data to complement and qualify the story told by the national statistics. In this respect they perform an important function. While food consumption levels by household income strata are often difficult to obtain, another important target variable, as a proxy for food insecurity, is the prevalence of poverty in a country. If the percentage of the population below the poverty line increases, then it is likely that nutrient intake will have decreased

TABLE 15
Data sources for countries studied

Country/ Source	Agriculture		Trade/macro		Food security		Agric. census	National surveys		Rapid appraisal
	Nat.	FAO	Nat.	IMF/WB	Nat.	FAO		Before reform	After reform	
Africa										
Cameroon	x		x	x	x				x	
Ghana	x		x	x	x				x	
Kenya	x		x	x	x	x		x	x	
Malawi	x	x	x		x				x	
Nigeria	x							x	x	
Senegal	x								x	
Tanzania	x		x	x	x	x				x
Uganda	x		x		x				x	x
Morocco	x		x	x		x			x	x
Asia										
China	x							x	x	
India	x		x		x		x	x	x	
Latin America										
Chile	x		x		x	x	x		x	
Guatemala	x						x	x		
Guyana	x	x	x	x	x			x	x	x
Peru	x	x	x	x		x	x	x	x	x

for lower income families as a whole. Ideally, the proxy would include not only the prevalence of poverty but also its depth, however, in the countries studied it was not always possible to make or obtain such measurements.

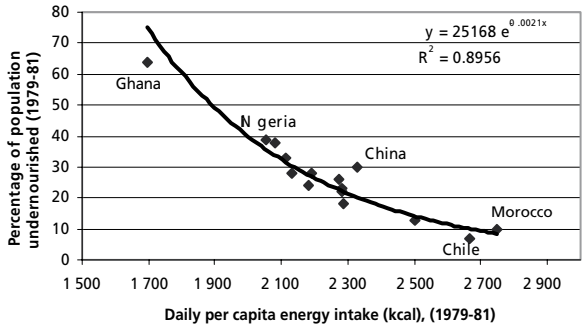
Where feasible, the country studies also review other variables that are related to household incomes of the poor, such as employment levels, in both urban and rural zones, and the land area cultivated. As pointed out in the analysis of Uganda, "Unemployment ... increases the vulnerability of the poor urban households to food insecurity." The same could be said for poor rural families whose landholdings are very small.

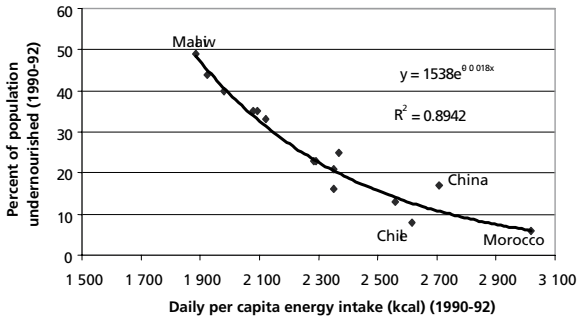
REFORM AND NATIONAL LEVEL FOOD SECURITY

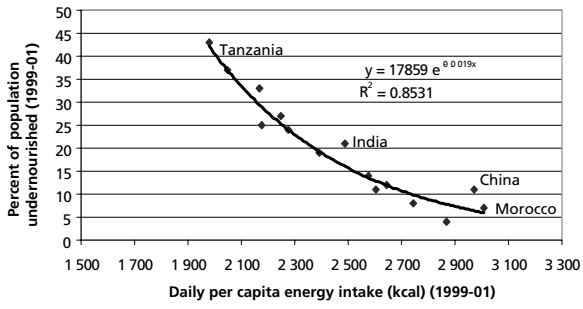
International trade in agriculture has a potentially important role to play in helping countries to meet their national food security objectives. Consumption smoothing will occur when international markets are used for purchasing or selling food when there are domestic production shortfalls or surpluses. Furthermore, international trade can increase income levels by stimulating productivity improvements and a more efficient allocation of resources. However, trade may also give rise to adverse effects on food security, particularly when it causes prices to be unstable, and can adversely impact rural food security if it reduces real prices received by domestic farmers.

The association of nutrition with agricultural production and with real incomes appears strong, as shown in Table 17. Given the link between food consumption and incomes, the role of industrialization in increasing incomes, and the fact that food can always be imported, there may have been a tendency among governments to minimize the importance of agricultural growth in reducing undernourishment.

FIGURE 12
Aggregate food availability vs prevalence of undernourishment, 1979-81, 1990-92, and 1999-2001







Source: [illegible]

However, agriculture emerges as a key sector in the countries studied, with agricultural growth important in reducing undernourishment, by its effectiveness in reducing poverty.

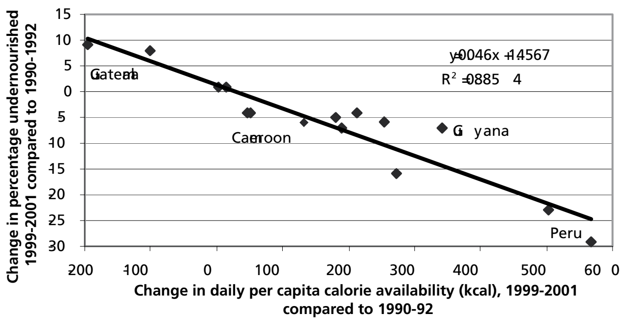
Per capita agricultural production increased after reform for ten of the sample countries, some by very significant amounts. However, in Kenya, Morocco, Senegal and Tanzania there was a worsening of this indicator, particularly Morocco and Tanzania. Among the countries with declines in the production index, only Kenya

TABLE 16
Per capita availability of calories, protein and fat, 1980/80-1999/01

	Calories (cal/day)			Protein (g/day)			Fat (g/day)		
	1980-82	1990-92	1999-2001	1980-82	1990-92	1999-2001	1980-82	1990-92	1999-2001
Africa									
Cameroon	2 260	2 123	2 240	57	51	56	48	43	48
Ghana	1 661	2 094	2 621	38	46	54	36	36	38
Kenya	2 164	1 924	2 044	56	51	53	42	45	48
Malawi	2 269	1 886	2 164	66	51	54	39	26	29
Nigeria	2 065	2 559	2 768	49	57	63	56	62	64
Senegal	2 343	2 283	2 275	67	67	63	62	60	68
Tanzania	2 186	2 078	1 970	54	51	48	31	31	29
Uganda	2 139	2 291	2 371	49	55	57	23	31	32
Morocco	2 772	3 017	3 002	73	84	81	53	58	59
Asia									
China	2 400	2 708	2 974	56	66	85	35	55	83
India	2 067	2 368	2 492	51	57	59	34	42	53
Latin America									
Chile	2 646	2 612	2 851	71	73	78	61	67	85
Guatemala	2 332	2 352	2 160	59	60	55	44	43	47
Guyana	2 517	2 350	2 536	61	61	73	50	35	49
Peru	2 143	1 979	2 602	55	49	64	42	43	50

Source: FAOSTAT, (FAO, 2004).

FIGURE 13
Change in average food availability vs change in undernutrition prevalence during the 1990s



Source: [illegible]

escaped a decline in nutrient availability as well. In other words, even if foreign exchange *per se* is not a limiting factor, evidently other factors were at work that prevented food imports from making up the production shortfall. A probable linkage in this regard operates via the effect of production on rural incomes, and the dependence of nutrition on income levels. Lack of sufficient income translates into lack of sufficient purchasing power to induce the marketing system to bring in needed quantities of imports. India is to some extent an exception: relatively low

TABLE 17
Change in the proportion of the population undernourished, food production, rural poverty and economic growth, 1979-2002

	Percentage of population undernourished		Change in percent under-nourished	Real growth per capita food production (percent) [a]	Incidence of rural poverty (percent)[b/]		Real growth per capita (average annual percent)	
							GDP	Ag. value added
	1990-1992	2000-2002	1990/92-2000/02	1989/91-2001	Early 1990s	End 1990s	1990-2002	1990-2002
Africa								
Cameroon	33	25	-8	6	59.6	49.9	-1.2	2.0
Ghana	35	13	-22	48	63.0	49.0	1.9	0.7
Kenya	44	33	-11	-6	46.3	59.6	-0.7	-1.5
Malawi	49	33	-16	67	-	66.5	1.1	5.1
Nigeria	13	9	-4	18	48.0	76.0	0.3	0.9
Senegal	23	24	1	-3	-	-	1.0	-1.1
Tanzania	35	44	9	-22	41.0	39.0	1.1	0.8
Uganda	23	19	-4	1	59.4	39.0	3.6	1.0
Morocco	6	7	1	-17	18.0	27.0	1.1	3.8
Asia								
China	17	11	-6	74	32.9	3.2	8.2	2.9
India	25	21	-4	13	30.1	21.0	3.7	0.6
Latin America								
Chile	8	4	-4	25	39.5	23.8	4.2	1.6
Guatemala	16	24	8	3	-	-	1.2	0.1
Guyana	21	9	-12	84	45	40	3.5	3.8
Peru	40	13	-27	51	70.8	64.8	1.3	2.0

[a] Overall per capita food production growth between 1989/91 and 2001 in 1989/91 constant prices.
[b] Percent of population below the national poverty line. Starting and ending years differ but are generally from 1990 to 2001, except for China where the beginning incidence of poverty is for 1978.
Source: Country case studies; FAO (2003b); World Bank (2003).

sectoral output growth (especially during the 1990s) is associated with fairly high aggregate income growth, but rising real agricultural prices have helped to offset the sluggish output growth, and industrial sectors have expanded rapidly since the loosening of state controls on the economy in the early 1990s. Other exceptions are Guatemala (higher real GDP growth than agricultural growth), and Peru (higher growth in agriculture than in real GDP).

The case studies show a very mixed impact of the reforms on the degree to which a country depends on imports for food supplies. This measure is complicated by trends in a range of variables, particularly population growth and the uneven pattern of reforms. Overall, the import dependency of these countries appears to have risen, at least in part a product of economic growth coupled with currency reform and (to a lesser extent) some relaxation of trade barriers.

Table 18 shows these indicators alongside the share of food aid as a percentage of commercial food imports. This ratio tends to decline, often significantly, in the period after 1995. The experience, however, differs sharply by country.

1) *Ghana*: national level indicators suggest that food security improved with earlier reforms, but the upturn of the ratio of food imports to total exports

TABLE 18
Indicators of food import dependence, 1985-2001

	Food imports as a percent of total merchandise imports		Change between 1985-89 and 1995-2001	Food imports as a percent of total exports of goods and services minus debt service		Change between 1985-89 and 1995-2001	Food aid as a percentage of commercial food import bill		
	1985-89	1995-2001		1985-89	1995-2001		1980-89	1990-95	1996-2001
Africa									
Cameroon	11	12	1	8	8	0	2	1	1
Ghana	9	10	1	19	14	-5	31	16	7
Kenya	4	9	5	9	17	8	28	17	10
Malawi	7	9	2	15	16	1	94	170	29
Nigeria	12	13	1	19	9	-10	0	0	0
Senegal	22	26	4	29	33	4	9	3	2
Tanzania	5	14	9	23*	26	3	83	9	9
Uganda	4	7	3	11	23	12	46	42	24
Morocco	11	12	1	19	18	-1	12	6	1
Asia									
China	4	2	-2	13	5	-8	1	1	0
India	4	2	-2	11	6	-5	11	12	3
Latin America									
Chile	4	5	1	3	5	2	2	0	0
Guatemala	7	11	4	12	15	3	30	18	16
Guyana	8	13	5	9*	11	2	49	30	29
Peru	16	13	-3	20	17	-3	13	16	7

* Data for 1990-94.
Source: FAOSTAT (FAO, 2004); World Bank, 2003.

and the slow down in the growth of food production per capita from the mid-1990s suggests a recent deterioration. While food imports constituted a declining share of total exports between 1992 and 1996, this trend has since been reversed, although the ratio remained below the 1992 level. Maize production appeared to keep pace with demand, whereas domestic production of rice rose marginally but not enough to offset growing demand. The proportion of rice imports to consumption has risen substantially. This can be at least partially explained by falling food aid volumes, the fall in the world price of rice, and exchange rate appreciation.

2) *Kenya*: national production of food crops increased slowly following the reforms of the mid-1990s, although this growth has primarily been in output of traditional crops, rather than in that of the main staple, maize, which has declined. The per capita trend has been less apparent, reflected in an increasing dependency on food imports and a persistent rise in the ratio of food imports to total merchandise exports, all of which suggests that food security at the national level has become increasingly compromised since the reforms.
3) *Malawi*: the most significant reforms took place in the 1990s, and correlate with increases, though variable, in total cereal and food production. However, strong population growth has meant that any increases in per capita food production have been marginal, and in the case of the main staple, maize, the supply has fallen. However, this has been compensated by increases in the supply of other food crops, particularly cassava and potatoes.

4) *Tanzania*: per capita availability of the main nutrients has fallen post-reform, partly highlighting the adverse impact of currency appreciation on domestic production and subsequent consumption, and also reflecting the high rate of population growth. This has occurred in spite of an expansion of international trade in food products.
5) *China*: per capita supplies of the main nutrients have risen substantially during the post-reform period, and this has been accompanied by a rapid increase in the supply and consumption of non-staple foods such as meat, vegetables and edible oils. Rising incomes were reflected in the fact that the proportion of grain consumed as animal feed nearly doubled. By the late 1990s, rapid economic growth had ensured that food imports as a share of total exports fall substantially. Thus, although food imports rose and were playing a bigger role in supplementing national food supply, the relative cost to the economy was substantially lower.
6) *India*: there has been no overall trend in production over the last decade. Economic reforms initiated during 1991 resulted in a sharp increase in real procurement and market prices of cereals, and an increase in public stockholding. Consequently, consumer prices rose relatively fast, impacting negatively effective demand and per capita consumption and hence food security.
7) *Latin America*: the supply of main nutrients per capita has fallen in Guatemala during the last decade, while in Guyana the aggregate supply of food per capita has remained stable and the ratio of food imports to total exports has fallen following the reforms - although even here the picture is quite uneven as the immediate positive impact of trade policy reforms appears to have peaked. In Peru, aggregate food availability has increased since the period of economic reform, but this has been through increasing imports rather than domestic production. This trend has weakened as economic growth has slowed.

REFORM AND HOUSEHOLD FOOD SECURITY

Indicators of household food insecurity

The aggregate level analyses depicted in Figures 12 and 13 display a strong (inverse) relationship between levels of per capita food availability and the prevalence of undernourishment. However, the most fundamental indicators of food security are those that reflect change at the household level. Any implication of policy for the availability, accessibility and stability of food supplies at the national level will be mediated by a range of institutional and regional parameters that can transform the situation for individual households.

Information at this level of disaggregation is often difficult to obtain, and is best accessed through household surveys. Although there is some evidence from the case studies in this respect, the coverage is not complete. Instead, a number of proxy variables are used.[2] Given that entitlements to food are closely correlated with

[2] It should be noted that only a few case studies attempt to investigate the differential impacts on net consuming as opposed to net food producing households. It is increasingly recognized that rural households are characterized by a diversity of consumption/production positions and that the impact of reform will be different for these different household types.

effective demand for food products, trends in per capita income levels will give some indication of changes in the ability of households to access food. Similarly, data on poverty can be illustrative, if one makes the assumption that any increase or decrease in those households estimated to exist below the poverty line will have concomitant implications for food security.

Other indicators that can reflect trends in household food security are the national estimates of the number of malnourished. Although undernourishment is only part of the impact of food insecurity, reflecting a worst case scenario, levels of household food security will be likely to move in the same direction as trends in undernourishment, although the correlation may not necessarily be close.

Poverty and reform

Those countries which have experienced relatively strong levels of growth in real GDP over the past decade tend to report positive outcomes with respect to reducing the number of people below the poverty line (Table 17). For example Ghana, Uganda, China and Guyana all report fairly significant reductions in poverty levels in the last decade. Peru and Tanzania experienced more moderate increases in real GDP and this appears to be reflected in more moderate reductions in poverty.

1) *Ghana*: the incidence of poverty declined from 51.9 percent in 1991/92 to 39.5 percent in 1998/99, but increased in the Central, Northern and Upper East regions.
2) *Tanzania*: the population below the basic needs poverty line declined from 39 to 36 percent between 1991/92 and 2000/01 and rural poverty dropped from 41 to 39 percent.
3) *Uganda*: poverty trends and human development indicators have improved, with both rural and urban poverty declining. The headcount ratio declined from 55 percent in 1992/93 to 35 percent of the population in 1999/2000 at the national level, and from 59 percent to 39 percent in rural areas.
4) *China*: since the start of the economic reforms in 1979, remarkable progress has been made in reducing rural poverty, from 260 million people to 29 million. This represents a fall from 32.9 to 3.2 percent of the rural population between 1978 and 2001. The greatest reductions in poverty came in the early years of reforms but the rate has continued to fall gradually since then.
5) *Guyana*: the country saw a reduction in absolute poverty from 43 percent in 1992 to 36 percent in 1999 (28 percent to 19 percent for critical poverty). However, there was no real improvement in the situation for the rural interior area between 1992/93 and 1999. Overall poverty levels remain high and, given the economic reverses since 1999, the improvements that occurred may not have been sustained.
6) *Peru* reported a moderate reduction in poverty during the 1990s, with national poverty falling from 57 percent in 1991 to 50 percent in 2001, and extreme poverty from 26.8 to 24.4 percent. Between 1991 and 1997, rural poverty dropped from 71 to 65 percent and urban poverty from 52 percent to 49 percent.

Table 17 also shows that in those countries experiencing relatively small increases in real GDP over the past decade, the indicators for the poor are generally less encouraging. Cameroon reports some negative trends, although a reduction in

poverty levels took place during the second stage of reform, from 1996-2001. Kenya, Malawi and Nigeria all experienced an increase in poverty rates during the 1990s.

1) *Cameroon:* per capita real income declined from 1984, followed by a relative improvement in the second phase of reforms. A similar trend is apparent in the household survey analysis of poverty trends, with an approximately 13 percent reduction of income poverty during the second phase of reform. However, poverty in the rural areas only fell by around 10 percent, still remaining at almost 50 percent of the rural population in 2001.
2) *Kenya:* the national incidence of poverty increased from 46 percent of the population in 1992 to 57 percent in 2000, with rural poverty over this period increasing from 46 percent to 60 percent. The rise in urban poverty for Kenya was even greater, from 29 percent in 1992 to over 51 percent in 2000. Household expenditure also decreased in real terms during the reform period.
3) *Malawi:* is one of the poorest countries in the world, with recent estimates indicating that 65 percent of the population fall below the poverty line and 29 percent are at bare subsistence levels. Changes in expenditure for a matched sample of Malawi farm households suggests that welfare may have declined in the post-reform period, with real expenditures for households in all sizes of farms declining between 1998 and 2002.
4) *Nigeria:* the real income of rural households rose by 60 percent on average between the pre-reform and the reform period. Estimates of the proportion of the population living below the poverty line in Nigeria show an increase from 28 percent in 1980 to 46 percent in 1985. This declined to 43 percent in 1992 but increased to 66 percent in 1996. Reform appeared to narrow the income gap between rural and urban households but the subsequent reversal of reform appears to have widened the gap again.

In summary, the effects of structural policy reforms on household incomes tend to depend on the overall response of the economy to the reforms. In those countries in which post-reform economic growth was inadequate, there was a greater possibility of poverty deepening.

Undernourishment and reform

In addition to being closely associated with poverty levels, food security is reflected in data on undernourishment. While data in this paper are generally presented from 1980 onward, the analysis here tends to focus on what has happened between 1990 and 2001 or 2002. These years cover the period, for most of the sample countries, when the effects of reforms were being felt or reforms were getting underway (Table 19). In 1999-2001, Tanzania had the highest rate of undernourishment, at 43 percent of the population. Kenya and Malawi each had at least one third of their populations estimated to be undernourished. For Cameroon, Guatemala, Senegal and India the rate was at least 20 percent of the population. Between 10 and 20 percent of the populations of Uganda, Guyana, Ghana, China and Peru were undernourished. Estimates for the remaining countries indicate that undernourishment was less than 10 percent of the population in Nigeria and Morocco and less than 5 percent in the case of Chile.

Over the period from 1979/81 to 1999/2001, the proportion of people undernourished was reduced in eight of the countries, with particularly significant declines for Ghana and Nigeria. The more recent trends are more encouraging.

TABLE 19
Undernourishment and population, 1990/92 and 1999/2001

	Proportion of the population undernourished		Change in proportion under-nourished (percentage points)	Total population (millions)		Popula-tion growth (percent)	Total undernourished (millions)		Change in under-nourished (millions)
	1990-92	1999-2001	1990/92-1999/2001	1990-92	1999-2001	1990/92-1999/2001	1990-92	1999-2001	1990/92-1999/2001
Africa									
Cameroon	33	27	-6	12	15	25	3.9	4	0.1
Ghana	35	12	-23	16	19	24	5.5	2.4	-3.1
Kenya	44	37	-7	24	31	26	10.6	11.5	0.9
Malawi	49	33	-16	89	114	29	4.7	3.7	-1
Nigeria	13	8	-5	10	11	18	11.2	9.1	-2.1
Senegal	23	24	1	8	9	25	1.7	2.3	0.6
Tanzania	35	43	8	27	35	30	9.5	15.2	5.7
Uganda	23	19	-4	18	23	31	4.1	4.5	0.4
Morocco	6	7	1	25	30	19	1.5	2.1	0.6
Asia									0
China	17	11	-6	1 169	1 275	9	193	135.3	-57.7
India	25	21	-4	861	1 008	17	214.5	213.7	-0.8
Latin America									0
Chile	8	4	-4	13	15	14	1.1	0.6	-0.5
Guatemala	16	25	9	9	11	27	1.4	2.9	1.5
Guyana	21	14	-7	1	1	14	0.2	0.1	-0.1
Peru	40	11	-29	22	26	17	8.9	2.9	-6

Source: FAO, 2002 and 2003b.

From 1990/92 to 1999/01, the undernourishment proportion declined in 11 of the 15 countries. The only countries for which the rate of undernourishment increased significantly during 1990s were Tanzania and Guatemala, but it also appeared to increase slightly in Morocco. In the case of Senegal, the data suggesting a marginal increase in the rate of undernourishment differ from the findings of the country study, which reports a decrease in the number of households that are food insecure. The discrepancy may be due to the fact that Table 19 covers a much longer span of time than the household statistics in the country study.

The proportion of the population that is undernourished does not necessarily indicate what is happening to the absolute number of undernourished people in a country. Table 19 shows that population growth has been significant in these countries, with cumulative population increases in excess of twenty percent for over half of the countries during the last decade. Growing populations may pose additional food security problems and the absolute number of undernourished in a country may rise even if the percentage of the population that is undernourished falls. This appears to have been the case for Cameroon, Kenya and, on a smaller scale, recently in Uganda.

For the countries as a group, the proportion of undernourished people has declined over the last two decades by 34 percent, of which 13 percent was during the 1990s. This is a reduction of 215 million undernourished people. However, all of the

improvement on this score was accounted for by China and India. When they are excluded from the sample, the other 13 countries show a very small decline in the aggregate number of undernourished.

In spite of this overall trend, a few countries have achieved significant percentage reductions in the total numbers undernourished in the past decade, particularly Chile, China, Guyana, Ghana, and Peru. In Malawi and Nigeria, there was also a decrease in the numbers of undernourished people in the more recent period. The countries which appear to have experienced significant percentage increases in the numbers of undernourished people during the 1990s include Guatemala, Morocco, Senegal and Tanzania. Surprisingly, India's rapid pace of progress by this measure during the 1980s declined to almost nil in the 1990s.

Income distribution and reform

Indicators of income distribution and of growth in the agriculture sector can complement the indicators based on undernourishment and poverty. Figure 14 shows income distribution for the countries in this study. While the Gini coefficients range from 30 in Ghana to 57 in Chile, there appears to be little correlation between these coefficients and the most recent data for the proportion of the population undernourished (as shown in Table 17). It is conceivable that trade reform may increase income inequality while at the same time reducing poverty and food insecurity.

DIFFERENTIATED EFFECTS WITHIN COUNTRIES

The proxy variables used above to indicate trends in household food security may mask the real picture by ignoring distributional and other variations *within* countries in response to macro-policy changes. The case studies identify a range of such differentiated effects, including by location, by region, by type of commodity produced as well as by particular groups of the population.

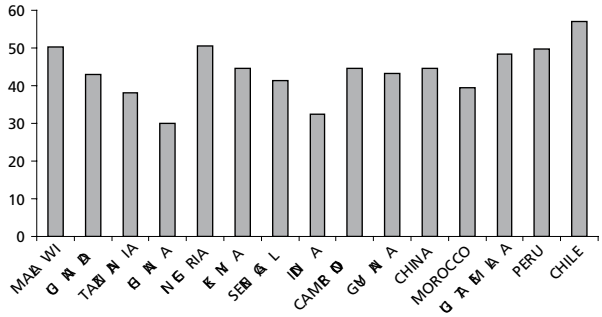
Urban, rural and regional disparities

The direction in which food security indicators change in response to shifts in economic policy is likely to vary with the level of development. Among the countries examined, there are wide differences in both the level of development and the urban/rural split. Chile has the highest per capita income level and is the most urbanised, with only 14 percent of the population being rural dwellers. The lower income countries tend to have high rural populations: 85 percent of the population in the case of Malawi and Uganda.

In all countries with available data, poverty rates are significantly higher in rural than urban areas. In Malawi for instance, it is estimated that 67 percent of the rural population and 55 percent of the urban population lie below the poverty line. Given that 85 percent of the total population is rural, poverty is predominantly a rural problem.

A number of the case studies report a widening of income disparities with reform. In Ghana, the proportion of households not able to meet minimum nutritional requirements declined by more than 80 percent in Accra, the capital city, while the proportion of households not able to meet minimum nutritional requirements

FIGURE 14
Income distribution as given by Gini coefficient



Source: World Bank 2004.

increased in the 1990s in the rural Central, Northern and Upper East regions. In the 1980s in Nigeria, poverty was significantly higher in the northern regions, but by the 1990s, poverty in the south had risen to very similar levels and there was convergence at higher levels of poverty. Rapid economic growth in China has been accompanied by an increasing income gap since the mid-1980s between households, regions, and urban and rural populations. Improvements in Guyana's poverty rate also seem to have benefited urban areas disproportionately.

As in the case of Ghana, many of the country studies report significant differences in poverty and food insecurity by region. Regional variation occurs for a range of reasons, including remoteness, land quality, climatic conditions, access to markets and inputs. For Kenya, poverty levels are highest in the Coast, North Eastern and Eastern provinces as well as in the highly populated Western and Nyanza regions and the Rift Valley and Central provinces. For Malawi, the Southern region has the highest poverty rate, followed by Central and Northern Malawi.

Significant regional differences also exist in China, where poor counties tend to be characterized as remote and mountainous and disadvantaged in terms of agricultural resources and climatic conditions. Almost 80 percent of counties officially designated as poor in the 1980s were concentrated to the west of the central mountainous parts of the country. The remaining poor counties are located in the hills of eastern and south-eastern China, but are generally less disadvantaged. Recent estimates for India suggest that the incidence of undernourishment ranges from below 8 percent in Punjab to over 43 percent in Tamil Nadu.

For Chile, the greatest incidence of extreme poverty is in the southern regions, where inhabitants do not have sufficient income to purchase basic foods, leaving them particularly affected by food security problems. Peru reports that Loreto, Amazonas, Cajamarca, Pasco and Ucayali are the provinces with the highest incidence of extreme poverty.

Despite the significant decline in Guyana's poverty rate the urban areas fared considerably better than the rural areas. In particular, the Rural Interior, where most

of the indigenous population lives, has seen no real improvement. As much as 78 percent of the Rural Interior population remained poor in 1999 and poverty in the Rural Coastal area was also considerably above the national average. In Uganda, there were significant reductions in poverty almost across the board, with the exception of the Northern region, where the persistence of poverty appears largely the result of more than fifteen years of civil conflict.

Similar findings on the geographical variation of benefits from reform were reported, on the basis of analysis of household data in eight African countries:

> *". . . recent work on poverty dynamics has shown that some regions, by virtue of their sheer remoteness, have been left behind as growth has picked up. Households with limited access to markets and public services have not benefited from growth during the 1990s."*
>
> **(Christiaensen *et al.*, 2003).**

Disparities related to commodities

Specialization in the production of different commodities can also account for variation in the impact of reform. The Chinese study shows clearly some key gainers and losers from trade reform at the regional level, as a function of cropping patterns. While both western and particularly the eastern regions of China have benefited from trade, liberalization appears to have hurt producers in central China, which is the largest producer of soybean and edible oil, two of the commodities most affected by liberalization of imports. The poor suffered, since they were large producers of these products. In recent years, however, the poor have probably gained from China's protection of the maize, cotton and wheat that they produce.

In Kenya, the less lucrative cash crops such as sugar and cotton are produced in the Coast, Western and Nyanza provinces. The more lucrative export crops such as tea and coffee are mainly produced in the Central Province, which in 2000 had the lowest poverty incidence estimate of any region. Reduction of poverty in Chile was greater in regions with more modern agricultural systems. During the 1990s, the poverty rates were lower and reduced by a larger proportion in the central zone, where agriculture is modern and export-oriented. This contrasts with higher poverty rates in the southern zone, where farmers mainly engage in traditional agriculture.

Export-oriented policies for agriculture may have a selective influence on food security, since greater export success appears to enhance food security among those able to participate in these markets, through the linkage with the higher rural incomes generated. For instance in Ghana the price incentives resulting from economic reform appear to have favoured export crop farmers, particularly those in cocoa. Export crop farmers tend to have higher real household incomes and expenditure, as well as higher real food expenditure per capita than do households headed by food crop farmers. For Nigerian farmers, 1996 data suggests that diversification was important. Those farmers specializing in both food and export crops had significantly lower poverty levels than those specializing in either food crops or export crops. The export crop producers had slightly higher levels of non-poor than the food crop producers, though it is possible that access to own-consumption may lead to better food security for the latter than poverty measures would indicate.

Similarly, subsistence farmers in Guatemala have lower incomes than in those regions where the focus is on producing export crops.

Gender related disparities

The evidence of increased poverty and food insecurity rates for female-headed households is mixed. The Cameroon study reveals that female-headed households tend to be particularly poor and therefore vulnerable. Female-headed households experienced strong growth in real household food consumption between 1984 and 1996, but weaker growth than households headed by men during the period 1996-2001. This may be due to more concentration on food crops by women, compared with a relative focus on cash crop production by men. The Kenya study also notes that households headed by males had higher incomes than those headed by females in all regions in 1997. Although for China poverty does not appear to be a problem particularly associated with women, in general poverty does adversely influence female schooling, female infant mortality and maternal mortality.

In Ghana, the proportion of rural households unable to meet minimum nutritional requirements is lower for women than for men. In Guatemala, it appears that the gender of the household head is not as important a risk factor now as in the past, because of remittances to wives and mothers as larger numbers of men have migrated overseas. Similarly for Guyana, the data suggest that female-headed households generally do better than male-headed households. However, a significant gender disparity occurring in Guyana that affects food security outcomes is the relatively low labour force participation rate of 39 percent for women compared with 76 percent for men. In Guatemala also, rural employment is mostly male, though female participation in the labour force appears to be increasing.

Disparities related to other groups

Several country case studies highlight higher poverty and food insecurity for minorities and indigenous populations. In Chile, the poorest rural southern regions include many Mapuches, indigenous inhabitants who are constrained by a lack of cultural, educational and productive abilities to integrate themselves into markets and access modern agriculture. Similarly for Peru, both general and extreme poverty rates are higher in those provinces where large parts of the population speak their native language (Quechua, Aymara and Amazonian dialects) rather than Spanish. In China minorities also represent a disproportionate proportion of the poor.

SOCIAL SAFETY NETS AND OTHER MEASURES

Any period of transition, particularly one that involves structural economic change, is likely to lead to hardships for those unable to adapt to change swiftly and seamlessly. Frequently such households are those that are most disadvantaged in the first place. Thus, trade and associated reforms can cause adverse effects, especially in the short term. Social safety nets, compensatory policies, and appropriate sequencing of reforms can be useful means of reducing short-term transition costs, allowing poor households greater opportunity to adjust to changing social and economic environments.

However, the poorer the country, the higher the proportion of vulnerable households, and also the fewer are the resources at the disposal of government to provide ameliorative measures of this kind. Although some case studies discuss increased government expenditure on social safety nets (Guyana and Peru), or

mention the importance of donor support (Malawi and Guatemala), nevertheless, given their very low income levels and tax bases, most of the countries under study face severe financial constraints in implementing effective social safety nets capable of shielding the vulnerable poor from the transition costs associated with reform. In addition to general social safety nets and policies to compensate for losses from reform, there are also examples of policies implemented specifically to enhance food security and health.

Social safety nets are integrated into policy design in India and China, as they are part of macro and sectoral policy rather than specifically targeted programmes. Targeted programmes are a burden on scarce fiscal resources, and have been introduced mainly in Latin America, and almost none in the relatively impoverished countries of sub-Saharan Africa.

Two of the case studies from sub-Saharan Africa do, however, show the use of safety nets in the region. The poor have access to some safety nets in Malawi, including NGO food-for-work programmes and supplementary feeding programmes. In the late 1990s, the Malawian Government (supported by donors) introduced a series of safety nets for poor smallholders to minimize costs of adjustment. These included free inputs, credit for inputs, and cash-for-work public programmes in food insecure areas.

None of the policy reform programmes adopted and implemented in Nigeria explicitly included social safety nets, but several government programmes related to poverty were initiated during the policy reform period. The Nigerian Government provided some ad hoc social safety nets, but they were not systematically implemented. Furthermore, there was a lack of clear targeting to the most vulnerable groups to address negative impacts of the policy reforms.

Among the Latin American countries, Chile has explicitly recognized that vulnerable groups might require special programmes to ensure continued food security, health and nutrition. The main programmes have focused on human capital investment, nutrition and education, with great efforts made to target programmes to the poorest geographical areas. Peru also followed a strategy of providing food and nutrition as well as basic health, sanitation and education to targeted sections of the population, as well as funding social emergency programmes during the 1990s. It is estimated that between 1997 and 1998, social assistance programmes reached more than 56 percent of households, with particularly strong coverage for rural households. Targeting problems, however, meant that fewer than 70 percent of the beneficiary households were considered poor.

Nutrition and nutrition-related support became necessary in the stabilization phase of the structural adjustment programme in Guyana. Two major safety nets were introduced to provide compensatory social support for the economic reforms: the Social Impact Amelioration Programme and Basic Needs Trust Fund. Safety nets provide cash, food and other benefits designed to alleviate the worst effects of poverty. The Government has supported a reduction in poverty, with spending increasing from 0.4 percent of GDP in 1989 to a peak of 3.2 percent of GDP in 1997. However, there appear to have been targeting problems, with the pattern of expenditure by the two major safety nets not matching the distribution of regional poverty. Government schemes to improve health and food security include food and micronutrient supplementation for infants, children and pregnant and lactating

women in addition to awareness campaigns on healthy cooking and the role of a balanced diet. A "third generation" set of reforms is presently being formulated to focus on areas including research, education, nutrition, food supplementation and concentration on key target groups. Specific goals will be identified and quantitative targets set.

Since the mid 1980s, successive governments in Guatemala have made it compulsory to fortify foodstuffs such as salt with iodine, sugar with vitamin A, wheat flour with iron and B complex vitamins. In 1997, the national school food provision programme evolved into a school breakfast for all students in rural primary schools. This programme provided an estimated 65 percent of rural children's daily nutritional needs. In urban areas, where children tend to enjoy better nutrition, a more modest programme was implemented. Nevertheless, the case study also notes that social protection schemes were poorly targeted and inefficient.

Some countries have made efforts to improve food security outcomes by maintaining strategic food reserves, for example, Kenya and Malawi. Tanzania also established a Strategic Grain Reserve to purchase and store maize in times of surplus, with resale as necessary to meet local market shortages. Other countries, including Uganda, do not have national food reserves to help the country cope with unexpected shortages. However, in the cases of Kenya and Tanzania, the presence of strategic food reserves has not prevented a deterioration of food security. Access to international markets to sell surplus crops and to purchase during times of shortage may lessen the need to keep domestic food reserves and may represent a more efficient option.

5

Summary and conclusions

FOOD SECURITY IMPACTS OF REFORM: A SUMMARY

In all the countries for which case studies have been presented, there has been a variety of macroeconomic and sectoral reforms that in some cases stretch back over more than a decade. Trade policy reforms have usually been only a part of this reform process, and in some cases have been introduced piecemeal alongside other shifts in policy. In this context it is difficult, if not impossible, to disentangle the effects on food security of one element of policy reform from the effects of others.

What the studies do demonstrate is the changing nature of food security against an ongoing process of policy change. In general the direction of these changes is the same for all: towards greater openness and competition in national markets with respect to both internal trade and international trade. But the institutional and infrastructural environments in which these reforms have taken place are widely different, as are the pace and sequence with which reforms have been introduced. The extent to which individual policy shifts can be associated directly with specific food security outcomes is limited. The case studies have highlighted the complex and individual nature of the reform process.

Table 20 reflects the impact of reforms on farmers in the countries studied. Many including Ghana, Nigeria, Uganda, China, Chile, Guyana, and Peru, appear to have experienced fairly positive food security outcomes over the past decade, in conjunction with trade reforms, while the consequences in Cameroon, Malawi, and India appear to have been more ambiguous. For the remaining countries (Kenya, Morocco, Senegal, Tanzania and Guatemala) food security outcomes appear to have been disappointing (though the exact nature of the changes in Senegal is still unclear). Although trade reform has not been the only change, there are indications that there has been some spill-over from these reforms to the level of food security.

1) *Cameroon:* results from reform have been somewhat disappointing to date. The proportion of children suffering from severe undernourishment more than doubled, from 3 percent to 6.4 percent, in the ten years after 1991. The number of undernourished increased. There have been some relatively small improvements in the agricultural production index and in per capita availability of calories and protein. Income growth was negative during the early 1990s, but has been reasonably steady and positive from 1995. In addition to the challenge of further improving growth rates, a major problem appears to be distribution of benefits from growth.
2) *Kenya*: the case study notes a dismal response to reform. Climatic factors such as drought are important in explaining the country's disappointing

TABLE 20
Impact of trade-related reforms on real incomes of farmers by cropping pattern

	Farmers producing:			
	Export crops	Domestic foodstuffs		
		Import competing		Non-tradeable
		Protected	Liberalized	
Africa				
Cameroon	+	+	-	-
Ghana	+		-	-
Kenya	+		-	
Malawi	+		-	
Nigeria	+	+	-	-
Senegal	+		-	
Tanzania	+		-	
Uganda	+		-	
Morocco	+	+	-	+
Asia				
China	+	+	-	=
India	+	+	-	=
Latin America				
Chile	+	+	=/-	=
Guatemala	+		-	-
Guyana	+	+	-	=
Peru	+	+	-	+

Legend: + implies positive impact; - a negative impact; and = virtually no change.
Source: Country case studies.

performance, but the major problems appear to be policy related. There has been poor coordination and sequencing of policies, with the impact worsened by unstable world market prices. At the beginning of the reform process, the Government did not appear committed to implementation of the new measures. With declines in food security, the poor have tried to cope by borrowing, begging or relying on relief food, but these are not sustainable ways of solving food insecurity. The country study suggests that increased domestic support measures are needed to allow the agricultural sector to develop within the framework of the WTO agreement on agriculture.

3) *Malawi* shows some positive results across a range of food security indicators during the 1990s. However, while overall food and nutrient supply per capita have been increasing, the supply of maize has declined. Maize is the main staple central to food security, which may account for the finding in the country study that the food security situation at the household level has worsened. Recent data show that real expenditure by farm households declined between 1998 and 2002, which may also indicate a worsening of food security. Declines in producer prices have also adversely affected producer incomes and consumption.
4) *Nigeria* reports positive outcomes for some indicators of aggregate food security. For example, there have been consistent increases in per capita calorie intake. In the pre-reform period (1983-85), calorie intake was below 2 000 kcal per day. It increased to approximately 2 200 and 2 400 during the

reform periods (1986-88 and 1989-91) and to almost 2 800 in the post-reform period (1994-97). Food security, as measured by this indicator, appeared to be a problem for Nigeria prior to the reform, but not afterwards. Nigeria also reports that food self-sufficiency increased for most products and periods from the early 1980s, with the country maintaining a high level of self-sufficiency in major cereals. However, while reforms generated improved incentives to agricultural commodity producers, the response to incentives was below expectations. Declines in world prices for major agricultural products had an adverse impact and improvements in average calorie intake do not necessarily imply improvements in the nutritional status of the poorest households.

5) *Senegal*: the available time series on household food security was short, but a rather marked decrease was registered between 1992 and 1995 in the proportion of food insecure households, from 42.5 percent to 34.3 percent. Nevertheless, this indicator moved in the opposite direction in two regions, with food security deteriorating sharply in Saint-Louis and to some degree in Diourbel. A finding of concern is that in the aggregate, female-headed households experienced a worsening of food insecurity.
6) *Tanzania*: the overall picture appears to be a significant worsening across a range of food security indicators. Although some households reported improved food security due to higher levels of earnings and access to buy cheap imported foods, others reported that food security has been worsened by policy changes. Adverse climatic events such as El Niño rainfalls also appear to have been critical in hindering food security. A marginal reduction in the percentage of the population below the poverty line has been achieved, but the relatively slow rate of economic growth has been a major hindrance to improving the status of the poor.
7) *Uganda*: here policies have been relatively successful in regard to improving food security. Economic reforms have resulted in increased total income, agricultural output and farm household incomes. There has been some improvement in per capita availability of calories in the aggregate, and the proportion of the population that is undernourished has decreased. There has also been a small increase in the absolute number of undernourished from 1979-91 to 1999-01, but the total population increased by far more during that time. Furthermore, the country study presents data showing that the percentage of food secure households increased from 60.9 percent in 1995 to 71.8 percent in 2003.
8) *Morocco* has experienced problems with economic reforms that have significance for other countries. Per capita nutrient levels have not noticeably improved, in part due to drought and also because they were previously high relative to other countries. It has the lowest level of undernourishment of the 15 countries apart from Chile. The distributional impacts of reform are interesting: the high level of protection tended to serve the interests of the larger farmers and families in areas of high production potential but did not benefit the small producers in the semi-arid zones who mainly farm to meet their own subsistence requirements. These social and regional differences were further compounded by high domestic costs of production and inefficient

resource use. Hence, whatever problems arose from reform, protection was not a policy that benefited the poor or enhanced food security.

9) *China*: economic reforms have generated outstanding results for economic growth, poverty reduction and food security at both the national and the household level. Sharp falls in poverty rates have dramatically improved household food security and the incidence of undernourishment has dropped. Both trade and domestic reforms have been important. Foreign trade has been a vital part of China's growth story, expanding even more rapidly than GDP. Overall, the impact of trade policy change appears to have been smaller than that of domestic reform. Furthermore, domestic policy reforms have tended to stimulate growth across all sectors, whereas trade reform has had more sector-specific effects. In aggregate, the net gains from trade reform in China are positive, but there have been large differences in effects for particular groups of farmers.
10) *Guatemala*: reform has shown mixed results and the country has not overcome food vulnerability problems. This is despite the successful substitution of agricultural production with more profitable products, and the many natural resources. Falling coffee prices have been a principal reason for the poor performance, and growth in non-traditional products has not been sufficient to compensate for employment lost in the coffee sector. Some adverse climatic events have occurred and the distribution of benefits from new sources of income has not been even: tourism is concentrated in certain areas, clothing factories tend not to locate in remote areas, and remittances only reach those with relatives abroad. Furthermore, there have been problems with distributing assistance, with allegations of corruption in the process. Guatemala may be a case in which greater transparency and accountability in government are necessary conditions for improvement of the lot of the poor.
11) *Guyana* has seen some significant improvements, with reforms leading to economic growth and a positive impact on food security. While there is not a problem with resource or food availability, a major conclusion of the country study is that remaining food security problems are "first and foremost situated at the level of policy failure to ensure adequate access to food for the whole population". Distribution and poverty are key problems and while adequate supplies exist in the aggregate, strong pockets of poverty and food security problems have persisted. Although Guyana imports food to meet its requirements, there has been no scarcity of foreign exchange in the post-reform period. Following liberalization, economic growth was rapid up to 1997. However, there has been a slippage in economic growth rates since 1997, attributable at least in part to exhaustion of the reform benefits. This leads to concern for the sustainability of the improvements in food security.
12) *Peru*: the food security picture showed important overall improvements across a range of food security indicators during the 1990s. With a resumption of economic growth, access to food improved, particularly after the mid 1990s, and poverty, especially extreme poverty, diminished. These achievements gave rise to significant gains in nourishment during most of the 1990s. However, during 1998-2001, the economic situation in Peru deteriorated dramatically, with an increase in extreme poverty from 15 to almost 25 percent of the population. In short, the gains in food security in the mid-1990s did not prove

to be sustainable. Other problems noted in the country study include some deterioration in the situation of most small rural farmers during the 1980s, with little improvement for them during the subsequent reforms. This was due in part to the downward price trend for small farm outputs, combined with increased agricultural input prices. However, social safety nets improved food access and even small farm households with declining agricultural income were able to improve their food security situation with the implementation of the reform measures.

While there have been varied experiences from similar kinds of policy reform, the underlying message is clear. Trade and associated domestic policy reforms are not intrinsically antithetic to food security. However, they should be seen as a part of a policy package governing the incentives and opportunities facing agricultural producers. This package needs to be subtly designed and carefully sequenced to ensure that positive results from greater trade openness are not offset by negative impacts on poor and food-insecure segments of the population.

POLICY LESSONS

The results of this study suggest that, particularly for countries at earlier levels of development, trade reform can be damaging to food security in the short to medium term if it is introduced without a policy package designed to offset the negative effects of liberalization.

Although trade policy reform has been only a part, and often a small part, of wider reform packages, nevertheless, some useful pointers emerge from the case studies:

- The underlying premise of the domestic and trade policy reforms undertaken by countries in the sample was, with respect to the agricultural sector, that greater market orientation would improve the sector's performance. However, the results from the reform experiences of the countries have been mixed. Where reform packages are carefully designed and implemented to ensure that positive results are generated for the poor, in the short and medium run as well as the long run, reforms are condusive to poverty reduction and improved food security.
- Greater attention needs to be paid to the sequencing of reforms in markets for inputs and outputs. Appropriate incentives on the side of outputs should be assured before (or at the same time as) input prices are raised, even at the cost of maintaining some well-targeted input subsidies during a transitional adjustment period.
- More thought should be given to ways to assist the private sector to fill more completely the gap left by dismantling State agricultural marketing institutions, including support for the development of effective marketing and distribution systems.
- Improving rural infrastructure is an important concomitant for successful policy reform in most countries, but it is particularly needed in low-income areas, along with support for productive investments by small farmers. Without such investments it is difficult for such farmers to respond to price incentives.
- Policies to encourage the development of rural non-farm employment are also important for the rural poor. These can include the development of micro-

finance, simplification of regulatory regimes, infrastructure improvement, and special incentives for rural industrialization in poor areas.

- As complementary policies to facilitate adjustment of the kind mentioned above can take time to bear fruit, transitional compensatory measures, targeted on lower-income groups, may be needed. The absence of measures to protect the poor, and the problems of targeting the most vulnerable groups, were noted in several of the case studies.
- Looking to the WTO negotiations on agriculture, the most sensitive domestic trade policy debates centre on policy instruments to deal with import competing sectors. This is particularly so in those cases where international markets are distorted due to high levels of support and export subsidies by rich countries that can afford them.
- For countries with a large proportion of low income and resource poor people living in rural areas and who depend on agriculture, reforms aimed at raising productivity and at non-agricultural employment creation are essential for enhancing food security in the medium to long term. However, since such reforms may take some time to yield results, it seems preferable that these reforms be set in motion before (or at least at the same time as) implementing measures such as removing subsidies on agricultural inputs, and reducing tariffs on key crops grown by low-income households.

AREAS FOR FURTHER RESEARCH

This synthesis has brought out the main elements of reform experiences in a number of countries and has yielded some tentative conclusions. Some of the issues which could benefit from further research are outlined here.

- The relative weight to be assigned to different components of macroeconomic and sectoral policy reforms in an adjustment package.
  It is important to understand the relevance of the stage of agricultural development to the contribution that the sector is making, or could potentially make, to broader growth, poverty reduction and levels of food security. A better understanding of the significance of sequencing on the agricultural sector, in particular of the balance between trade reform and domestic policy changes, would be useful.
  The fact that reforms were often initiated in response to a macro-economic crisis adds weight to arguments that specific sectoral policy interventions or reforms should not necessarily be put in place simultaneously. Rather, they should be implemented following the alleviation of the factors contributing to the crisis.
- The transmission mechanisms between policy reforms and real producer prices and the constraints that modify these.
  Such transmission mechanisms are a function of the marketing institutions and the structure of the market, but they are also influenced by price discovery mechanisms and information channels. The question of how farmers form expectations about future prices and how these expectations can be made more informed is vital to the promotion of transparency in reform.
- The differential supply response of different types of producers in different institutional and policy environments.

Understanding the impact of price changes on different groups of consumers is important for understanding the impact on food security. It is clear that the farm sector can be divided into a number of categories from the viewpoint of supply response: by size, by region and by household circumstance. Consumer groups can also be identified. A more complete understanding of the way in which each group responds to price incentives would make empirical estimation much more useful.

- The dynamic effects of reforms can be quite different to the static effects.
  The assessment of the impacts of reforms in the case studies is generally made in a static manner, comparing the relative size and distribution of costs and benefits before and after reform. Further attention needs to be paid both to dynamic benefits where reform has been successful in stimulating growth and/or productivity increases and to the transitional costs associated with the process.
- The role of the state and the private sector in the provision of services and facilitation of access to agricultural input and output markets.
  The relation between public and private institutions is often complex. The role of state trading agencies is often obscure and is in any case changing in many countries. From the point of view of analysis of reform policies a clear understanding of the ways in which the state determines the prices of inputs and outputs, and the way that the private sector is involved in these activities is essential.
- The appropriate criteria for prioritizing fiscal expenditures on compensatory and complementary policy measures in an adjustment programme at different stages in the reform process.
  More understanding of the best use of funds to assist agriculture to take advantage of the benefits of reform and avoid the costs that come from the inability to adjust would be a significant contribution.

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Annexes

A

Limits of the case study approach

The case study approach to examining policy reform and its impact on the farm sector poses a number of difficulties, many of which also apply to alternative methodologies.

A principal difficulty in establishing linkages between changes in policy variables and target variables is that policy change is usually a process that occurs over a number of years, even decades, and often in an intermittent and even inconsistent manner, such as raising import tariffs that had been reduced, or re-imposing controls on imports or exports. In Peru, for example, the number of items whose importation was restricted increased from 107 at the end of 1980 to 4 715 at the end of 1987 and then fell to 535 at the end of 1989 and zero in 1990. Variations in exchange rate policy also have been experienced in the countries in the sample. Nigeria liberalized its exchange rate beginning in the 1980s, re-instituted a fixed exchange rate in 1993, implemented a dual exchange rate system in 1995 and finally restored a market exchange rate in 1999. To a certain extent, the case study approach allows these factors to be internalized in the investigation of the relationship, but establishing a causal link is not possible. The fact that some key policy reforms are difficult to quantify, as in the case of removal (full or partial) of State monopolies over grain trade or agricultural input supply, makes their occurrence difficult to introduce into quantitative studies. Case studies can be useful in providing the detail to rationalize producer response in the light of such reforms.

It is also difficult to separate the effects of policy reforms from other structural changes that may be occurring in an economy and from exogenous events that are beyond the control of policy-makers. Sometimes non-economic factors also influence the course of the economy in a significant way. Additionally, some policy reforms do not necessarily generate the intended effects in the short or medium run. For example, the Malawi and Ghana studies found that the private sector has not responded to the withdrawal of State marketing services in the less well-connected areas, with the result that marketing channels remained weakened for several years after the policy reform. The same has been observed for rural financial services. In some cases, the reforms have not had the full set of intended effects because supporting changes have not been put into effect. In these circumstances, the time horizon of the study may not be sufficient to capture the full set of intended effects of policy reform.

Another fundamental limitation facing all approaches to the impact of reforms is that data are scarce in regard to household food consumption levels, especially for poor rural families who are most at risk of food insecurity. The case studies have made an effort to utilize the available survey evidence, but the data are sometimes weak and contradictory, and annual time series on this variable do not exist in most of the countries studied. This is one reason why poverty estimates also are used in regard to measuring policy effects, since they tend to be closely correlated with food

insecurity. However, care must be exercised in assuming that this correlation is a strict one, and some of the case studies explore differences in the response of poverty levels and food security indicators.

Finally, in regard to the individual country studies it should be noted that complete, multiple-equation regression estimates have not been used to quantify the relationships between policy variables, transmission variables and target variables. This is due in part to specification problems given that some key policy variables are not easily quantifiable. How, for example, would the effect on agriculture of the withdrawal of government from rural credit provision be quantified? In addition, for some relationships a complete specification would require inclusion of variables that go beyond the scope of the present study. The decision not to employ complete regression models is also explained by incompleteness of key data series. Some partial regressions are presented in the case studies but on the whole the analysis is more numerical in character with the intention of bringing out a clearer picture of stylized facts and refining or strengthening hypotheses for future consideration.

Nevertheless, in spite of these difficulties, the studies have brought out some broad trends and results that appear reasonably robust.

B

Price decomposition analysis

This annex presents the results of a decomposition of domestic price changes into the three components: world price changes, exchange rate movements and other effects (including policy shifts).

The domestic price of a product, for some period "0", is determined by the equation:

$$P^d_0 = P^w_0 * E_0 * (1+t_0) * (1+ c_0),$$

where P^d is domestic price, P^w is world price, E is the exchange rate, (1+t) represents the *ad valorem* tariff and (1+c) represents other costs (e.g. transport and marketing costs). A similar relationship is defined for some other period (period "1"):

$$P^d_1 = P^w_1 * E_1 * (1 + t_1) * (1+c_1).$$

Taking logs (ln) of both equations and subtracting, one obtains the equation:

$$(\ln P^d_1 - \ln P^d_0) = (\ln P^w_1 - \ln P^w_0) + (\ln E_1 - \ln E_0) + (\ln t_1 - \ln t_0) + (\ln c_1 - \ln c_0)$$

The first-order difference gives the (approximate) percentage change. In view of data limitations, most of the case studies combined the last two terms when conducting the decomposition. Time series and cross-section regression analyses using commodities for which relevant time series data were available in the case study countries show these equations to be highly significant in explaining domestic prices.

The tables illustrate that real domestic price movements varied significantly by commodity and by reform episode. This was despite the fact that international prices were generally declining, indicating that changes in the latter were being significantly modified, and often reversed, by domestic economic and trade policies.

In the case studies, the presentation of the price decomposition analysis is presented either as a change in the domestic price as a percentage change with respect to previous period, or as a percentage change with respect to a base period, or both. In this annex, the results are presented with respect to the previous period and the discussion constructed on that basis. Whilst the interpretation of results in the case study narrative holds irrespective of the end points compared, the results presented in Annex B should be used for comparative purposes.

It should be noted that the analysis in the case studies is often undertaken in terms of real price series. The interpretation of changes in the real exchange rate (RER) can be ambiguous where this is the case. Where studies deflate domestic prices by the domestic price index and the international price index by an international price deflator, the real exchange rate change should be calculated by dividing the

nominal exchange rate change by the difference between the domestic and foreign inflation rates, and not just by the domestic inflation rate. Although, given the low rate of inflation of US manufactured goods prices over the period the values of the exchange rate will not differ greatly whether it is calculated by dividing the nominal exchange rate change by the difference between the domestic and foreign inflation rates or simply the domestic inflation rate, it should be noted for the purposes of comparative analysis that in the calculations for the synthesis chapter, the RER is calculated by the latter method.

TABLE B.1

Decomposition of changes in domestic prices (percent changes with respect to previous period)

Product	Period	Change in domestic price	Change in world price	Change in real exchange rate	Change in policies and other effects
Cameroon					
Rice	1989-93/1985-88	-85.6	11.1	1.3	-98.0
	1994-99/1989-93	23.7	2.5	37.8	-16.5
Coffee	1989-93/1985-88	-61.0	-91.3	1.3	28.9
	1994-99/1989-93	52.0	37.7	37.8	-23.5
Cocoa	1989-93/1985-88	-66.1	-68.8	1.3	1.4
	1994-99/1989-93	0.3	5.9	37.8	-43.4
Cotton	1989-93/1985-88	-37.9	-3.3	1.3	-36.0
	1994-99/1989-93	0.7	-6.6	37.8	-30.5
Ghana					
Rice	1984-86/1980-83	-12.3	-62.3	139.3	-89.4
	1987-91/1984-86	3.2	10.0	53.4	-60.2
	1992-00/1987-91	-36.3	-3.8	24.4	-56.9
Maize	1984-86/1980-83	-48.0	-29.6	139.3	-157.7
	1987-91/1984-86	0.7	-24.5	53.4	-28.2
	1992-00/1987-91	-20.4	-11.9	24.4	-32.8
Cocoa	1984-86/1980-83	13.8	-15.0	139.3	-110.5
	1987-91/1984-86	49.2	-56.3	53.4	52.1
	1992-00/1987-91	0.2	-32.5	24.4	8.4
Groundnut	1984-86/1980-83	-16.8	-45.2	139.3	-110.9
	1987-91/1984-86	-21.4	4.2	53.4	-79.0
	1992-00/1987-91	-16.5	-28.5	24.4	-12.4
Kenya					
Maize	1986-93/1980-85	-0.7	-51.7	41.5	9.5
	1994-00/1986-93	13.0	-8.6	-11.5	33.2
Wheat	1986-93/1980-85	-15.2	-45.4	41.5	-11.2
	1994-00/1986-93	10.2	-12.0	-11.5	33.8
Rice	1986-93/1980-85	-18.9	-43.1	41.5	-17.3
	1994-00/1986-93	30.4	3.1	-11.5	38.8
Tea	1986-93/1980-85	-49.8	-43.0	41.5	-48.3
	1994-00/1986-93	-14.1	1.7	-11.5	-4.2
Coffee	1986-93/1980-85	-35.9	-72.7	41.5	-4.7
	1994-00/1986-93	3.1	-13.8	-11.5	28.4
Sugar	1986-93/1980-85	-2.2	-60.1	41.5	16.4
	1994-00/1986-93	14.1	-12.4	-11.5	38.1
Malawi					
Rice	1985-89/1980-84	-2.6	-52.5	10.7	39.2
	1990-94/1985-89	15.9	15.1	6.7	-6.0
	1995-00/1990-94	47.5	-20.6	24.2	43.9

Product	Period	Change in domestic price	Change in world price	Change in real exchange rate	Change in policies and other effects
Maize	1985-89/1980-84	-27.4	-48.0	10.7	9.9
	1990-94/1985-89	-6.2	-11.7	6.7	-1.2
	1995-00/1990-94	20.6	-5.0	24.2	1.4
Groundnut	1985-89/1980-84	-36.0	-44.7	10.7	-2.0
	1990-94/1985-89	-29.2	7.3	6.7	-43.2
	1995-00/1990-94	39.6	-29.3	24.2	44.8
Tobacco	1985-89/1980-84	-3.3	-14.3	10.7	0.3
	1990-94/1985-89	5.2	-4.7	6.7	3.1
	1995-00/1990-94	-11.4	-14.1	24.2	-21.5
Cotton	1985-89/1980-84	-19.4	-49.2	10.7	19.1
	1990-94/1985-89	-24.1	-8.6	6.7	-22.3
	1995-00/1990-94	5.3	-10.3	24.2	-8.6
Nigeria					
Rice	1986-93/1980-85	111.1	-43.1	149.2	5.0
	1994-98/1986-93	-82.7	11.2	-38.5	-55.5
Maize	1986-93/1980-85	72.9	-51.7	149.2	-24.6
	1994-98/1986-93	-18.5	0.9	-38.5	19.1
	1999-00/1994-98	-22.6	-38.3	44.7	-29.0
Coffee	1986-93/1980-85	68.3	-72.7	149.2	-8.2
	1994-98/1986-93	40.8	0.9	-38.5	78.3
	1999-00/1994-98	-45.6	-65.3	44.7	-25.0
Cocoa	1986-93/1980-85	56.2	-69.6	149.2	-23.4
	1994-98/1986-93	-11.8	-17.4	-38.5	44.0
	1999-00/1994-98	-37.3	-45.6	44.7	-36.4
Groundnut	1986-93/1980-85	67.4	-29.3	149.2	-52.5
	1994-98/1986-93	-60.6	-22.7	-38.5	0.6
	1999-00/1994-98	-8.8	-19.7	44.7	-33.7
Senegal					
Rice	1984-92/1980-83	6.93	-55.64	1.38	61.19
	1993-00/1984-92	30.79	-0.76	47.85	-16.30
Groundnut	1984-92/1980-83	-2.27	-45.71	1.38	42.07
	1993-00/1984-92	20.64	-22.94	47.85	-4.28
Sorghum	1984-92/1980-83	0.06	-51.37	1.38	50.05
	1993-00/1984-92	6.91	-18.46	47.85	-22.48
Cotton	1984-92/1980-83	-1.93	-49.46	1.38	46.16
	1993-00/1984-92	20.48	-21.53	47.85	-5.85
Uganda					
Maize	1985-87/1980-84	39.3	-51.4	30.1	60.6
	1988-93/1985-87	-11.7	-1.8	61.9	-71.7
	1994-00/1988-93	-2.2	-11.4	10.6	-1.3
Coffee	1985-87/1980-84	13.9	-20.0	30.1	3.8
	1988-93/1985-87	-39.0	-84.2	61.9	-16.7
	1994-00/1988-93	79.8	14.7	10.6	54.6
Cotton	1985-87/1980-84	-13.4	-51.3	30.1	7.7
	1988-93/1985-87	36.4	-3.4	61.9	-22.1
	1994-00/1988-93	-31.7	-10.9	10.6	-31.3
Tea	1985-87/1980-84	-37.0	-32.2	30.1	-35.0
	1988-93/1985-87	14.4	-13.0	61.9	-34.4
	1994-00/1988-93	23.4	2.0	10.6	10.9
Tobacco	1985-87/1980-84	-125.0	-12.9	30.1	-142.3
	1988-93/1985-87	96.4	-1.8	61.9	36.3
	1994-00/1988-93	-21.0	-19.6	10.6	-12.0

Product	Period	Change in domestic price	Change in world price	Change in real exchange rate	Change in policies and other effects
Beans	1985-87/1980-84	35.2	-62.6	30.1	67.7
	1988-93/1985-87	-24.0	-7.2	61.9	-78.7
	1994-00/1988-93	-1.0	-18.6	10.6	7.1
Morocco					
Wheat	1986-90/1980-85	-15.4	-41.0	23.7	2.0
	1991-96/1986-90	-16.0	-3.8	-1.5	-10.7
	1997-00/1991-96	-18.3	-31.3	-9.3	22.3
Maize	1986-90/1980-85	-17.3	-48.4	23.7	7.5
	1991-96/1986-90	-3.2	-1.0	-1.5	-0.6
	1997-00/1991-96	-31.9	-27.1	-9.3	4.6
Barley	1986-90/1980-85	-39.2	-29.4	23.7	-33.4
	1991-96/1986-90	-4.0	-1.5	-1.5	-0.9
	1997-00/1991-96	-3.3	-13.8	-9.3	19.8
Groundnut	1986-90/1980-85	-3.8	-26.6	23.7	-0.9
	1991-96/1986-90	10.9	-16.0	-1.5	28.4
	1997-00/1991-96	-6.5	-18.9	-9.3	21.7
Sunflower	1986-90/1980-85	12.9	-34.0	23.7	23.2
	1991-96/1986-90	-26.7	-1.0	-1.5	-24.2
	1997-00/1991-96	-24.3	-35.5	-9.3	20.6
Guatemala					
Rice	1986-90/1980-85	39.8	-43.2	56.3	26.6
	1991-95/1986-90	-47.0	13.2	2.6	-62.8
	1996-00/1991-95				
Maize	1986-90/1980-85	9.7	-48.4	56.3	1.8
	1991-95/1986-90	-17.4	-7.6	2.6	-12.4
	1996-00/1991-95	-5.6	-7.0	-14.7	16.1
Wheat	1986-90/1980-85	-13.5	-41.0	56.3	-28.8
	1991-95/1986-90	-25.3	-8.6	2.6	-19.3
	1996-00/1991-95	-6.7	-13.7	-14.7	21.7
Coffee	1986-90/1980-85	-9.9	-26.1	56.3	-40.1
	1991-95/1986-90	-48.9	-49.6	2.6	-1.9
	1996-00/1991-95				
Sugar	1986-90/1980-85	-25.6	-53.8	56.3	-28.0
	1991-95/1986-90	-3.6	-7.4	2.6	1.2
	1996-00/1991-95				
Guyana					
Rice	1986-91/1980-85	74.5	-42.1	146.9	-30.2
	1992-95/1986-91	-17.0	13.9	45.0	-75.8
	1996-00/1992-95	-30.0	-24.9	-12.6	7.6
Sugar	1986-91/1980-85	-17.7	-56.7	146.9	-107.9
	1992-95/1986-91	12.2	-1.9	45.0	-30.9
	1996-00/1992-95	7.9	-26.1	-12.6	46.6
Bananas	1986-91/1980-85	33.5	-5.3	146.9	-108.1
	1992-95/1986-91	0.5	-23.4	45.0	-21.0
	1996-00/1992-95	-17.6	-4.9	-12.6	-0.1
Coconut	1986-91/1980-85	86.8	-68.3	146.9	8.2
	1992-95/1986-91	12.3	7.8	45.0	-40.4
	1996-00/1992-95	0.3	0.6	-12.6	12.3
India					
Rice	1986-90/1980-85	6.5	-43.2	33.4	16.3
	1991-95/1986-90	10.6	13.2	46.2	-48.8
	1996-00/1991-95	-18.3	-23.3	-5.5	10.4

Product	Period	Change in domestic price	Change in world price	Change in real exchange rate	Change in policies and other effects
Maize	1986-90/1980-85	-5.7	-48.4	33.4	9.4
	1991-95/1986-90	9.5	-7.6	46.2	-29.2
	1996-00/1991-95	-19.3	-7.0	-5.5	-6.8
Wheat	1986-90/1980-85	-21.8	-41.0	33.4	-14.1
	1991-95/1986-90	8.7	-8.6	46.2	-29.0
	1996-00/1991-95	5.1	-13.7	-5.5	24.3
Coconut Oil	1986-90/1980-85	-17.1	-66.4	33.4	15.9
	1991-95/1986-90	-5.2	5.3	46.2	-56.7
	1996-00/1991-95	-10.2	12.0	-5.5	-16.7
Sheep meat	1986-90/1980-85	-6.5	-24.8	33.4	-15.0
	1991-95/1986-90	12.2	-8.0	46.2	-26.1
	1996-00/1991-95	28.0	7.4	-5.5	26.2

Product	Period	Change in domestic price	Change in world price	Exchange rate	Change in import tariffs	Change in policies and other effects
Tanzania						
Rice	1985-91/1980-84	2.54	-50.40	90.97	-2.72	-35.32
	1992-95/1985-91	-8.57	14.76	47.53	-18.05	-52.82
	1996-00/1992-95	-41.39	-24.94	-35.54	-1.55	20.65
Maize	1985-91/1980-84	5.25	-49.42	90.97	-2.72	-33.59
	1992-95/1985-91	97.83	-11.98	47.53	-18.05	80.33
	1996-00/1992-95	-47.88	-5.91	-35.54	-3.13	-3.30
Coffee	1985-91/1980-84	10.44	-55.60	90.97		-24.94
Arabica	1992-95/1985-91	29.31	-41.02	47.53		22.79
	1996-00/1992-95	-34.08	3.59	-35.54		-2.13
Coffee	1985-91/1980-84	-9.47	-54.21	90.97		-46.23
Robusta	1992-95/1985-91	6.70	-30.63	47.53		-10.20
	1996-00/1992-95	-31.33	-26.19	-35.54		30.40
Cotton	1985-91/1980-84	5.81	-46.99	90.97	-2.06	-36.11
	1992-95/1985-91	3.74	-12.64	47.53	-13.35	-17.80
	1996-00/1992-95	-34.01	-16.92	-35.54	-7.80	26.25
Chile						
Wheat	1974-81/1968-73	104.5	29.1	76.0	-30.3	29.7
	1982-83/1974-81	-5.2	-44.9	5.8	-17.5	51.5
	1984-89/1982-83	20.8	-44.8	41.4	14.4	9.8
	1990-00/1984-89	-37.5	-12.6	-7.1	-11.3	-6.4
Maize	1974-81/1968-73	47.9	7.7	76.0	-30.3	-5.5
	1982-83/1974-81	-0.6	-41.2	5.8	-17.5	52.3
	1984-89/1982-83	8.3	-30.4	41.4	5.3	-8.0
	1990-00/1984-89	-31.1	-22.8	-7.1	-7.7	6.5
Sugar	1974-81/1968-73	68.0	66.7	76.0	-30.3	-44.3
	1982-83/1974-81	13.3	-116.0	5.8	-17.5	141.0
	1984-89/1982-83	29.1	-29.8	41.4	22.1	-4.6
	1990-00/1984-89	-30.8	5.9	-7.1	-14.4	-15.2
Beans	1974-81/1968-73	78.2	-13.5	76.0		15.7
	1982-83/1974-81	-44.6	-93.6	5.8		43.3
	1984-89/1982-83	45.0	32.1	41.4		-28.5
	1990-00/1984-89	4.2	-4.3	-7.1		15.5
Beef	1974-81/1968-73	79.6	-12.8	76.0	-30.3	46.7
	1982-83/1974-81	-8.2	-42.6	5.8	-17.5	46.1
	1984-89/1982-83	20.7	48.3	41.4	5.3	-74.2
	1990-00/1984-89	-9.3	25.0	-7.1	-7.7	-19.5

Product	Period	Change in domestic price	Change in world price	Exchange rate	Change in import tariffs	Change in policies and other effects
Peru						
Rice	1985-90/1980-84	-55.9	-51.4	-19.9	0.0	15.4
	1991-93/1985-90	-101.9	1.1	-65.7	2.9	-40.1
	1994-00/1991-93	-11.7	3.0	-6.0	5.9	-14.6
Maize	1985-90/1980-84	-27.7	-48.4	-19.9	0.0	40.5
	1991-93/1985-90	-90.7	-13.3	-65.7	0.6	-12.2
	1994-00/1991-93	-12.2	-2.9	-6.0	5.1	-8.3
Barley	1985-90/1980-84	-45.2	-34.8	-19.9	0.0	9.5
	1991-93/1985-90	-91.6	-11.3	-65.7	0.6	-15.1
	1994-00/1991-93	-29.3	5.8	-6.0	1.1	-30.2
Coffee	1985-90/1980-84	8.3	-27.8	-19.9		56.0
	1991-93/1985-90	-198.1	-91.1	-65.7		-41.2
	1994-00/1991-93	76.1	63.8	-6.0		18.3
Cotton	1985-90/1980-84	-31.5	-46.9	-19.9		35.3
	1991-93/1985-90	-103.5	-21.2	-65.7		-16.5
	1994-00/1991-93	2.5	2.6	-6.0		6.0

Source: Calculation based on data from individual country studies.

TABLE B.2
Decomposition of changes in domestic prices – China

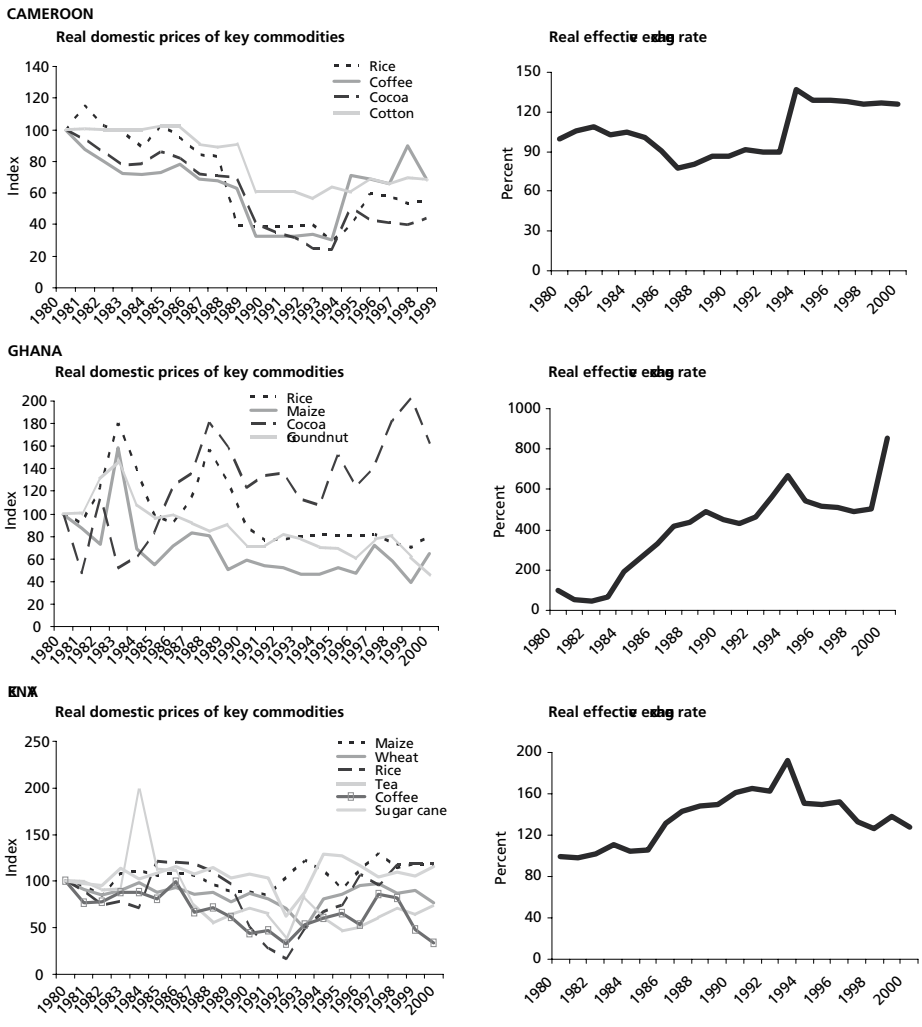
Commodity	Period	Percentage change in domestic price over previous period	Percentage change in domestic price due to	
			Trade	Others
Rice	1985			
	1990	20.74	-2.14	22.88
	1995	20.54	0.4	20.14
	2000	-38.15	3.93	-42.08
Wheat	1985			
	1990	21.09	-9.78	30.87
	1995	10.11	8.91	1.2
	2000	-33.98	9.79	-43.77
Maize	1985			
	1990	15.89	1.83	14.06
	1995	16.78	-4.73	21.51
	2000	-31.76	14.45	-46.21
Other grains	1985			
	1990	13.41	-1.1	14.51
	1995	38.97	-7.77	46.74
	2000	10.4	-2.9	13.3
Soybean	1985			
	1990	13.18	5.07	8.12
	1995	0.68	-14.59	15.27
	2000	-33.13	-40.63	7.5
Oil crops	1985			
	1990	60.35	-9.5	69.85
	1995	-7	3.19	-10.19
	2000	-3.95	-25.14	21.19
Sugar crops	1985			
	1990	13.33	47.57	-34.23
	1995	13.94	-23.54	37.49
	2000	-19.39	16.81	-36.19
Vegetables	1985			
	1990	-26.24	0.17	-26.41
	1995	-8.8	-0.03	-8.77
	2000	-13.6	-0.17	-13.43
Pork	1985			
	1990	23.66	1.13	22.52
	1995	34.47	-1.17	35.64
	2000	-16.99	0.59	-17.58
Beef	1985			
	1990	27.02	9.36	17.67
	1995	30.95	-13.76	44.71
	2000	-14.52	-1.63	-12.89
Sheep meat	1985			
	1990	41.46	0.74	40.72
	1995	52.75	-2.49	55.24
	2000	-10.74	-0.83	-9.9
Poultry	1985			
	1990	9.13	-0.16	9.28
	1995	8.77	0.12	8.65
	2000	-19.86	-2.27	-17.59
Fish	1985			
	1990	38.83	1.15	37.68
	1995	-8.42	1.45	-9.88
	2000	-16.07	-0.26	-15.81

Source: Based on China country study.

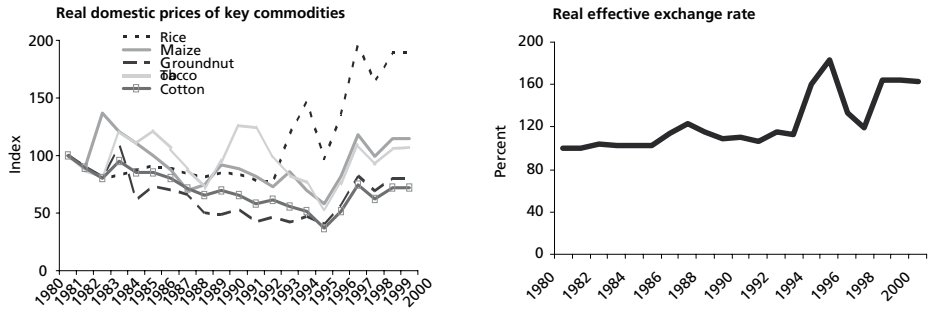
C

Domestic prices and the real effective exchange rate

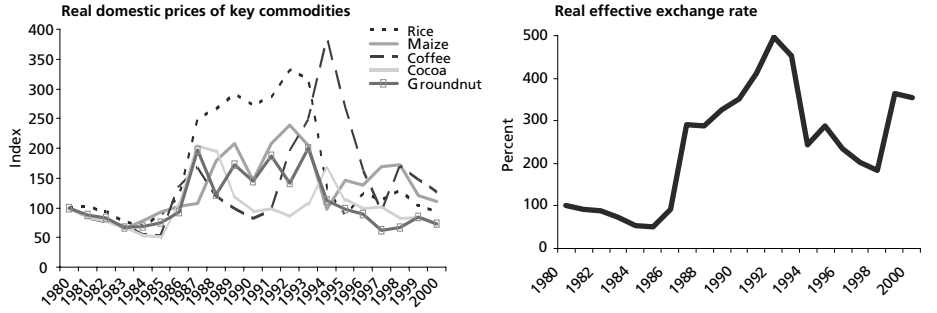
FIGURE C.1
Real domestic prices and real effective exchange rate, 1980-2000 (1980=100)



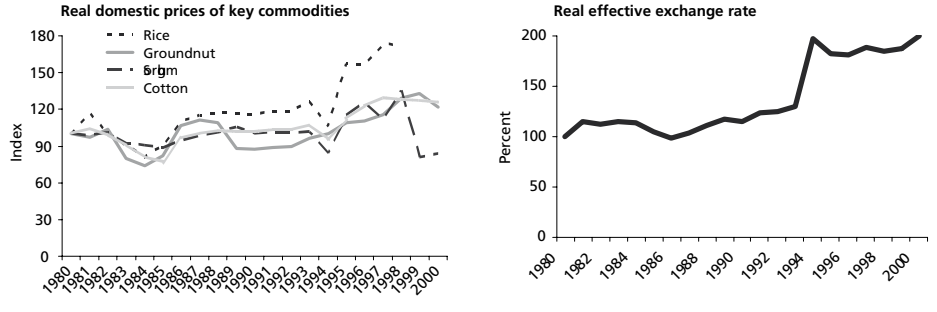
MALAWI



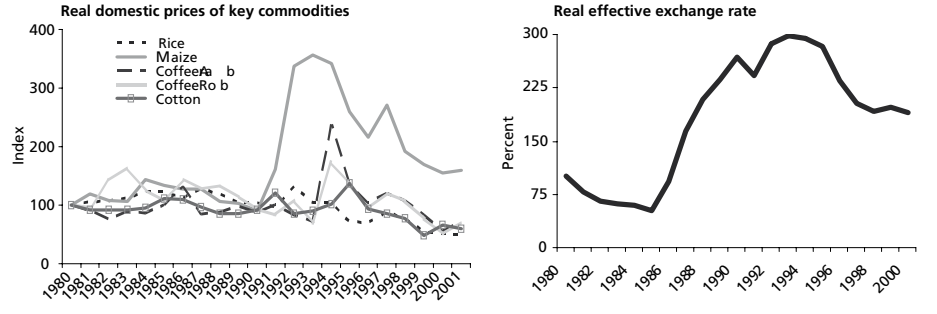
NIGERIA



SENEGAL

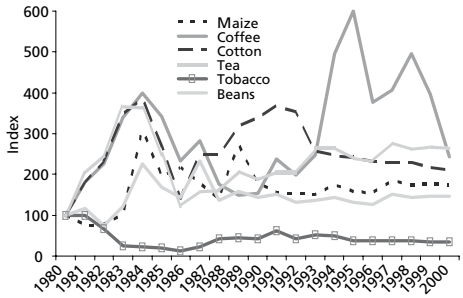


TANZANIA

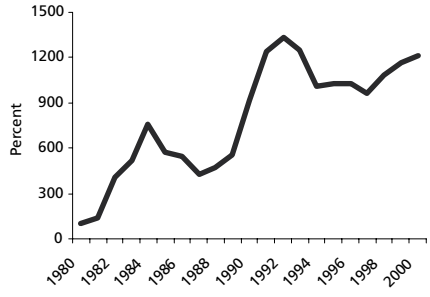


UGANDA

Real domestic prices of key commodities

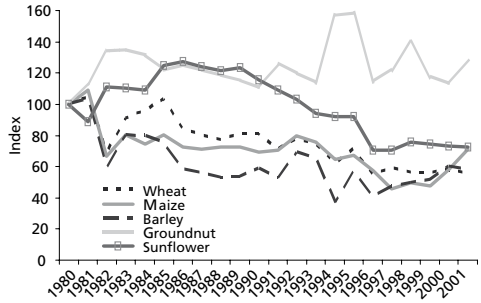


Real effective exchange rate

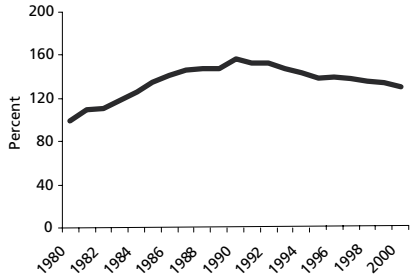


MOROCCO

Real domestic prices of key commodities

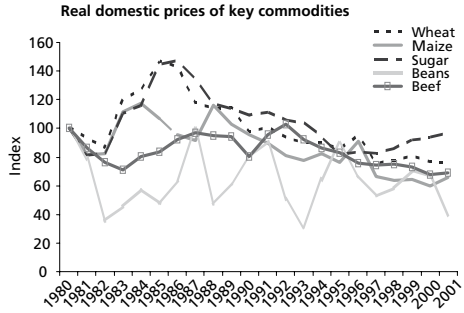


Real effective exchange rate

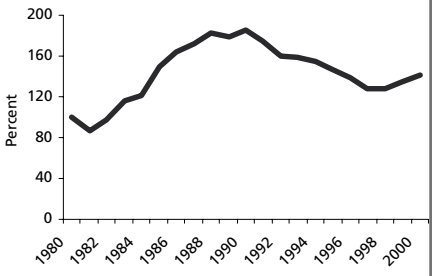


CHILE

Real domestic prices of key commodities

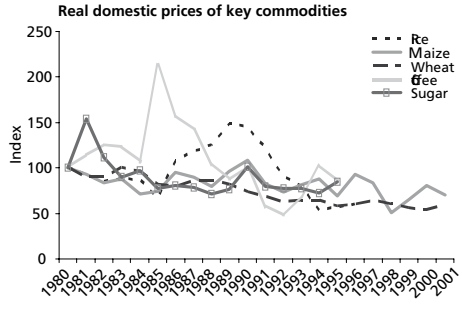


Real effective exchange rate

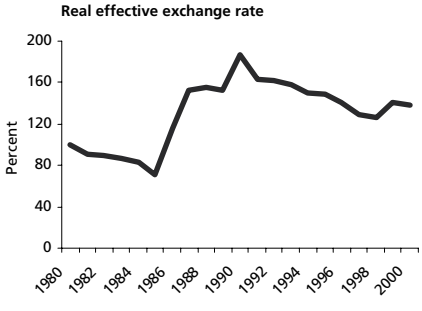


GUATEMALA

Real domestic prices of key commodities

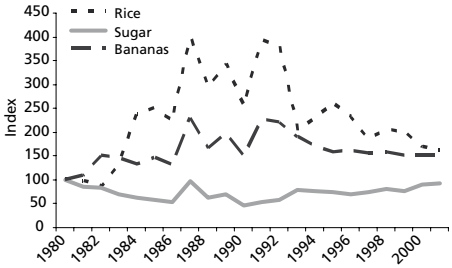


Real effective exchange rate

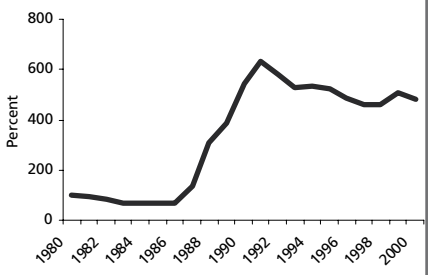


GUYANA

Real domestic prices of key commodities

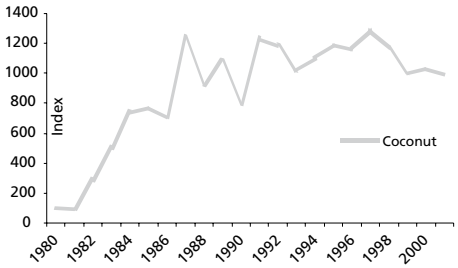


Real effective exchange rate



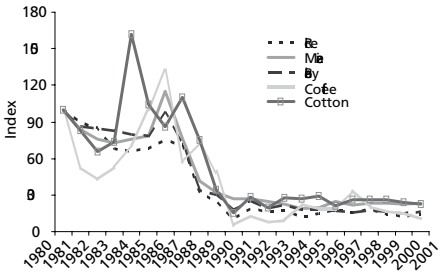
GUYANA

Real domestic prices of coconut

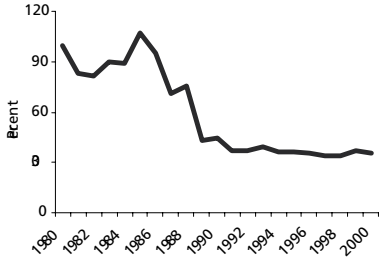


PERU

Real domestic prices of key commodities

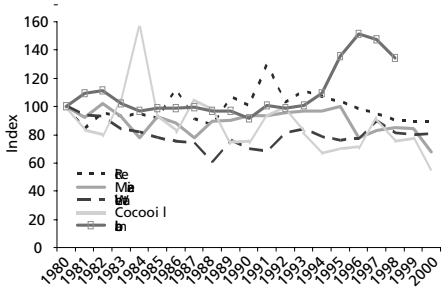


Real effective exchange rate

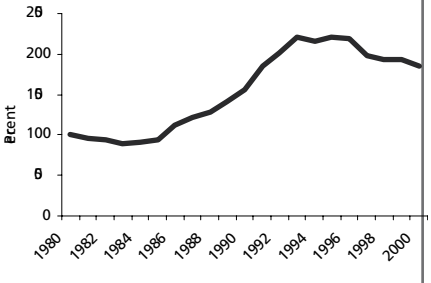


INDIA

Real domestic prices of key commodities



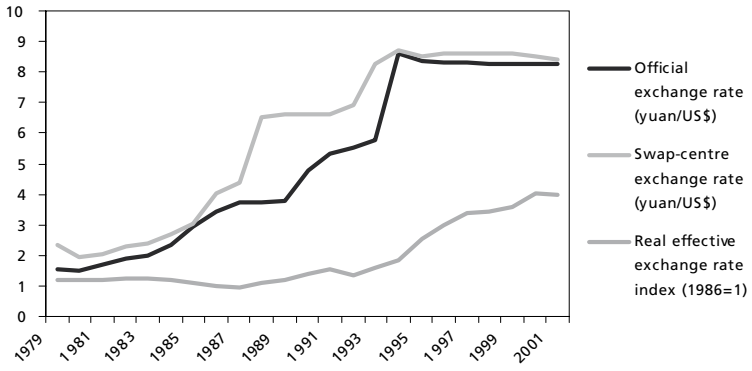
Real effective exchange rate



Source: Domestic prices of key commodities calculated from data of country studies

Source: Real effective exchange rate calculated from data of IMF, 2004

FIGURE C.2
China – evolution of exchange rates 1979-2001



Source: Based on China country study

D

Price transmission analysis

INTRODUCTION

This annex describes the method used to investigate econometrically the extent to which world market prices and the real exchange rate influence the domestic price in 65 country/commodity pairs. The number of observations in each series was 20 years of annual data. First, the degree to which world price signals have been transmitted to domestic markets over the past two decades is examined. Then whether domestic prices were closer to world prices following the implementation of policy reforms is investigated. The expectation is that following reforms: (i) domestic price levels will be closer to world price level; and (ii) changes in world prices will be transmitted to domestic markets more completely and more rapidly. Following this, a logarithmic regression of the world price on the domestic price with and without the inclusion of the real exchange rate is considered.

THE MODEL

To examine the relationship between sets of prices, most studies have looked at correlation coefficients or have used the following type of regression

$$p_t^d = \mu + \beta\, p_t^w + \varepsilon_t \qquad (1)$$

where p_t^d and p_t^w represent the domestic and world prices of the commodities and μ and β are parameters to be estimated with ε_t denoting the error term. From the above regression, the hypothesis that the slope coefficient equals unity and (possibly) the intercept term equals zero can be tested; formally, $H_0 : \mu + 1 = \beta = 1$. Under H_0 the deterministic part of equation (1) becomes $p_t^d = p_t^w$, which implies that the difference $p_t^d - p_t^w$ is a white noise process.

Estimating equation (1) and testing H_0 presents two problems:

(i) because of extensive government interventions in primary commodity markets of developing economies, it is unlikely that domestic and world prices will only differ by a white noise as H_0 of (1) dictates. Therefore, H_0 is expected to be rejected without necessarily ruling out some degree of co-movement between domestic and world prices;

(ii) statistical properties of the series involved in the regression, most importantly non-stationarity, may invalidate standard econometric tests and thus give misleading results regarding the degree to which world signals are being considered by domestic market participants or policy makers.

Consequently, it was decided to employ a model that relaxes the restrictive nature of (1) and accounts for non-stationarity. Correlation between the two prices

leads to the conclusion that domestic prices follow world price signals. However, if the slope coefficient is different from unity, the corresponding price differential would be growing and such growth would not be accounted for, although prices move in seemingly synchronous manner. Hence, stationarity of the error term of (1) (given that the prices are non-stationary) while establishing proportional price movement, should not be considered as a testable form equivalent to that of the H_0 of equation (1).

To account for the non-unity slope coefficient, one can restrict the parameters of equation (1) according to H_0. In this case, the problem is equivalent to testing for units root in the following univariate process:

$$(p_t^d - p_t^w) \sim I(0) \tag{2}$$

If the price differential as defined in equation (2) is stationary, then one can conclude that domestic prices follow world price movements in the long run. It is worth noting that cointegration tests are not very powerful as they only make inferences about the existence of the moments of the distribution of $(p_t^d - p_t^w)$ and not about certain restrictions that may be required by economic theory [e.g. H_0 of equation (1)). Therefore, equation (2) cannot substitute for the H_0 of equation (1); it can only serve as an intermediate step in establishing its validity. The restrictive nature of equation (1) can be circumvented by appending lags. For example, adding one lag gives:

$$p_t^d = \mu + \beta_1 p_t^w + \beta_2 p_{t-1}^d + u_t \tag{3}$$

where μ and β_i's are parameters to be estimated while μ_t denotes the error term, (i.e. $\sum \beta_i = 1$). The restriction implies:

$$(p_t^d - p_{t-1}^d) = \mu + \alpha(p_{t-1}^w - p_{t-1}^d) + \beta(p_t^w - p_{t-1}^w) + u_t \tag{4}$$

where, $(1-\beta_i) = \alpha$ and $\beta_3 = \beta$. Since all series in equation (4) are stationary, several hypotheses can be tested with conventional *F*-tests. The existence of cointegration and an error correction specification examining stationarity of equation (2) is equivalent to testing the restrictions imposed on equation (3), the validity of which gives equation (4).

The most important feature of equation (4) is the economic interpretation of its parameters: β indicates how much of a given change in the world price of the commodity will be transmitted to the domestic price in the current period (referred to as initial adjustment term, short-run effect, or contemporaneous effect); α indicates how much of the past price difference between domestic and world prices is eliminated in each period thereafter (referred to as error-correction term, speed of adjustment, or feedback effect). A stationary price differential guarantees (in theory at least) *a* to be within [0,2]. Furthermore, the closer to unity are α and β, the higher the speed at which world price changes are transmitted into domestic prices. Note that *a* cannot be zero, as this has been ruled out by the fact that the price differential is stationary. Finally, equation (4) may contain more lags of changes in both domestic and world prices, but this is a data-specific question.

Equation (5) is used to determine how long it takes (n is the adjustment period in years) for the domestic price of the commodity in question to adjust to a given price change in world price (see Baffes and Gardner 2003 for details).

$$k = 1 - (1 - \beta)(1 - \alpha)^n \tag{5}$$

SUMMARY OF RESULTS

The model was applied to 65 commodity/country cases. Stationarity properties of the world prices are examined first (Table D.1). World prices of beans, coconut, coconut oil, groundnut, sheep meat, rice, and sugar prices appear to be trend-stationary. Only banana, cocoa and coffee (including robusta and arabica) prices indicate trend non-stationarity. Barley, beef, cotton, tea, tobacco, sorghum, sunflower oil and wheat prices show signs of weak stationarity.

The stationarity properties of the domestic prices are reported in Table D.2. The majority of the domestic prices were found to be non-stationary. For Cameroon, Nigeria and Peru all the commodity prices are non-stationary. The following country/commodity prices were also found to be stationary: Chile, beans; Ghana, rice, maize and groundnut; Guatemala, maize and wheat; rice; India, coconut oil; Kenya, maize and sugar cane; Morocco, wheat, maize, barley and groundnut; Senegal, rice; Uganda, cotton. Evidence of weak stationarity was also observed in several cases.

Since most of the commodity prices are non-stationary, the stationarity properties of the price differentials (last two columns of Table D.2) were examined. For cases where world and domestic prices have different stationarity properties, the evidence suggests that the respective domestic market commodity market has been isolated.

Results from the estimation of equation (4) without allowing for structural break for all 14 countries are presented in Table D.3. Table D.4 presents the results from the log specification of equation (1). However, when the exchange rate variable was included in this equation (Table D.5b), the results improved dramatically. Thus, these results will be used in the analysis. Although (1) is only relevant when the price differential is non-stationary or when there is no co-movement under it the co-integration parameter is unity, the results for all cases are presented for comparison.

The estimation of world vs domestic price linkages presents mixed results that vary with country/commodity relationships. Using the R^2 as the proportion of domestic price variability attributable to world price changes, for Cameroon, only cocoa shows a significant variability of domestic prices being explained by world prices (53 percent) while the entire adjustment process (99 percent) takes place within three years. The price differential is stationary at the 5 percent level, thus pointing to strong integration. The logarithmic regression in levels reported in Table D.5 pointed to strong integration as all stationary statistics were below -3.00. The adjusted R^2 indicates that 36 percent of domestic price variability for cotton (76 percent for cocoa and 49 percent coffee) are explained by world price movements. For rice, only about 8 percent of the variability in domestic prices is explained by world prices (Table D.3). Domestic cocoa prices adjust faster to the world price variability that the other prices (99 percent within three years) with slope closer to

unity. The speed of adjustment within the three-year horizon is slower for domestic cotton price (28 percent) followed by domestic rice prices (40 percent). Coffee prices adjust by about 81 percent within three years.

For Chile, 54 percent and 57 percent of the domestic price variability for maize and beef are explained by world prices with adjustments within a three year period of 78 percent and 25 percent respectively. Domestic prices of beans almost completely adjust (98 percent) within three years although only about 40 percent of its domestic price variability is explained by world prices. All stationarity statistics are below -3.00, indicating strong integration with world prices (Table D.5).

For Ghana, 27 percent of the domestic price movements for maize are explained by world prices but with complete adjustment within three years. The adjustment coefficient is 0.84 and is highly significant. The short-run effects are also positive and significant. However, in the case of cocoa, which is the most important export crop, the logarithmic regression reports a negative co-integration parameter but a significant and positive exchange rate coefficient. The co-integration parameter indicates strong convergence with world price movements and the adjusted R^2 suggests that about 55 percent of the variability in domestic prices is accounted for by world prices (Table D.5). In the case of groundnuts a high level of adjustment to world price variability was observed even though world prices only explain about 16 percent of domestic price variability. The co-integration parameters for all the other commodities indicate some degree of integration with world prices.

For Guatemala, although 66 percent and 35 percent of adjustments of world price movements for maize and wheat respectively occurs within three years, both the adjustment and short-run effects are not significantly different from zero. The stationarity statistics of the price differentials indicate that both domestic and world prices of both maize and wheat indicated strong movements between world and domestic prices (Table D.5). The exchange rate parameter is highly significant for maize.

Tobacco in Malawi and barley in Morocco show almost complete adjustments within three years with significant adjustment coefficients and short-run effects. The co-integration parameters given in Table D.5 are also significant and greater than -3.00 in both cases, with strong co-movement between world and domestic prices.

In the case of Nigeria, although none of the commodities indicate any significant adjustment or short-run effects, the logarithmic regression that includes the exchange rate indicates co-movement between domestic and world prices. The exchange rate is significant for all commodities. The R^2 in some cases is about 40-60 percent, indicating some transmission between world and domestic prices.

In the case of Kenya, tea, wheat and coffee prices show significant adjustment and short run effects. Domestic tea prices adjust completely to world price shocks within three years, while for wheat and coffee about 92 percent and 87 percent of the adjustment takes place respectively within three years. The world price coefficient for tea is close to unity with the co-integration parameter indicating strong co-movement for all domestic prices with their respective world prices (Table D.5).

For Peru, only coffee gives a highly significant adjustment coefficient and short-run effect, with 48 percent of the variability in domestic prices accounted for by world price movements. Domestic prices adjust completely within three years. The exchange rate is highly significant for all commodities with the co-integration parameter indicating strong convergence between domestic and world prices.

For Tanzania, both arabica and robusta coffee show a highly significant adjustment coefficient and short run effects with over 50 percent of domestic price variability accounted for by world price movements. For both, 95 percent of the adjustment took place within three years. Stationarity statistics of the price differentials indicate strong co-movement.

For Guyana, only the domestic coconut price indicates significant adjustment and short-run effects. World price movements accounted for 38 percent of domestic price variability with 72 percent of the adjustment completed within three years. For sugar and rice, the results are not surprising since the bulk of both commodities are exported under the ACP quota at EU pre-determined prices.

POLICY REFORMS AND PRICE TRANSMISSION

The effects of policy reforms undertaken by these countries on the transmission of world price changes to domestic prices are considered. The appropriate choice and dating of reform actions is not straightforward. Many price policy reforms have been partial, introduced in stages over several years, and subject to delays and temporary reversals.

Since most of the countries in the study have undertaken various forms of reform since the early 1980s, it is assumed here that by the early 1990s, if these reforms are successful, their effects should have been noticed in form of structural shifts in the relevant commodity sectors. In this regard, testing is for structural shift using 1993 as the break point. Furthermore, as the number of observations is not sufficient to estimate both the pre- and post-reform parameter, we use a *Predictive Chow Test* that is designed to test for breaks in such situations.

"Predictive" Chow Tests

The Chow test is used to test for break points or structural changes in a model. The problem is posed as a partitioning of the data into two parts of size n_1 and n_2. The null hypothesis to be tested is

$$H_0 : \beta_1 = \beta_2 = \beta$$

where β_1 is estimated using the first part of the data and β_2 is estimated using the second part.

The test is performed as follows (refer to Russell Davidson and James G. MacKinnon, *Estimation and inference in econometrics*, 1993, p. 380).

1. The p parameters of the model are estimated.
2. A second linear regression is performed on the residuals; $\hat{u}$ from the nonlinear estimation in step one.

   $$\hat{u} = \hat{X} b + residuals$$

   where $\hat{X}$ is Jacobian columns that are evaluated at the parameter estimates. If the estimation is an instrumental variables estimation with matrix of instruments W, then the following regression is performed:

   $$\hat{u} = Pw * \hat{X} b + residuals$$

   where Pw is the projection matrix.

3. The restricted SSE (RSSE) from this regression is obtained. An SSE for each subsample is then obtained using the same linear regression.
4. The *F* statistic is then

$$f = [((RSSE\text{-}SSE_1 - SSE_2)/p)/((SSE_1+SSE_2)/(n\text{-}2p))].$$

This test has p and n-$2p$ degrees of freedom.

Chow's test is not applicable if $\min(n_1,n_2) < p$, since one of the two subsamples does not contain enough data to estimate β. In this instance, the *predictive Chow test* can be used. The predictive Chow test is defined as

$$f = \frac{(RSSE - SSE_1) \times (n_1 - p)}{SSE_1 \times n_2}$$

where $n_1 > p$. This test can be derived from the Chow test by noting that the $SSE_2 = 0$ when $n_2 <= p$ and by adjusting the degrees of freedom appropriately.

The results of estimating equation 4 without restrictions and applying the *Predictive Chow Tests* are presented in Table D.6, as are the pre- and post-reform nominal rates of protection. The test found incidences of structural shifts for coffee and cocoa in Cameroon, sheep meat in India, rice in Kenya, rice and groundnut in Malawi, sunflower in Morocco, sorghum in Senegal and coffee (Arabica) in Tanzania.

From Tables D.5 and D.6 we find evidence that policy reforms in the countries investigated have reduced distortions in their domestic commodity prices. The nominal rates of protection indicated that only 27 of the commodity/country pairs indicated decline in the Nominal Rate of Protection during the pre- and post-1993 reform period. These are: rice in Cameroon; wheat, sugar, beans and beef in Chile; rice and groundnut in Ghana; bananas and coconuts in Guyana; maize, coconut oil and sheep meat in India; tea in Kenya; wheat, barley and groundnut in Morocco; rice and cocoa in Nigeria; rice, maize, coffee, cotton in Peru; rice and cotton in Tanzania; tea and tobacco in Uganda.

TABLE D.1
Stationarity tests – world prices

	Without trend		With trend	
	ADF	**PP**	**ADF**	**PP**
Bananas	-1.37	-1.3	-2.33	-2.22
Barley	-2.62*	-1.94	-3.31**	-2.39
Beans	-6.01***	-3.01**	-5.95***	-3.07**
Beef	-2.15	-1.84	-2.72*	-2.45
Cocoa	-0.55	-1.24	-2.42	-2.18
Coconut	-2.59	-2.66*	-3.48**	-3.11**
Coconut oil	-2.87*	-2.93**	-3.29**	-3.12
Coffee	-1.30	-1.76	-2.24	-2.11
Coffee arabica	-1.68	-1.85	-2.1	-2.33
Coffee robusta	-0.87	-1.32	-2.38	-2.18
Cotton	-1.79	-1.98	-3.09**	-2.9
Groundnut	-2.91*	-2.86*	-4.05***	-4.18***
Lamb meat	-3.6***	-3.38**	-3.71***	-3.18**
Maize	-1.74	-1.54	-2.93**	-2.53
Rice	-3.35**	-2.91*	-3.07**	-3.09**
Sorghum	-1.84	-1.84	-2.75*	-2.47
Sugar	-3.58***	-3.82***	-3.44**	-3.33**
Sunflower	-1.4	-1.05	-2.88*	-2.06
Tea	-2.28	-2.43	-2.92*	-2.64*
Tobacco	-1.39	-1.53	-3.16**	-2.68*
Wheat	-2.73*	-2.17	-3.05**	-2.31

Notes: ADF is the augmented –Dickey Fuller test and PP is the Phillips-Perron test. The critical values for 50 observations are: -2.60 (10 percent), -2.93 (5 percent), and -3.58 (1 percent). Asterisks denote levels of significance (*for 10 percent, ** for 5 percent, and *** for 1 percent).

TABLE D.2
Stationarity tests – domestic prices and price differentials

	Without trend		With trend		Price differentials	
	ADF	**PP**	**ADF**	**PP**	**ADF**	**PP**
Cameroon						
Rice	-1.62	-1.39	-1.27	-1.41	-1.63	-1.93
Coffee	-1.66	1.9	-1.24	-1.57	-1.3	-1.87
Cocoa	-1.48	-1.51	-1.58	-1.64	-3.05**	-3.33**
Cotton	-1.11	-1.16	-1.12	-1.52	-2.48	-2.58
Chile						
Wheat	-0.91	-1.03	-2.55	-2.06	-3.18**	-2.32
Maize	-0.72	-1.14	-2.98**	-2.40	-4.29***	-2.00
Sugar	-2.13	-1.49	-3.43**	-1.71	-3.92***	-3.05**
Beans	-5.78***	-3.99***	-6.00***	-3.94**	-5.00***	-2.73*
Beef	-1.62	-1.79	-1.84	-1.89	-1.36	-1.27
Ghana						
Rice	-2.69*	-1.95	7.16***	-2.86*	-3.4**	-2.82*
Maize	-2.26	-3.08**	-3.42**	-4.2***	-3.68***	-3.55**
Cocoa	-1.69	-2.07	-1.95	-3.84***	-1.31	-0.96
Groundnut	-0.71	-0.63	-4.79***	-2.93**	-4.25***	-3.91***
Guatemala						
Maize	-3.4**	-3.42**	-4.1***	-3.75***	-2.16	-2.03
Wheat	-0.51	-0.87	-4.29***	-2.86*	-3.24**	-2.26
Guyana						
Rice	-2.2	-2.06	-1.6	-1.53	-3.26**	-2.5
Sugar	-2.29	-3.26**	-2.2	-3.03**	-2.43	-2.85*
Bananas	-2.76*	-3.29**	-2.18	-2.93**	-3.15**	-3.09**

	Without trend		With trend		Price differentials	
	ADF	**PP**	**ADF**	**PP**	**ADF**	**PP**
Bananas	-2.76*	-3.29**	-2.18	-2.93**	-3.15**	-3.09**
Coconut	-7.91***	-4.12***	-5.65***	-2.39	-5.05***	-3.97***
India						
Rice	-1.75	-3.2**	-1.44	-3.11**	-3.81***	-3.02**
Maize	-1.5	-2.32	-1.78	-2.67*	-2.36	-2.2
Coconut oil	-2.41	-2.53	-4.8***	-3.41**	-2.9*	-2.76*
Lamb meat	-1.19	-0.92	-2.58	-1.62	-1.58	-2.19
Wheat	-2.32	-2.81*	-2.03	-2.47	-1.47	-1.23
Kenya						
Maize	-2.6*	-2.4	-3.2**	-2.91*	-1.81	-1.38
Wheat	-2.36	-2.9*	-2.34	-2.88*	-1.89	-1.74
Rice	-2.09	-1.83	-1.99	-1.75	-1.63	-1.6
Tea	-1.75	-2.31	-2.17	-2.97**	-2.34	-3.39**
Coffee	-1.4	-1.83	-2.05	-2.38	-1.59	-2
Sugar cane	-3.45**	-3.16**	-3.4**	-3.14**		-3.58**
Malawi						
Rice	-0.43	-0.64	-2.11	-2.44	-1.05	-1.08
Maize	-1.95	-2.13	-1.83	-1.98	-1.66	-1.6
Groundnut	-1.49	-1.95	-0.62	-1.31	-0.54	-1.63
Tobacco	-3.05**	-2.65*	-3.16**	-2.58	-2.25	-2.19
Cotton	-1.77	-2.06	-1.5	-1.83	-2.62*	-2.23
Morocco						
Wheat	-1.25	-1.5	-3.09**	-4.5***	-2.12	-2.39
Maize	-2.2	-2.04	-2.74*	-3.2**	-2.07	-2.03
Barley	-2.92*	-3	-2.96**	-3.86***	-2.53	-2.69*
Groundnut	-4.29***	-3.77***	-4.07***	-3.5**	-2.61*	-2.56
Sunflower	-0.34	-0.44	-3.06**	-1.78	-3.28**	-2.14
Nigeria						
Rice	-1.81	-1.47	-1.6	-1.27	-2.22	-1.97
Maize	-1.74	-1.80	-1.55	-1.86	-1.67	-1.56
Coffee	-2.32	-1.92	-2.91*	-2.32	-1.13	-1.16
Groundnut	-1.14	-1.62	-1.07	-1.54	-2.06	-2.38
Cocoa	-3.34**	-2.21	-3.18**	-2.15	-1.89	-1.57
Peru						
Rice	-1.16	-1.2	-1.46	-1.83	-1.09	-1.34
Maize	-1.19	-1.27	-2.1	-1.58	-2.01	-1.65
Barley	-0.84	-0.95	-1.54	-1.81	-1.08	-1.19
Coffee	-1.39	-1.89	-1.85	-2.29	-1.62	-2.25
Senegal						
Rice	-0.33	-0.78	-3.3**	-2.65*	-1.52	-1.94
Sorghum	-2.3	-3.13**	-2.37	-3.1**	-1.98	-2.08
Cotton	-1.14	-1.07	-3.56**	-2.43	-1.1	-1.5
Groundnut	-2.21	-1.63	-3.42**	-2.45	-1.51	-1.7
Tanzania						
Rice	0.13	-0.19	-1.55	-1.91	-2.8*	-2.62*
Maize	-1.86	-1.72	-2.27	-1.67	-1.72	-1.77
Coffee Arabica	-2.71*	-3.25**	-2.51	-3.1**	-2.09	-2.07
Cotton	-1.7	-2.24	-1.97	-2.58	-2.71*	-2.73*
Coffee Robusta	-1.69	-2.34	-2.68*	-2.94**	-2.21	-2.88*
Uganda						
Maize	-2.97**	-2.67*	-2.68*	-2.69*	-2.52	-1.98
Coffee	-2.28	-2.73*	-2.21	-2.34	-1.37	-2.94**
Cotton	-3.13**	-3.77***	-3.06**	-3.54**	-2.85*	-4.8***
Tea	-3.08**	-2.39	-3.13**	-2.27	-2.64*	-2.2
Tobacco	-3.08**	-2.39	-3.13**	-2.27	-2.64*	-2.2
Beans	-2.67*	-3.42**	-2.53	-3.29**	-3.06**	-2.49

Notes: Asterisks denote levels of significance (* for 10 percent, ** for 5 percent, and *** for 1 percent).

TABLE D.3
Restricted error correction model

	Constant	Adjustment coefficient	Short-run effect	Adj. R^2	3 year adjustment
Cameroon					
Rice	0.1684	0.1828	-0.1039	0.0819	40 percent
	(1.2)	(1.6)	(0.54)		
Coffee	0.2748**	0.358**	0.2767	0.1942	81 percent
	(1.98)	(2.2)	(1.34)		
Cocoa	0.3268***	0.8098***	-0.0239	0.5291	99 percent
	(3.65)	(4.7)	(-1.10)		
Cotton	-0.01059	0.1193	-0.05404	0.0039	28 percent
	(-0.34)	(1.04)	(-0.39)		
Chile					
Wheat	0.002352	0.093107	0.023379	-0.0270	27 percent
	(0.07)	(1.17)	(0.15)		
Maize	0.017077	0.135084	0.654577***	0.5447	78 percent
	(0.73)	(1.41)	(4.97)		
Sugar	-0.0647*	-0.11457	-0.21378	0.0983	-68 percent
	(-1.65)	(-1.89)	(-1.87)		
Beans	-0.15042	0.651833**	0.591629**	0.4029	98 percent
	(1.55)	(2.67)	(2.94)		
Beef	-0.02482	-0.02714	0.310526***	0.5675	25 percent
	(-1.42)	(-0.48)	(4.71)		
Ghana					
Rice	-0.00929	-0.0001	0.030947	-0.0537	3 percent
	-	-	(0.18)		
Maize	0.104836	0.842465**	0.625954	0.2663	100 percent
	(1.27)	(2.97)	(1.43)		
Cocoa	-0.07652	0.134495	-0.22239	-0.0203	21 percent
	(-0.64)	(1.18)	(-0.41)		
Groundnut	-0.04611	0.326754**	0.045386	0.1572	71 percent
	(-1.3)	(2.07)	(0.26)		
Guatemala					
Maize	0.020942	0.229037	0.257038	-0.0098	66 percent
	(0.4)	(1.26)	(0.89)		
Wheat	-0.00013	0.106393	0.084811	-0.0321	35 percent
	(0.00)	(1.16)	(0.69)		
Malawi					
Rice	0.03373	-0.01045	0.03436	-0.1131	-
	(0.71)	(-0.10)	(0.19)		
Maize	0.09879	0.27317	-0.04199	0.0794	60 percent
	(1.44)	(1.88)	(-0.17)		
Cotton	0.08685	0.14655	-0.07933	-0.009	33 percent
	(0.76)	(1.05)	(-0.39)		
Tobacco	0.16253**	0.48018**	1.037**	0.4042	100 percent
	(2.12)	(1.96)	(2.51)		
Groundnut	0.23886	0.14771	0.14454	-0.0696	47 percent
	(0.36)	(0.82)	(0.61)		
Morocco					
Wheat	-0.02377	0.0001	0.069288	-0.0507	7 percent
			(0.29)		
Maize	-0.01602	0.144293	0.371928*	0.0383	61 percent
	(0.43)	(0.80)	(1.66)		
Barley	0.061125	0.617409**	0.505291	0.303	97 percent
	(1.12)	(2.77)	(1.54)		
Sunflower	-0.02319	0.093892	-0.02605	-0.0337	24 percent
	(-0.98)	(1.01)	(-0.17)		
Groundnut	-0.010307**	0.227645**	0.064759	0.2349	57 percent
	(-2.98)	(2.7)	(0.53)		

	Constant	Adjustment coefficient	Short-run effect	Adj. R^2	3 year adjustment
Nigeria					
Rice	0.22915	0.0584	0.158	-0.1020	30 percent
	(0.23)	(0.45)	(0.05)		
Maize	-0.01858	0.14428	0.191	-0.0178	49 percent
	(-0.26)	(1.27)	(0.49)		
Coffee	0.011503	0.0001	0.0001	0.00	-
	-	-	-		
Groundnut	-0.05068	0.2344	0.0996	0.0064	60 percent
	(-0.68)	(1.41)	(0.31)		
Cocoa	-0.05256	0.1453	0.396	0.0172	62 percent
	(-0.56)	(1.32)	(0.90)		
Peru					
Rice	0.068902	0.135424	-0.14195	0.0163	26 percent
	(0.44)	(1.34)	(-0.53)		
Maize	0.012285	0.1911**	-0.29098	0.1797	32 percent
	(0.19)	(2.18)	(-1.16)		
Coffee	0.161826	0.448299**	1.084965***	0.4844	100 percent
	(1.16)	(2.18)	(3.47)		
Barley	-0.07544	0.101846	-0.60062*	0.1335	-16 percent
	(-1.18)	(1.27)	(-1.7)		
Senegal					
Rice	0.01799	0.002481	-0.17334	0.0493	-16 percent
	(0.5)	(0.03)	(-1.51)		
Sorghum	-0.02601	0.166377	0.365684	0.0801	63 percent
	(-0.63)	(1.52)	(1.55)		
Cotton	0.007857	-0.01853	-0.05199	-0.0996	-11 percent
	(0.38)	(-0.34)	(-0.5)		
Groundnut	0.009467	-0.011091	0.061135	-0.1014	3 percent
	(0.26)	(0.14)	(0.49)		
Tanzania					
Rice	-0.00917	0.081913	0.06489	-0.0929	28 percent
	(-0.17)	(0.662)	(0.39)		
Maize	-0.06121	0.127517	-0.1745	0.0237	22 percent
	(-0.76)	(1.34)	(-0.49)		
Coffee Arabica	-0.1277	0.184522*	0.9000216	0.5718	95 percent
	(-0.2)	(1.76)	(5.2)		
Cotton	0.003371	0.0001	0.40105	0.1052	40 percent
	-	-	(1.8)		
Coffee Robusta	0.031935	0.313227**	0.842379	0.5364	95 percent
	(0.59)	(2.55)	(4.64)		
Uganda					
Beans	0.068707	0.186056*	0.485573	0.2718	72 percent
	(1.2)	(1.64)	(2.96)		
Maize	0.004024	0.28677**	0.128667	0.1072	68 percent
	(0.05)	(2.07)	(0.29)		
Coffee	-0.04232	0.232828**	0.664772	0.3573	85 percent
	(-0.49)	(2.6)	(2.94)		
Tobacco	-0.12809	0.314552**	-0.33396	0.1157	57 percent
	(-1.49)	(2.01)	(-0.41)		
Cotton	-0.00348	0.297532***	0.407883	0.4537	79 percent
	(-0.08)	(3.65)	(1.77)		
Tea	0.064	-0.0035	0.407883	0.064	40 percent
	(1.20)	(-0.08)	(1.77)		

Notes: These are estimates of equation (4). Asterisks denote level of significance (* for 10 percent, ** for 5 percent, and *** for 1 percent). For other definitions, see Table 1. The 3 year adjustment is reported only when α is significantly different from zero at the 10 percent level (otherwise it is denoted as "-")

TABLE D.4
Logarithmic regressions in levels, without real exchange rate

	Constant	Log (β)	Adj. R^2	DW	PP
Cameroon					
Rice	3.9013**	0.344	0.0575	0.3936	-1.5042
	(2.81)	(1.05)			
Coffee	3.0745***	0.4949***	0.4545	0.9158	-2.1437
	(5.31)	(3.87)			
Cocoa	1.1948**	0.8552***	0.7516	1.441	-3.2394
	(2.08)	(7.38)			
Cotton	2.9115***	0.407**	0.3236	0.6351	-1.8256
	(4.47)	(2.93)			
Chile					
Wheat	4.3978***	0.0772	0.0194	0.3845	-1.2399
	(7.59)	(0.61)			
Maize	2.7843***	0.4171***	0.4264	0.4236	-1.4563
	(5.35)	(3.76)			
Sugar	5.3292***	-0.1114	0.0938	0.4107	-1.6530
	(14.93)	(-1.40)			
Beans	2.3558**	0.4204**	0.2137	1.5949	-3.6191
	(2.85)	(2.27)			
Beef	3.7561***	0.1952**	0.2174	0.355	-1.1628
	(9.95)	(2.3)			
Ghana					
Rice	3.7824***	0.2137	0.0623	0.6632	-2.1431
	(4.26)	(1.12)			
Maize	2.0449**	0.5918***	0.3368	1.8887	-4.1405
	(2.29)	(3.11)			
Cocoa	7.0513***	-0.5542***	0.4567	1.6579	-4.0118
	(10.36)	(-4.00)			
Groundnut	2.4156**	0.4928**	1.666	1.0066	-2.3858
	(2.95)	(2.92)			
Guatemala					
Maize	3.7986***	0.21*	0.1538	1.6588	-3.724
	(7.17)	(1.86)			
Wheat	2.5099***	0.5086***	0.609	0.5976	-1.9278
	(5.82)	(5.44)			
Guyana					
Rice	7.7124***	-0.7122**	0.2536	0.9998	-2.3997
	(5.89)	(-2.54)			
Sugar	3.9085***	0.1452*	0.1326	1.3963	-3.1066
	(10.21)	(1.7)			
Bananas	5.7317***	-0.2364	0.0411	1.0491	-3.0815
	(4.56)	(-0.9)			
Coconut	9.3953***	-0.41367**	0.3039	0.8333	-2.9664
	(5.12)	(-2.88)			
India					
Rice	4.6961***	-0.0311	0.0088	1.4669	-3.2704
	(13.31)	(0.41)			
Maize	3.91***	0.1231*	0.1384	1.4752	-3.1940
	(11.83)	(1.75)			
Coconut oil	3.2523***	0.3367**	0.3199	0.9956	-2.4060
	(6.25)	(2.99)			
Lamb meat	5.1424***	-0.1555	0.0447	0.235	-1.1481
	(6.52)	(-0.94)			
Wheat	3.9162***	0.1609**	0.1966	0.9343	-2.5754
	(11.39)	(2.16)			

	Constant	Log (β)	Adj. R^2	DW	PP
Kenya					
Rice	5.2169*	-0.1187	0.005	0.5685	-1.9408
	(2.91)	(-0.31)			
Maize	5.4169***	-0.1477*	0.1382	1.19	-2.9344
	(13.66)	(-1.75)			
Coffee	2.3575***	0.5024***	0.7465	1.6316	-3.6166
	(7.88)	(7.48)			
Sugar cane	4.5132***	-0.022	0.0056	1.4332	-3.297
	(14.97)	(-0.33)			
Wheat	3.8552***	0.1593	0.1069	1.2826	-3.0435
	(7.92)	(1.51)			
Tea	-0.5206	1.1561***	0.5401	1.6083	-3.6871
	(-0.44)	(4.72)			
Malawi					
Rice	6.2852***	-0.3402	0.1041	0.5073	-1.3094
	(5.88)	(-1.49)			
Maize	4.3824***	0.1448	0.0433	0.8839	-2.2056
	(5.99)	(0.93)			
Cotton	3.8956***	0.3**	0.1735	0.7433	-2.1602
	(5.78)	(2)			
Tobacco	1.6862	0.7153**	0.2896	1.079	-2.604
	(1.35)	(2.78)			
Groundnut	3.4227***	0.3366	0.1151	0.6558	-1.6363
	(3.3)	(1.57)			
Morocco					
Wheat	2.5459***	0.4591***	0.4693	1.0767	-2.5918
	(4.93)	(4.1)			
Maize	2.4091***	0.4746***	0.4777	0.917	-2.4214
	(4.51)	(4.17)			
Barley	1.677*	0.6573**	0.3489	1.2664	-3.0684
	(1.79)	(3.019)			
Sunflower	3.1204***	0.3288**	0.2309	0.4015	-1.5952
	(4.79)	(2.39)			
Groundnut	4.9368***	-0.1202	0.1068	1.5224	-3.647
	(12.78)	(-1.51)			
Nigeria					
Rice	6.531***	-0.3108	0.0326	0.3675	-1.4204
	(3.6)	(-0.80)			
Maize	7.3105***	-0.6091**	0.2588	0.919	-2.3334
	(6.59)	(-2.58)			
Coffee	5.2928***	-0.3332*	0.1284	0.8273	-2.3879
	(5.96)	(-1.67)			
Groundnut	4.2542***	0.085	0.0046	0.6608	-1.7246
	(3.06)	(0.30)			
Cocoa	5.0311***	-0.1243	0.0281	0.7743	-2.3229
	(6.11)	(-0.74)			
Peru					
Rice	0.9757	0.6785**	0.1696	0.413	-1.4395
	(0.42)	(1.97)			
Maize	-1.0665	0.3343***	0.433	0.5154	-1.9012
	(-0.63)	(3.81)			
Coffee	-2.8402**	0.7127***	0.7705	1.5802	-3.6393
	(-2.9)	(7.99)			
Barley	-4.2358	-0.9540**	0.3583	0.506	-1.7583
	(-1.45)	(-3.26)			
Senegal					
Rice	5.9069***	-0.3336**	0.1965	0.3507	-1.2025
	(8.17)	(-2.16)			

	Constant	Log (β)	Adj. R^2	DW	PP
Sorghum	4.3685*** (9.96)	0.0192 (0.20)	0.0022	1.4525	(-3.2167)
Cotton	5.4732*** (14.4)	-0.2101** (-2.48)	0.2447	0.5152	-1.9200
Groundnut	5.4877*** (10.31)	-0.1989* (-1.81)	0.147	0.7526	-2.3236
Tanzania					
Rice	3.92*** (4.44)	0.2095 (1.11)	0.0607	0.4545	-0.9303
Maize	7.1765*** (5.36)	-0.6522** (-2.28)	0.2151	0.461	-1.6945
Coffee Arabica	3.5643*** (6.52)	0.1549 (1.31)	0.0828	1.3751	-3.0423
Cotton	2.7915*** (4.78)	0.3142** (2.42)	0.2351	1.0644	-2.6634
Coffee Robusta	2.8353*** (6.96)	0.3491*** (3.82)	0.4343	1.4659	-3.8571
Uganda					
Beans	5.0494*** (9.65)	-0.0804 (-0.72)	0.0263	1.5633	-3.6912
Maize	6.964*** (6.46)	-0.5049** (-2.2)	0.2026	1.3349	-3.1384
Coffee	4.0979*** (4.9)	-0.0652 (-0.35)	0.0063	0.5967	-2.6923
Tobacco	2.6425 (0.75)	0.4149 (0.57)	0.017	0.5648	-2.3712
Cotton	5.2223*** (5.25)	-0.1344 (-0.61)	0.019	0.8924	-3.5472
Tea	2.6425 (0.75)	0.4149 (0.57)	0.017	0.5648	-2.3712

Notes: These are estimates of equation (1). Asterisks denote level of significance (* for 10 percent, ** for 5 percent, and *** for 1 percent). For other definitions, see Table 1. The 3 year adjustment is reported only when α is significantly different from zero at the 10 percent level (otherwise it is denoted as "-")

TABLE D.5

Regressions of domestic prices (dependent variables) with world prices and real exchange rates (independent variables)

	Constant	World Price	RER	Adj. R^2	DW	PP
Cameroon						
Rice	5.724**	0.3689	-0.4464	0.0887	0.3587	-3.882***
	(2.07)	(1.11)	(-0.76)			
Coffee	1.3550	0.4942***	0.3989	0.4876	1.1501	-11.2197***
	(0.78)	(3.88)	(1.05)			
Cocoa	2.4462	0.8354***	-0.2671	0.7621	1.4548	-15.5921***
	(1.57)	(7.02)	(-0.86)			
Cotton	4.0822***	0.3909**	-0.2536	0.3611	0.7112	-6.4755***
	(3.04)	(2.8)	(-1.0)			
Chile						
Wheat	0.118	0.3603**	0.6524**	0.2666	0.5242	-5.331***
	(0.07)	(2.25)	(2.46)			
Maize	-2.2867***	0.7381***	0.7811***	0.8805	0.8139	-8.7305***
	(-3.46)	(11.37)	(8.27)			
Sugar	3.0043*	-0.0309	0.4302**	0.2922	0.3219	-4.4786***
	(2.77)	(-0.38)	(2.25)			
Beans	0.4062	0.4925**	0.3564	0.2658	1.6539	-18.5995***
	(0.21)	(2.53)	(1.13)			
Beef	3.455***	0.1611*	0.099	0.2408	0.4088	-5.1215***
	(6.21)	(1.65)	(0.74)			
Ghana						
Rice	6.0499***	-0.113	-0.1843**	0.2828	0.9056	-11.173***
	(4.83)	(-0.51)	(-2.35)			
Maize	5.430***	0.0671	-0.2301**	0.4672	2.2084	-22.8895***
	(3.00)	(0.22)	(-2.10)			
Cocoa	4.5611***	-0.2322	0.227*	0.548	1.9559	-21.1886***
	(3.14)	(-1.09)	(1.91)			
Groundnut	6.1293***	-0.0547	-0.2638***	0.6581	0.8877	-9.8389***
	(5.84)	(-0.31)	(-4.28)			
Guatemala						
Maize	1.1282	0.4264***	0.3734**	0.359	1.9786	-20.3882***
	(0.93)	(3.15)	(2.4)			
Wheat	3.6775***	0.4219***	-0.1729	0.6453	0.6754	-7.5038***
	(3.84)	(3.78)	(-1.36)			
Guyana						
Rice	6.4492***	-0.5711**	0.157	0.3491	0.9807	-9.219***
	(4.37)	(-2.02)	(1.63)			
Sugar	3.9925***	0.1407	-0.0166	0.1379	1.3972	-14.4546***
	(8.56)	(1.59)	(-0.33)			
Bananas	3.8731**	0.0513	0.1245**	0.2624	1.4017	-14.584***
	(2.79)	(0.19)	(2.32)			
Coconut	5.4836**	-0.5965	0.3652**	0.4295	0.6177	-8.741***
	(2.11)	(-1.31)	(1.99)			
India						
Rice	4.0837***	0.0114	0.0987	0.1043	1.622	-16.7893***
	(7.28)	(0.14)	(1.39)			
Maize	3.1693***	0.1976**	0.0935	0.1866	1.6979	-19.0949***
	(4.02)	(1.96)	(1.03)			
Coconut oil	4.7227***	0.2231*	-0.2258*	0.4201	1.3083	-14.5331***
	(4.88)	(1.79)	(-1.76)			
Lamb meat	3.0364**	0.0514	0.2662**	0.2994	0.2941	-3.7842***
	(2.82)	(0.31)	(2.56)			
Wheat	3.7088***	0.1813*	0.0271	0.2004	0.9490	-9.8419***
	(4.69)	(1.75)	(0.29)			

	Constant	World Price	RER	Adj. R^2	DW	PP
Kenya						
Rice	14.3886***	-0.5565	-1.5887**	0.2796	1.0595	-11.5994***
	(3.75)	(-1.49)	(-2.62)			
Maize	6.672***	-0.2255**	-0.1985	0.1934	1.4716	-15.6465***
	(5.57)	(-2.06)	(-1.11)			
Coffee	2.5301	0.4949***	-0.0311	0.7466	1.6459	-16.9233***
	(1.56)	(5.08)	(-0.11)			
Sugarcane	4.9449***	-0.0306	-0.0877	0.0173	1.4713	-15.6558***
	(5.03)	(-0.43)	(-0.46)			
Wheat	6.9443***	-0.207	-0.5039**	0.3776	1.5153	-15.9674***
	(5.88)	(-0.19)	(-2.80)			
Tea	2.8138	0.8692**	-0.4334	0.5594	1.7585	-17.9193***
	(0.71)	(2.14)	(-0.89)			
Malawi						
Rice	0.8998	-0.1293	1.0486***	0.4514	1.3693	-14.7577***
	(0.50)	(-0.67)	(3.38)			
Maize	6.3483**	0.0091	-0.317	0.0851	0.6879	-6.9542***
	(2.77)	(0.04)	(-0.91)			
Cotton	8.2221***	0.0453	-0.759**	0.4298	0.5215	-5.0042***
	(5.06)	(0.29)	(-2.84)			
Tobacco	1.7592	0.7071	-0.0079	0.2896	1.0753	-11.9502***
	(0.43)	(1.39)	(-0.02)			
Groundnut	3.4876	0.3322	-0.0103	0.1152	0.6524	-5.164***
	(1.12)	(1.11)	(-0.02)			
Morocco						
Wheat	0.5904	0.5426***	0.3437	0.493	1.1353	-10.9705***
	(0.27)	(3.75)	(0.92)			
Maize	0.5358	0.555***	0.3269	0.4971	0.9769	-10.4574***
	(0.23)	(3.70)	(0.83)			
Barley	6.8511**	0.3629	-0.8398	0.4291	1.5069	-14.7706***
	(2.03)	(1.34)	(-1.59)			
Sunflower	-0.8529	0.4491***	0.7447**	0.3915	0.618	-6.4423***
	(-0.44)	(3.27)	(2.18)			
Groundnut	5.2242***	-0.1311	-0.0513	0.109	1.5296	-17.5272***
	(3.65)	(-1.35)	(-0.21)			
Nigeria						
Rice	2.0882	0.1425	0.5537***	0.5387	0.4731	-4.4295***
	(1.28)	(0.48)	(4.44)			
Maize	1.956	0.1351	0.4451***	0.6288	1.6542	-18.0143***
	(1.30)	(0.55)	(4.24)			
Coffee	-1.6758	0.5051*	0.7754***	0.4892	0.8844	-9.0167***
	(-0.81)	(1.79)	(3.57)			
Groundnut	0.205	0.5488**	0.4293***	0.5471	1.1056	-9.0635***
	(0.16)	(2.46)	(4.64)			
Cocoa	-2.086	0.7459***	0.6812***	0.5575	1.1873	-13.277***
	(1.27)	(3.38)	(4.64)			
Peru						
Rice	-3.6848***	0.233	1.6421***	0.8764	2.438	-24.68***
	(-3.60)	(1.00)	(10.15)			
Maize	-1.4575**	-0.0305	1.3849***	0.9256	2.3669	-23.0569***
	(-2.32)	(-0.17)	(10.91)			
Coffee	-4.2315***	1.1904***	0.7518**	0.8299	2.0471	-20.8908***
	(-4.12)	(4.22)	(2.51)			
Barley	-3.6185***	0.2074	1.5755***	0.9199	2.8497	-28.7378***
	(-3.41)	(0.77)	(11.23)			
Senegal						
Rice	2.4543***	-0.1939*	0.6519***	0.6813	1.1772	-12.4004***
	(3.03)	(-1.87)	(5.23)			

	Constant	World Price	RER	Adj. R^2	DW	PP
Sorghum	3.4634***	0.0840	0.1402	0.0576	1.6195	-17.2592***
	(3.52)	(0.74)	(1.03)			
Cotton	3.3254***	-0.065	0.3486***	0.5369	1.0604	-12.0961***
	(4.70)	(-0.81)	(3.37)			
Groundnut	2.9478**	-0.000448	0.3677**	0.3627	0.972	-11.7504***
	(2.60)	(-0.00)	(2.47)			
Tanzania						
Rice	4.7542***	0.1400	-0.1272	0.1407	0.4800	-3.3633**
	(4.40)	(0.72)	(-1.29)			
Maize	3.9417*	-0.2366	0.3219*	0.3273	0.5584	-7.4981***
	(1.74)	(-0.65)	(1.73)			
Coffee Arabica	0.2191	0.5168***	0.4197***	0.426	1.6027	-17.1621***
	(0.20)	(3.53)	(3.28)			
Cotton	2.2834**	0.3733**	0.0608	0.2567	1.1304	-11.9856***
	(2.49)	(2.41)	(0.72)			
Coffee Robusta	1.0793	0.5365***	0.2314*	1.5333	1.5557	-17.9997***
	(1.11)	(4.18)	(1.95)			
Uganda						
Beans	3.0551**	0.1633	0.2065	0.1467	1.4538	-14.6642***
	(2.27)	(2.27)	(1.59)			
Maize	4.3989**	-0.1509	0.2174	0.2898	1.3816	-14.3744***
	(2.18)	(-0.46)	(1.49)			
Coffee	-2.561*	0.6876***	0.7969***	0.6108	1.314	-12.6214***
	(-1.87)	(3.68)	(5.29)			
Tobacco	7.9521*	-0.4058	-0.3137	0.1341	0.5655	-6.8066***
	(1.65)	(-0.46)	(-1.56)			
Cotton	-1.3752	0.8089***	0.5683***	0.5901	1.1896	-14.7865***
	(-0.93)	(3.38)	(5.01)			
Tea	7.9521*	-0.4058	-0.3137	0.1341	0.5655	-6.8066***
	(1.65)	(-0.46)	(-1.56)			

Notes: These are estimates of equation (1). Asterisks denote level of significance (* for 10 percent, ** for 5 percent, and *** for 1 percent). For other definitions, see Table 1. The 3 year adjustment is reported only when α is significantly different from zero at the 10 percent level (otherwise it is denoted as "-")

TABLE D.6
Test for structural change (Predictive Chow Test Break Point – 1993)

	F-value	Pr>F		F-value	Pr>F		F-value	Pr>F
Cameroon			**India**			**Peru**		
Rice	0.59	0.7521	Rice	0.14	0.9951	Rice	0.29	0.9542
Coffee	5.12**	0.0135	Maize	0.75	0.6506	Maize	0.76	0.6462
Cocoa	3.09*	0.0594	Coconut oil	0.76	0.6432	Coffee	0.58	0.7702
Cotton	0.59	0.7518	Lamb meat	3.67**	0.0349	Barley	0.14	0.9947
			Wheat	0.47	0.8466			
Chile			**Malawi**			**Senegal**		
Wheat	0.46	0.8574	Rice	25.66***	0.0001	Rice	1.54	0.2662
Maize	0.45	0.8604	Maize	2.24	0.1256	Sorghum	27.18***	0.0001
Sugar	0.1	0.9985	Cotton	0.98	0.5068	Cotton	0.98	0.5081
Beans	1.01	0.4913	Tobacco	1.12	0.4331	Groundnut	0.23	0.9736
Beef	1.29	0.3553	Groundnut	5.05**	0.013			
Ghana			**Morocco**			**Tanzania**		
Rice	0.11	0.9973	Wheat			Rice	2.52*	0.0951
Maize	0.89	0.5612	Maize	0.86	0.5759	Maize	0.32	0.9399
Cocoa	0.24	0.9706	Barley	2.11	0.1435	Coffee arabica	7.08***	0.0041
Groundnut	1.16	0.4109	Sunflower	11.55***	0.0007	Cotton	-	-
			Groundnut	1.3	0.3513	Coffee robusta	1.48	0.2852
Guatemala			**Nigeria**			**Uganda**		
Maize	2.04	0.1536	Rice	2.25	0.1241	Beans	0.09	0.9988
Wheat	0.42	0.8850	Maize	1.71	0.2202	Maize	0.42	0.8802
			Coffee	-	-	Coffee	0.08	0.991
			Groundnut	0.63	0.7365	Tobacco	0.45	0.8615
			Cocoa	0.4	0.8945	Cotton	0.82	0.6056
						Tea	0.09	0.9988
Guyana			**Kenya**					
Rice	0.53	0.8109	Rice	6.39***	0.0059			
Sugar	0.24	0.97	Maize	2.03	0.1568			
Bananas	0.04	0.999	Coffee	5.68***	0.0088			
Coconut	0.12	0.9968	Sugar cane	0.58	0.7741			
			Wheat	1.25	0.3705			
			Tea	0.89	0.562			

Note:The critical values for the F-test for 7 and 9 DF in the numerator and denominator respectively are: 2.51 (10 percent), 3.29 (5 percent) and 5.61 (1 percent). Asterisks denote level of significance (* for 10 percent; ** for 5 percent and *** for 1 percent).

TABLE D.7
Nominal rate of protection

	1980-1993	1994-2000	1980-2000
Cameroon			
Rice	2.66	1.90	2.43
Coffee	1.04	2.21	1.39
Cocoa	0.64	0.72	0.66
Cotton	0.17	0.21	0.18
Chile			
Wheat	0.29	0.18	0.25
Maize	0.08	0.09	0.09
Sugar	0.73	0.56	0.67
Beans	-0.21	-0.03	-0.15
Beef	0.37	-0.01	0.25
Ghana			
Rice	0.25	0.06	0.19
Maize	0.17	0.24	0.19
Cocoa	-0.45	0.16	-0.25
Groundnut	0.005	-0.023	-0.004
Guatemala			
Maize	0.09	0.27	0.15
Wheat	0.30	0.33	0.31
Guyana			
Rice	-0.08	-0.15	-0.10
Sugar	0.07	0.49	0.21
Bananas	-0.20	-0.02	-0.14
Coconut	-0.30	0.02	-0.19
India			
Rice	-0.09	0.00	-0.06
Maize	-0.21	-0.01	-0.14
Wheat	-0.04	0.38	0.10
Coconut oil	0.36	0.10	0.27
Lamb meat	-0.40	-0.06	-0.29
Kenya			
Maize	-0.05	0.47	0.12
Wheat	-0.10	0.30	0.03
Rice	0.01	0.51	0.18
Tea	0.38	0.16	0.30
Coffee	0.10	0.50	0.23
Sugar cane	-0.05	0.29	0.07
Malawi			
Rice	-0.15	0.88	0.19
Maize	0.34	0.97	0.55
Groundnut	0.14	0.67	0.31
Tobacco	0.32	0.48	0.37
Cotton	1.13	1.47	1.25
Morocco			
Wheat	0.09	0.07	0.09
Maize	-0.02	-0.03	-0.02
Barley	0.21	0.06	0.16
Groundnut	-0.44	-0.15	-0.35
Sunflower	-0.02	0.01	-0.01
Nigeria			
Rice	1.11	0.36	0.86
Maize	-0.14	0.08	-0.07

Part 2

Trade-related reforms and food security: country case studies

Cameroon

Ernest Bamou, Jean Pierre Tchanou, François Honoré Mkouonga and Dominique Njinkeu[1]

EXECUTIVE SUMMARY

Following independence in 1960, the Government intervened heavily in the rural and agricultural sectors to promote development. An economic crisis beginning in 1987 led to a series of Structural Adjustment Programmes (SAPs) aimed at correcting macroeconomic disequilibria, reducing microeconomic rigidities, limiting economic vulnerability to external shocks and improving competitiveness. All of these proved ineffective. An Extended Structural Adjustment Facility (ESAF) was implemented in August 1997. At a sectoral level, the main focus of the reforms was progressive liberalization of agricultural input and output markets and the withdrawal of the state from key areas of economic activity.

Two of the most significant reforms in terms of the impact on producer incentives were the devaluation of the exchange rate in 1994 and the implementation of the Uruguay Round Agreement on Agriculture which led to an erosion of the preferential tariff margins enjoyed by producers.

Impact on intermediate variables

Both the domestic producer and international prices of the main export crops declined in real terms during the period to 1993. They recorded a rise only after the 1994 devaluation. The devaluation had its most pronounced effect on cocoa and coffee prices which more than doubled in 1995. They then remained relatively stable until 1998 before rising again due to relatively favourable international market conditions. During the first phase of reforms (prior to devaluation) parastatal marketing boards continued to intervene in prices by seeking to stabilize them in the face of falling international prices. During the second phase (following devaluation) upward price movements can be mostly explained by exchange rate devaluation, although downward pressure was still being maintained by international prices (which continued to fall) and domestic market liberalization.

For food crops (notably rice) the producer prices were pegged to world prices. Liberalization provoked a fall in both consumer and producer prices. The fall in producer price intensified during the second phase of reforms with the restructuring of public enterprises.

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Although output fell in all agricultural sub-sectors in the period to 1993, cash crop production decreased at 9 percent on average while food crop production remained relatively stable with an average 0.5 percent decrease. Export crops suffered heavily from external shocks, whilst subsistence agriculture benefited from a switch away from cash crops and the arrival of new producers in response to salary cuts and other reforms in public sector working conditions.

From 1994 to 2000 the production of the food crop sub-sector increased at an annual average rate of 4 percent. Yields have however stagnated. The relatively positive production trends observed can be attributed to the increase in area under production.

The fall in exports during the economic crisis continued despite the structural adjustment measures. Only the devaluation and fiscal reforms of 1994 stimulated an increase in export earnings. With the continuous reduction in oil exploitation, agriculture has assumed a more important role in the country's international trade. The share of agrifood products in total imports is decreasing, falling significantly after the 1994 devaluation.

Impact on target variables

An increase in some national level food security indicators has been recorded for the period 1996 to 2000. The food imports to agricultural exports ratio declined and the total supply of key commodities increased significantly between 1990/1991 and 1998/2000. However, a decrease was recorded in per capita food supply due to the rising population and the proportion of children suffering from severe malnutrition has more than doubled, from 3 percent in 1991 to 6.4 percent in 2001.

There was a 13 percent reduction in the number of people living below the poverty line during the second phase of reforms, but this obscures an uneven distribution of income improvements. Generally, farmers have benefited little from price increases caused by devaluation. Inflation and reductions in the payroll of public and private employers greatly reduced the purchasing power of households. The fall in purchasing power was closely followed by a reduction in food expenditure and consumption. Real income instability has also worsened due to the withdrawal of state price controls in 1990.

On the whole, male-headed farm households benefited more from the reforms than female-headed households. This is because men are more involved in the production of tradable commodities whose prices have tended to rise during the reform period. Women are traditionally associated with non-tradable subsistence crops.

Policy lessons

The fact that malnutrition is mainly observed in rural areas supports the contention that the improvement observed in the national food security indicators is more attributable to the wider economic growth than to changes in agricultural performance. Additionally, the benefits of growth accrue to a minority of the (mainly urban) population. Reform should not only focus on direct income distribution channels (including transfers, salary increments, etc.) but must also take into account indirect channels like improving support structures for production and marketing, developing enabling institutions for the integration of the most vulnerable into markets, improving access to credit, and creating incentives for greater labour mobility and the creation of small scale enterprises.

TABLE 1
Contribution of agriculture sector to GDP, 1988-2000 (percentage of GDP)

	1988	1989	1990	1993	1994	1995	1996	1997	1998	1999	2000
Primary sector	49.9	50.5	36.4	32.9	37.1	39.9	38.6	42.9	44.4	46.0	47.8
Subsistence agriculture	24.1	23.9	22.7	22.2	24.6	25.0	24.2	26.3	27.1	28.4	29.4
Perennial agriculture	10.7	11.8	3.0	1.9	1.6	1.9	1.2	2.1	2.4	2.3	2.4
Breeding and hunting	9.0	7.6	4.8	3.6	4.1	4.1	4.1	4.3	4.6	4.4	4.6
Fishery	0.3	0.3	3.1	2.8	2.8	3.0	2.9	3.0	2.7	2.8	2.9
Forestry	5.8	6.9	2.7	2.3	4.0	6.0	6.2	7.2	7.5	8.1	8.5

Source: World Bank database.

TABLE 2
Contribution of agriculture to total employment, 1989/90 - 1996/97

	1989/90		1994/95		1995/96		1996/97	
	Employment ('000)	Share (%)	Employment ('000)	Share (%)	Employment ('000)	Share (%)	Employment ('000)	Share (%)
Modern	342.4	10.2	304.0	8.0	312.4	8.0	325.1	8.1
Informal	3 019.2	89.8	3 487.4	92.0	3 583.3	92.0	3 676.4	91.9
Agriculture	2 162.6	64.3	2 451.0	64.5	2 517.0	64.6	2 587.3	64.7
Total employment	3 361.6	100.0	3 791.4	100.0	3 895.7	100.0	4 001.5	100.0

Source: Mkouonga and Gasas, 2001.

INTRODUCTION: CONTEXT AND NATURE OF THE REFORMS

The role and level of development of the agriculture sector

Before 1978 agriculture accounted for more than 50 percent of GDP, more than 70 percent of employment and for most of the country's export earnings. Although, the sector's relative contribution diminished somewhat after 1978, following the start of oil exploitation, its direct contribution to GDP, employment and exports remains high. If one includes agricultural processing and marketing activities, the sector accounts for at least 50 percent of national GDP and more than 60 percent of total employment. The devaluation of the CFA (the Communauté Financière Africaine franc) in January 1994 had a positive effect on the sector's share of GDP (Tables 1 and 2).

During the oil boom (1978-86) the agricultural sector registered an average annual growth rate of 3.5 percent. This fell to -5.2 percent during the economic crisis of 1987-93. It was during this period that the majority of structural and stabilization reforms were implemented. However, the negative growth rate cannot be attributed solely to the reforms. A number of external shocks, including a sharp fall in international commodity prices and a large rise in the real effective exchange rate, contributed to the problem (Ghura, 1997).[2]

Cocoa, coffee and cotton are the country's most important cash crops. They are an essential source of income for poor rural households and an import source of

[2] Between 1985 and 1987, the export price indexes for cocoa, coffee and rubber fell, respectively, by 24 percent, 11 percent and 20 percent (Blandford *et al*., 1995).

export revenues. The main food products are rice, millet, sorghum, cassava, plantain and groundnuts.

Degree of openness of the economy prior to the reforms

Following independence in 1960, the Government intervened heavily in the rural and agricultural sectors, either directly through the establishment of government-owned corporations and enterprises or indirectly through the regulation of the private sector, the implementation of agricultural support programmes and the provision of rural infrastructure.

Motivation for the reforms

The reforms were triggered by the economic crisis at the end of the 1980s. The main features of this crisis were:

- declining world prices for the country's main exports;
- drastic deterioration in the balance of payments;
- an overvalued exchange rate;
- a large fiscal budget deficit;
- negative economic growth and negative agricultural growth;
- increasing poverty.

The crisis led to measures aimed at correcting macroeconomic disequilibria, reducing microeconomic rigidities and inefficiencies, limiting the economy's vulnerability to external shocks and significantly improving its competitiveness (Touna and Tsafack-Nanfosso, 2000). The medium-term goal of these reforms was to restructure the economy and stimulate growth.

Macro and sectoral components and the policy instruments used

Between 1988 and 1996, Cameroon signed four agreements with international financial institutions as part of support by these institutions for the country's SAPs (September 1988, December 1991, March 1994 and September 1995). These agreements proved ineffective and in August 1997 an Extended Structural Adjustment Facility (ESAF) was approved. This met with greater success and in 2000 Cameroon became eligible for support under the Heavily Indebted Poor Countries (HIPC) as well as the International Monetary Fund's (IMF) so called second generation reforms

TABLE 3
Per capita household income and consumption 1984-2000 (in constant 1994 thousand CFA)

	1984	1990	1996	2000
Real GDP	366.2	316.9	274.0	300.8
Household AGNI[1]		325.7	246.1	274.9
Household consumption	404.2	312.7	221.4	253.5
Gross household savings		13.1	24.7	21.3
Population (in thousand inhabitants)	8 851	11 530	13 658	14 853

[1] Available Gross National Income including net factor incomes.
Source: Data from MINPAT (1985), MINEFI/DSCN (1992) and MINEFI/INS (2002a) deflated by the corresponding year CPI.

programme. These initiatives led to the cancellation of a significant portion of the country's external debt.

Various reforms have been implemented as part of the economic stabilization and structural adjustment process. These have included: (1) fiscal and monetary policy reforms; (2) exchange rate devaluation; (3) banking and financial sector reform; (4) trade liberalization and (5) agricultural policy reform. The aims were to:

- reduce inflation through tight fiscal and monetary policy;
- rationalize public sector spending through cuts and better budget management;
- progressively liberalize interest rates;
- stimulate private initiative and reduce production costs through market deregulation and improved price incentives;
- shift the bias in production incentives away from non-tradable goods and services towards tradables;
- revive agricultural productivity through market liberalization and the reform of public sector enterprises;
- revitalize international trade by consolidating the process of sub-regional integration and diversifying foreign trading partners.

Reform of the public sector focused on reforming public finances, restructuring public services, and redefining the role of the state in order to free resources for the provision of public goods and essential infrastructure and services. Measures were taken to control state expenditure, increase state revenue and reduce public sector debt. Efforts to control public sector spending included:

- a freeze and cuts in public sector salaries and allowances;
- early retirement programmes programme for state personnel;
- cuts in the student population in government vocational schools;
- a reduction of embassy staff as well as 'costly' and 'non-profitable' economic missions;
- restrictions on the mobility of public sector personnel to reduce travel costs.

Following these reforms, the state wage bill fell by 12 percent in 1992 (Tsafack-Nanfosso, 1999). Further salary cuts in January and November 1993 led to a sharp fall of almost 35 percent in the payroll during the 1993/94 fiscal year (MINEFI/DP, 2000).

At the national level, a net deterioration of per capita real income and household consumption expenditures is recorded as from 1984, despite the relative recovery recorded in 2000 as shown in Table 3.

Macroeconomic reforms

Fiscal policies

Cameroon is a member of Economic and Monetary Community for Central Africa (CEMAC), which in 1998 took over from the Central African Economic and Customs Union (UDEAC) which was created in 1964 with five members (Cameroon, Congo, Gabon, Central African Republic and Chad). UDEAC's objectives involved the creation of a common market, support for the economic development of its members, and cross-country harmonization of development policies (including fiscal policy). The most significant initiative of the Customs Union has been the Regional Fiscal Reform Programme (RFRP) framework, which was adopted by Cameroon in 1994, and aimed to simplify and harmonize the setting and collecting of indirect taxes and international tariffs.

TABLE 4
Pre- and post-January 1994 agricultural products tariff structure

Taxes and duties	Pre-1994		Since June2000	
	Import (% CIF val.)	Export (% FOB val.)	Import (% CIF val.)	Export (% FOB val.)
Exit tax		2.0		
Custom duties	5.0 - 7.5		10.0 - 30.0	
Entry tax	10.0 - 30.0			
Turnover tax	11.5 - 20.5			
Value added tax			18.5	
Complementary tax	5.0 - 20.0			
Sanitary and veterinary tax	50 CFA/T	50 CFA/T	50 CFA/T	50 CFA/T
Packaging tax		0.5		0.5
Loading tax		247 - 588 CFA		247 - 588 CFA
Preferential tax	0.1	0.1	0.1	0.1
Unloading tax	595.1 CFA			
Computer dues	1.5	1.5	1.5	1.5
CNCC tax	0.3	0.3	0.3	0.3
Minimum tax	5.0			
Pre-account	2.0			
Council tax	180 CFA/T	180 CFA/T	180 CFA/T	180 CFA/T
Phytosanitary tax	50 CFA/T	50CFA/T	50 CFA/T	50CFA/T
Credit distribution tax	1.0	1.0	1.0	1.0
Cattle tax	150-200 CFA/head	150-200 CFA/head		
Veterinary inspection tax		0,95		
Tree cutting tax	25	25		
Reforestation tax	5 –6 CFA/ha/yr			
Total	41.4 – 87.9	5.4	31.4 - 51.4	3.4
	+	+	+	+
	875 CFA/T	527 - 869 CFA/T	280 CFA/T	527 – 869 CFA/T

Notes: Val = value; T = tonne; ha = hectare; yr = year.
Source: Bamou and Mkouonga (2003).

TABLE 5
Pre- and post-Uruguay Round (UR) MFN rates of selected agricultural products to EU and United States markets

Commodities	European Union			United States		
	Pre-UR	Post-UR	Percent changes	Pre-UR	Post-UR	Percent changes
Agriculture excluding fish	4.83	0.75	-84.5	0.04	0.02	-50.0
Fish and preparations	17.61	11.72	-33.4	0.00	0.0	0.0
Bananas	20.0	16.0	-20.0	Na	Na	Na
Coffee	5.0	0.0	-100.0	0.0	0.0	0.0
Palm oil	5.0	1.9	-62.0	Na	Na	Na
Cocoa	3.0	0.0	-100.0	1.2	0.3	-75.0
Wood products	5.2	2.6	-50.0	5.7	3.2	-43.9
Leather, rubber, footwear	0.28	0.21	-25.0	0.21	0.07	-66.7

Na = Not available.
Source: Njinkeu and Monkam (2002) and Amjadi *et al.* (1996).

Financial and banking sector reforms

Financial and banking sector reforms involved a number of measures including (a) reform of the banking system by liquidating non-profitable establishments; (b) emergency measures to relieve the liquidity crisis by discharging arrears and rescheduling credits at the Central Bank; (c) restructuring agricultural credit; and (d) better control over banks by supranational authorities.

In 1997 the Cameroon Agricultural Bank (*Crédit Agricole*) was liquidated, with the result that only a few parastatal and agro-industrial enterprises are today able to satisfy the credit needs of agricultural producers. Most smallholders are unable to access credit from formal financial institutions and rely on relatives and informal moneylenders. Some donor-funded microfinance programmes also supply credit to smallholders, but these are not widespread, nor well developed, and they lack coordination with the formal banking sector.

Monetary policies

Through monetary policy agreements with France, the currency of the CEMAC, like that of all the other countries of the CFA zone, has since 1948 been freely convertible into French francs (FF) at a fixed parity of CFA 50 per FF 1. After 1985, the economic and financial situation of the zone worsened following: (1) the deterioration in terms of trade due to the collapse in the international prices of major exports, (2) a decline in competitiveness due to the appreciation of the FF against the currencies of the zone's major trading partners and (3) other constraints including the very high cost of labour (Clément *et al*., 1996).

From the early 1990s, persistent poor macroeconomic performance showed that internal adjustments alone (carried out as part of SAPs) could not sufficiently revitalize the economy and that monetary adjustment should be also considered. Countries of the CFA agreed on the virtues of a stable common currency compared to national currencies and in January 1994, therefore, decided to devalue the CFA.

Trade policies

Trade reforms have involved the harmonization of policy across CEMAC member states and the simplification of tariff structures. Import duties are fixed by CEMAC authorities according to the following schedule: (1) 5 percent for basic commodities, (2) 15 percent for raw materials and equipment goods, (3) 35 percent for intermediate goods and, (4) 50 percent for final consumption goods. Apart from exemptions decided by the regional authorities, these duties apply to all imports from outside the Customs Union (Table 4).

Thanks to the Lomé Convention trade agreements with the European Union (EU), Cameroon's agricultural products have traditionally received preferential access to European markets. One of the consequences of the EU's adherence to WTO agreements is an erosion of the preferential margins (Table 5).

Sectoral reform

The Public and Parastatal Sector Enterprises Rehabilitation authority that was set up to undertake and monitor the Government's restructuring programme concluded that there was a need to restructure those enterprises that were to remain in the state

TABLE 6
Situation of agriculture sector public enterprises 1994 and 2002

Enterprises	Activities/products	Characteristics in 1994	Situation in 2002
FONADER	Supply of inputs	Monopoly of credit to production	Liquidated
SOCAPALM	Palm oil Palm nuts	55 percent production of palm oil	Privatized
CDC	Banana, palm oil, tea, palm nuts, rubber	Monopoly of tea and rubber	Partnership with Del Monte for the production of bananas. Privatized
SODECOTON	Training and supervision, credits to production, productions: cotton fiber, oil and cake marketing	Monopoly of the sector	Undergoing privatization
SODECAO	Training and supervision of peasants, phytosanitary treatment of plantations	Monopoly of the cocoa zone	Liquidated
NPMB	Marketing of export products, financing of subsidies	Monopoly of export commodities	Liquidated
SODEBLE	Wheat	Monopoly	Liquidated
SODERIM (Rice cultivation in the West)	Development of farmlands Hiring of equipment Rice hauling	Cartel	
SEMRY (Rice cultivation in the North)	Development of farmlands Hiring of equipment Rice hauling	Cartel	Restructured
UNVDA (Rice cultivation in the North West)	Development of farmlands Hiring of equipment Rice hauling	Cartel	Restructured
CAMSUCO	Sugar	Cartel	Bought by SOSUCAM (private)
PNVRA	Vulgarization of interface research results-production	Monopoly	
IRAD	Development of research (selected seedlings of maize, cassava, palm oil, etc.)	Monopoly	
MIDEVIV	Foodstuff trading	Liquidated	
Cereals Board	Cereals trading in the North	Liquidated	
SNAR	Prevention of food insecurity	End of Japanese grants, integration into MINAGRI	Activities have slowed down
CENEEMA	Supply of agricultural equipment	Privatized	
UCCAO	Supply of inputs, decortication of arabica and robusta coffee, exports	Monopoly of arabica	
OCB	Banana	Privatized in 1990	
CELLUCAM	Paper pulp	Liquidated	
CENADEC	Cooperative development	Liquidated	
CENADEFOR	Forestry development	Restructured	Considerable reduction of activities
COCAM	Veneer wood	Privatized	
HEVECAM	Rubber development	Undergoing privatization and reduction of activities	Privatized
MIDO	Agricultural development	Liquidated	
ONAREF	Forestry development	Liquidated	
ONDAPB	Small livestock	Liquidated	
SCT	Tobacco development	Liquidated	
SODENKAM	Rural development	Liquidated	
SOFIBEL	Timber	Liquidated	
SODEPA	Cow meat	Monopoly	Restructured and liberalized sector
WADA	Rural development	Liquidated	
ZAPI-EST	Rural development	Liquidated	

Source: Bamou and Mkouonga (2003).

portfolio, and that others should either be privatized or liquidated. Table 6 shows the results of this process for the agricultural sector.

The marketing of agricultural products was progressively liberalized. The National Produce Marketing Board (NPMB) and the Food Crop Development Authority (MIDEVIV), both public enterprises formerly controlling marketing of agricultural products, were liquidated. For many producers, liberalization was accompanied by a deterioration of marketing conditions (varying according to the produce and region). Faced with a small number of powerful and well-organized private enterprises, producers no longer received prices sufficient to compensate their efforts and encourage farm investment.

Agricultural trade liberalization involved gradual removal of existing Quantitative Restrictions (QRs).

Input policy

The agricultural input sub-sector has continuously attracted the attention of public authorities whose strategies to promote tradable input use cover two periods: 1960–1987 and 1988-present (Ntsama, 2000).

The first period was characterized by state intervention in the supply of inputs to agricultural producers. A National Programme on Fertilizers (NPF) was set up with the assistance of FAO following independence in 1960, with the objective of importing fertilizers and promoting their use. In 1980 the National Fund for Rural Development (FONADER) took over from the role of the NPF, as well as supplying other inputs such as phytosanitary products. Agricultural inputs were fully subsidized and distributed to producers either through the services of the Ministry of Agriculture or development corporations like the Cocoa Development Corporation (SODECAO) and the Cotton Development Corporation (SODECOTON). Subsidy rates for fertilizers and sanitary/phytosanitary products averaged 75 and 100 percent respectively. The subsidization policy lasted until 1990 (Varlet, 1997).

Demand for fertilizers rose sharply under the subsidy programmes, from 15 000 tonnes in 1974/75, to around 80 000 tonnes in 1986. Nevertheless, the state monopoly over input imports often resulted in late deliveries to users and proved ineffective and increasingly costly to public finances (Ntsama, 2000). The agricultural campaign of 1986/87 marked a turning point in terms of government strategy, due to severe fiscal pressure and a drastic fall in the world price of Cameroon's main agricultural exports.

The second period started in 1987 with the help of donors. Directed towards liberalizing and privatizing the sub-sector, it led to the launching of two fertilizer programmes to cover the northern and southern part of the country. The first programme, named the Sub-Sector Fertilizer Reform Programme (SSFRP) was set up in 1987 with the assistance of USAID. Meanwhile, the Special Programme for the Importation of Fertilizers (SPIF) took off in 1988 with the support of the European Development Fund (EDF). The two programmes had as their objective the establishment of a durable and effective private sector system for importing, distributing and using fertilizers (Ntsama, 2000). The aim in the long run was to eliminate direct fertilizer subsidies and promote the efficient use of fertilizers (Table 7).

Imports followed a downward trend up to 1994/95 (Table 8). This can be explained by the progressive elimination of subsidies, which raised the cost of fertilizers; and by the collapse in agricultural product prices, both of which reduced the purchasing power

TABLE 7
Agricultural inputs subsidization rates, 1990/91-1993/94 (percentage of purchase)

	1990/91	1991/92	1992/93	1993/94
Fungicides	75	50	25	0
Insecticides	100	100	50	0

Source: Varlet and Berry (1997).

TABLE 8
Agricultural inputs: imports after sub-sector reform, 1989/90-1998/99

Campaigns	Total imports (tonnes)	Imports under SSFRP and SPIF contract	
		Quantity (tonnes)	Percent of total imports
1989/90	81 503	64 172	79
1990/91	43 551	22 003	51
1991/92	32 641	31 800	97
1992/93	55 610	22 670	41
1993/94	32 690	18 200	56
1994/95	107 047	0	0
1995/96	93 104	7 500	8
1996/97	150 993	3 580	2
1997/98	112 657	3 000	3
1998/99	85 020	-	-

Source: Ntsama (2000).

of fertilizer users. For example, on cocoa plantations the use of fertilizers and pesticides has practically ceased since the elimination of subsidies, even though phytosanitary control is indispensable to high quality cocoa production (Amin, 1999).

A substantial increase in imports came about in 1994/95 as a result of the CFA devaluation, which, while increasing the price of inputs, stimulated an increase in agricultural product prices sufficiently to render them profitable. Throughout this period, the level of fertilizer consumption barely rose above that prevailing in 1986 before the reforms began. Of the more than 1.2 million farmers in Cameroon, less than 4 percent use chemical fertilizers (IFAD, 1998). Average consumption was about 2 to 3 kg/ha compared to the African average of 7 to 8 kg/ha (MINAGRI/DEPA, 1999). The needs of producers are clearly not being met. Ntsama (2000) identified many causes of low input consumption in Cameroon:

- Importers form an oligopoly that enables them to fix the prices of inputs at a high level compared to the CIF price.
- SSFRP and SPIF programmes are more concerned with importers than inputs users in their input funding policy. Moreover there is no SSFRP credit mechanism to support an increased use of fertilizers on farms.
- The introduction of an average 7.75 percent tax on the CIF value of inputs contributes to their high cost.

Research and extension programmes

Research and extension programmes have the potential to improve agricultural productivity and these may need strengthening during periods of adjustment.

However, in Cameroon, funding for agricultural research decreased under the adjustment programme. World Bank support efforts were put into strengthening the extension system from 1990 onward. This has helped to improve the availability of agricultural extension services, including rural information, communication systems and transfer of appropriate technologies to farmers, though with mixed results. The Research Institute for Agricultural Development (IRAD) was created for the purpose of supporting research and development in Cameroonian agriculture and assessing the quality of agricultural inputs. However, problems including the poor state of equipment and a shortage of adequately qualified personnel have been obstacles to its proper functioning. Many agricultural and rural training schemes exist, but it is not clear how effective they are. For example, some training facilities are highly degraded, some programmes do not offer the most suitable types of training, and there have been problems with budgets and equipment.

Infrastructure
Poorly developed and maintained transport infrastructure constitutes a major constraint to agricultural sector productivity and output. It leads to high transport costs, limited access to markets (including those of neighbouring countries) and high post-harvest losses. Responsibility for the road network is shared between the Ministry of Public Works (MINTP), local authorities, road users and their associations. The railway sector is bound by a 20-year concession, signed with a private operator, CAMRAIL. The railway line, almost 1 000 km long, is the oldest in Central Africa. No major improvement has been made to the network since the early 1980s, and the quality of infrastructure has seriously deteriorated, with the monopoly enjoyed by the private operator leading to poor and expensive service. Despite quite advanced restructuring of the marine transport sector, costs remain relatively high and the main port of Douala is the most expensive on the West African coast. Storage and processing infrastructure for food crops in rural areas is inadequate and appears largely responsible for food insecurity in some regions of the country, such as the north. The few major rural and urban markets are poorly equipped and managed.

CONSEQUENCES OF REFORMS: INTERMEDIATE VARIABLES

In assessing the effects of reform on output incentives, the impact of changes in international and domestic prices are investigated in relation to other possible drivers such as the exchange rate, improvements in the efficiency of domestic marketing systems etc. It should be noted that many of the reforms that have been implemented simultaneously or/and sequentially are aimed at removing structural bottlenecks that impede the proper functioning of the market mechanism. It is therefore difficult to isolate policies that have been beneficial or harmful to agricultural performance.

Trends in international and domestic prices
Price trends are given in Table 9. Producer and international prices of all the four main export crops declined up to 1993. They recorded a rise only after the 1994 devaluation. The effects of devaluation on cocoa and coffee prices were especially pronounced in 1995. Their prices more than doubled in 1995 and were relatively

TABLE 9
Annual change in real price index of selected agricultural products, 1981-1999 (percent)

	Producer				International			
	Rice	Coffee	Cocoa	Cotton	Rice	Coffee	Cocoa	Cotton
1981	15.5	-12.3	-6.6		6.1	-36.6	-27.7	-18.8
1982	-11.7	-9.1	-8.8	-0.7	-39.8	0.2	-22.1	-19.8
1983	-3.3	-9.4	-8.7	0.0	-7.3	6.2	15.6	10.2
1984	-10.2	-0.5	0.7	0.1	-10.3	6.0	7.7	-8.4
1985	15.9	1.1	9.6	2.4	-17.7	-16.0	-9.9	-29.1
1986	-7.2	7.2	-5.1	-0.1	-18.5	19.3	-10.6	-22.0
1987	-11.6	-11.6	-11.6	-11.6	12.8	-33.1	-6.3	51.2
1988	-1.6	-1.6	-1.6	-1.6	31.1	-10.1	-23.3	-17.9
1980-88	**-1.6**	**-4.0**	**-3.6**	**-1.3**	**-4.8**	**-7.1**	**-8.5**	**-6.1**
1989	-53.1	-7.1	-1.7	1.7	2.3	-23.9	-25.0	14.3
1990	-1.1	-47.9	-43.2	-32.9	-10.8	-30.9	-2.9	3.4
1991	-0.1	-0.1	-12.1	-0.1	2.0	-13.1	-9.8	-10.6
1992	0.0	0.0	-9.1	0.0	-1.8	-15.2	-10.7	-27.0
1993	3.3	3.3	-22.5	-7.6	-14.1	19.2	-1.7	-2.6
1989-93	**-10.2**	**-10.4**	**-17.7**	**-7.8**	**-4.5**	**-12.8**	**-10.0**	**-4.5**
1994	-26.0	-11.2	-1.3	13.2	84.3	118.8	22.7	34.3
1995	35.0	136.8	106.3	-4.8	-36.6	3.3	0.2	20.4
1996	50.7	-3.8	-14.5	14.0	13.9	-36.1	-0.6	-19.8
1997	-3.4	-3.9	-4.6	-4.6	-42.0	-4.5	9.0	-3.6
1998	-7.7	36.7	-3.1	6.0	46.0	2.6	2.1	-18.4
1999	3.4	-24.3	10.8	-1.5	-18.9	-20.5	-33.2	-20.0
1994-99	**8.7**	**21.7**	**15.6**	**3.7**	**7.8**	**10.6**	**0.0**	**-1.2**

Source: Calculated from MINEFI/DSCN (1999), Ntsama (2000), MINAGRI/DEPA (1992) and World Bank Database.

stable until 1998 when they recorded another rise due to favourable international market conditions. Prices of cotton and rice recorded an uneven evolution due to poor international market conditions.

Decomposition of price changes

Price changes as a result of liberalization can be attributed to both domestic and international market conditions (Table 10). During the first phase of policy reforms, movements in the producer price of cocoa and coffee (the marketing of which were under the supervision of the National Produce Marketing Board (NPMB) until 1993) depended more on international price changes than on domestic policies. The producer prices set by the NPMB were pegged to world prices.

Rice, which was largely imported and whose consumer price was formerly regulated by the State, was liberalized during the first phase of reforms. This provoked a fall in both consumer and producer prices. The fall in producer prices intensified during the second phase of reforms as public enterprises responsible for supervising producers (SEMRY, SODERIM and UNVDA) were restructured.

In the second wave of reforms the producer price of cotton was affected by the complete restructuring of the cotton marketing parastatal, SODECOTON, and associated disruptions in investment and support.

For tradable commodities, market liberalization helped to align domestic price movements more closely to international price movements than had been the case

TABLE 10
Decomposition of change in real producer price index of selected agricultural products (percentage change with respect to pre-reform base period 1985-88)

Product	Period	Change in domestic price	Change in world price	Change in real effective exchange rate	Other changes
Rice	1989-93	-85.57	11.11	1.31	-97.99
	1994-99	-61.84	13.58	39.10	-114.53
Coffee	1989-93	-61.04	-91.26	1.31	28.90
	1994-99	-9.09	-53.55	39.10	5.36
Cocoa	1989-93	-66.11	-68.84	1.31	1.42
	1994-99	-65.84	-62.93	39.10	-42.02
Cotton	1989-93	-37.92	-3.26	1.31	-35.97
	1994-99	-37.20	-9.85	39.10	-66.45
Agriculture	1989-93	-0.06	-0.38	0.01	0.31
	1994-99	0.03	-0.18	0.39	-0.18
		Changes with respect to previous period			
Rice	1994-99/1989-93	23.74	2.48	37.79	-16.53
Coffee	1994-99/1989-93	51.95	37.70	37.79	-23.54
Cocoa	1994-99/1989-93	0.27	5.91	37.79	-43.43
Cotton	1994-99/1989-93	0.72	-6.59	37.79	-30.48
Agriculture	1994-99/1989-93	51.75	20.47	37.79	-6.51

Source: Author's calculations using data from MINEFI/DSCN (1992), MINEFI/INS (2002a), Ntsama (2000), MINAGRI/DEPA (1992) and MINFI/DP (2000) for the calculation of REER.
Note: Comparative results from price decomposition analyses across the case study countries are provided in Annex B of the Synthesis chapter.

prior to the reforms. In general, price changes for subsistence and agricultural food products can be explained by changes in domestic policies, while those of perennial crops are largely explained by changes in world prices.

The results in Annex B present the change in the domestic price as a percentage change with respect to previous period. The case study analyses vary in that some present results as a percentage change with respect to a base period. While the interpretation of results in the case study narrative holds irrespective of the end points compared, the results presented in Annex B should be used for comparative purposes.

During the first phase of reforms, parastatal marketing boards continued to intervene in prices by seeking to stabilize them in the face of falling international prices. During the second phase, upward price movements can be mostly explained by changes in the exchange rate, although downward pressure was still being maintained by international prices (which continued to fall) and domestic market liberalization.

The infrastructure for storage and marketing is poor. It is an obstacle to the smooth supply of food to urban areas, and is largely responsible for food insecurity in certain regions of the country (such as the north). Major rural and urban markets are scarce, poorly equipped and poorly managed. This situation results in high

transaction costs, limits the negotiating capacity of producers (particularly small-scale producers), reduces farm revenues and constrains farm investment.

Effects on agricultural output and value added

This section highlights the possible relation between the reforms and agricultural sector performance during the three main periods covering: (1) from the oil boom in 1978 to 1987, (2) the beginning of the economic crisis in 1988 to 1993, and (3) since the CFA devaluation in 1994.

Agricultural production contracted by an average of 3 percent per annum during the economic crisis of 1991-93 (Table 11). Although all sub-sectors recorded negative growth, perennial agriculture suffered greatly from external shocks and decreased by more than others (- 9 percent on average). Subsistence agriculture remained relatively stable with an average annual decrease of only 0.5 percent. It benefited from the arrival of new producers: farmers abandoned perennial crops in favour of subsistence agriculture, which at the time generated more income and food. Furthermore, due to salary cuts and changes in working hours in the public sector,[3] civil servants turned to subsistence agriculture in order to make ends meet.

From 1994 to 2000 the production of the food crop sub-sector increased at an annual average rate of 4 percent. The growth can be attributed to the economic crisis and the long-term effects of the arrival of new producers. Close to 70 percent of food production is self-consumed.

Perennial crop production (coffee, cocoa, cotton, etc.) has been stagnating for more than a decade because of price instability, low productivity, poor use of agricultural inputs, poor negotiating capacity of farmers, and new opportunities offered by the national market for food products. Perennial crops also suffered most from the withdrawal of government support. Even the relative gains in competitiveness due to the CFA devaluation of 1994 were short-lived.

Growth in the production of food products has slowed down in recent years and is even falling for some important products like rice, groundnuts and plantain, as shown in Table 12.

Yield trends of some of the selected products show that, in the past ten years, subsistence agricultural yields stagnated and remained low (Table 13). The diminishing yield in cotton is characteristic of the situation of other perennial products. The low use of inputs (partially due to input sector reform) and declining soil fertility are the main reasons.

Given the stagnation of yields, the relatively positive production trends observed in the subsistence sector can mostly be attributed to the increases in area.

Effects on imports and exports

The decrease in exports has continued despite the structural adjustment measures. Only the devaluation of 1994 stimulated an increase in export earnings.

With the continuous drop in oil exploitation, agriculture assumed a very important role in the country's international trade. Table 14 shows that its share in total exports

[3] In the early 1990s, the official eight hour day, from 8.00 to 16.00, with a two hour break between 12 noon and 14 hours, was brought back to 7.30 to 15.30 with a one hour break at 13.00. This new arrangement allowed workers and others to devote their afternoons to farming activities.

TABLE 11
Change in agricultural sub-sectors' real production 1980-2000 (percent)

	1980/89	1991/93	1994	1995	1996	1997	1998	1999	2000	1994/2000
Primary sector	3.6	-3.0	12.7	7.6	-3.2	11.2	3.5	3.6	3.9	5.6
Subsistence agriculture	2.1	-0.5	10.5	1.7	-3.0	8.5	3.0	5.0	3.5	4.2
Perennial agriculture	7.5	-9.4	-15.1	12.9	-35.5	75.4	16.4	-4.0	4.0	7.7
Breeding and hunting	-0.4	-8.1	11.9	-0.2	0.8	5.9	7.1	-6.0	5.0	3.5
Fishery	-2.8	-2.5	1.1	6.4	-4.2	4.5	-8.8	3.5	3.0	0.8
Forestry	16.7	-3.2	71.0	50.2	3.5	15.7	4.8	7.0	5.0	22.5

Source: World Bank Database.

TABLE 12
Production of selected agricultural products 1989-2002 (thousand tonnes)

	1989	1990	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Millet/Sorghum						350	366	371	381	332	290	350
Rice	67	63	47	63	49	47	47	47	73	67	61	50
Cassava						1 780	1 848	1 918	2 781	1 889	1 901	1 950
Groundnuts									211	184	197	200
Plantain						1 250	1 290	1 326	1 332	1 157	1 164	1 200
Cocoa	122	129				136	126	127	125	116	123	122
Coffee	133	86				63	104	73	76	98	86	70
Cotton	104	104	126	166	195	195	220	182	195	196	204	207

Source: MINEFI/DP (2002), MINAGRI/DEPA (1992).

TABLE 13
Yield trend of selected agricultural products, 1988/89-1998-99

Products	Area (x '000 ha)		Production ('000 t)		Yield (t/ha)	
	1988/89	1998/99	1988/89	1998/99	1988/89	1998/99
Millet/Sorghum	498	306	418	647	0.8	2.1
Rice	1.4	22.5	4.9	73.2	3.6	3.3
Cassava	81	218	809	2815	10	12.9
Groundnuts	96	222	80	211	0.8	0.9
Plantain	60	90	854	1332	14.2	14.8
Cotton	111.6	172.5	165.4	194.7	1.48	1.13

Notes: t = tonne; ha = hectare; t/ha: tonnes per hectare.
Source: Mkouonga and Gasas, 2001.

increased significantly. It increased from 14 percent and 33 percent of total volume and value, respectively, in 1992 to 28 percent and 50 percent in 1998, falling back to 17 percent and 39 percent in 2001, indicating that the competitive gains due to the 1994 devaluation could not be sustained.

In response to the devaluation, the volume of total imports initially fell, whilst their value rose (1994 and 1995). However, after 1996, import values and volumes rose in response to economic growth and the RFRP reforms. The share of agrifood products in total imports has declined since the early 1990s, although year to year changes in their absolute volume and value has been erratic. They nevertheless dropped significantly after the 1994 devaluation and rose sharply after the slight adjustment

TABLE 14
Agricultural and agrifood products export and import indicators, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total exports growth rate										
Quantities		-10.9	5.0	-12.7	1.1	10.7	4.8	2.5	-3.3	-4.3
Value		-19.2	44.2	34.4	1.3	19.6	10.3	-14.2	22.9	8.6
Agricultural shares in total exports										
Quantities	14.1	14.4	18.9	20.9	22.7	24.9	27.9	23.5	19.5	17.2
Value	33.4	36.4	46.3	46.4	47.1	43.7	50.4	54.3	41.2	39.3
Agricultural exports growth rate										
Quantities		-8.7	37.3	-3.1	9.7	21.4	17.3	-13.7	-19.6	-15.6
Value		-11.8	83.1	34.7	2.9	11.0	27.1	-7.6	-6.7	3.6
Total imports growth rate										
Quantities		7.6	-3.2	-3.9	48.4	22.3	31.5	5.5	-0.1	17.7
Value		-6.4	7.2	48.8	23.2	23.7	23.5	-5.4	9.4	32.1
Agrifood shares in total imports										
Quantities	43.1	32.2	39.0	31.0	14.6	13.5	18.8	17.7	20.1	19.2
Value	34.5	26.8	29.0	23.6	17.4	16.6	19.4	20.8	21.4	18.7
Growth in agrifood imports										
Quantities		-19.6	17.2	-23.7	-30.2	12.9	88.4	-03	13.0	12.6
Value		-27.2	16.0	21.0	-9.4	13.3	44.5	1.5	12.5	15.6

Source: Authors' computation from data provided by the Customs Department.

TABLE 15
International trade indicators of selected agricultural products, 1993-2001 (percentage annual change)

Exports		1993	1994	1995	1996	1997	1998	1999	2000	2001
Coffee	Q	-27.1	-10.6	-25.9	33.0	9.3	-11.6	-15.8	65.5	-27.0
	V	-34.6	110.0	37.9	16.3	-1.3	-2.6	-16.4	43.9	-29.5
Cocoa	Q	-5.8	-6.6	20.6	21.2	-11.5	0.2	-4.3	-7.1	17.8
	V	-18.4	17.9	78.8	33.0	-13.0	42.0	-4.7	-29.5	22.1
Cotton	Q	11.5	-1.0	-4.9	-7.8	81.7	-10.4	-15.1	32.9	4.1
	V	4.9	60.9	*4.8*	16.1	82.7	-9.8	-20.2	4.4	27.7
Imports										
Rice	Q	nd	69.6	-37.58	-38.7	4.1	130.5	-22.5	6.1	37.5
	V	nd	152.1	-45.52	2.3	-2.1	88.3	-2.3	-7.6	46.9
Cereals	Q	-20.7	77.1	-33.52	-43.2	18.9	153.0	-11.3	24.9	19.5
	V	-1.4	151.7	-31.50	-23.1	34.5	130.0	-3.1	14.1	31.0
Cotton	Q	13.2	-10.0	-17.78	27.2	27.0	-9.0	6.0	-32.8	3.3
	V	-10.0	0.1	34.84	-8.0	26.6	-8.0	0.3	-33.8	-17.9

Notes: Q: Quantities and V: Values.
Source: Authors' computation from data provided by the Customs Department.

of the salaries of civil servants in 1996. On average, rice and cereal imports increased sharply in the 1990s despite price hikes due to the devaluation (Table 15).

CONSEQUENCES OF REFORMS

National food security

Various indicators are used to provide insights into the national food security situation. From 1996 to 2001 the ratio of food imports to agricultural exports

TABLE 16
National food security ratios, 1992-2001

	Food imports /agricultural exports	Rice self-sufficiency (rice imports/rice exports)	Food imports per capita (in CFA)
1992	12.3		2 760.8
1993	12.2	17.3	2 311.7
1994	10.5	10.0	3 694.4
1995	7.3	19.0	3 391.5
1996	6.6	25.7	2 875.5
1997	6.1	26.1	2 880.1
1998	8.1	16.9	4 976.3
1999	8.5	19.2	4 796.0
2000	9.5		4 951.7
2001	12.3		6 261.1

Source: Authors' computations from data provided by the Customs Department.

TABLE 17
Change in national food indicators between 1990/91 and 1998/2000 (percent)

	Total supply	Per capita supply (kg/year)	Per capita/day calories	Per capita/day proteins (g)	Per capita/day fat (g)
Millet/sorghum	-3.4	-20.4	-20.4	-20.9	-20.6
Rice (milled equivalent)	95.7	59.0	59.6	58.3	37.5
Cassava	13.2	-8.4	-8.5	-8.8	-7.1
Groundnuts (shelled equivalent)	4.5	-7.5	-7.6	-6.7	-7.6
Plantains	46.8	18.8	18.8	18.6	15.4
Cocoa beans		-16.2	-13.7	-13.3	-12.2
Coffee		-18.9	-19.2	-28.6	

Source: Authors' computations from FAO data.

declined, suggesting a possible improvement (Table 16). It fell from 12.3 percent in 1992 to only 7.3 percent in 1975, a year after the 1994 devaluation and RFRP reforms, although it started rising again from 1998 as agricultural exports declined. There has, however, been an upward trend in per capita food imports throughout the period since 1992.

The total supply of the main products increased significantly between 1990/1991 and 1998/2000 (Table 17). However, apart from rice and plantains, the decrease in per capita indicators highlights a food security problem.

Stevens *et al*. (1999) identified vulnerability, dependency on imports, and per capita GDP as criteria for appraising the food security situation of a given country. The shortfall of domestic food supply, vulnerability of risk groups such as women and children, regional variations and nutritional imbalances are also considered in this analysis.

The magnitude of the domestic food supply deficit can be illustrated by the evolution of cereal production. Between 1960 and 1998, cereal production per capita fell from 157 kg to 85 kg, generating a deficit between supply and an ever-growing demand. To narrow this gap, imports over the same period increased from 32 to 350 thousand tonnes per year (Herbel, 2000). The domestic supply deficit can be partially

TABLE 18
Malnutrition indicators for children between 0-35 months, 1991-2001 (percent)

	Severe malnutrition (emaciation)[1]	Chronic malnutrition (retarded growth) [2]			Weight deficiency [3]
	National	National	Urban	Rural	National
1991	3.0	24.4	16.9	29.6	13.6
1996	5.7	23.8			29.5
1998	6.0	29.3	22.4	31.7	22.2
2001	6.4	42.1	28.3	48.0	22.3

[1] Ratio weight/size against reference ratio; [2] Ratio size/age against reference ratio; [3] Ratio weight/age against reference ratio.
Sources: MINEFI/DSCN (1999) and ECAM (1997).

TABLE 19
Geographic distribution of the population by living standard, 1996 and 2001

	Cameroon Survey (EBC) 1996 (%)			Cameroon Survey (ECAM) 2001 (%)		
	Poor	Intermediary	Comfortable	Poor	Intermediary	Comfortable
Urban	41.4	38.16	39.29	22.1	22.41	59.78
Semi-urban	38.52	35.07	26.41	30.68	25.54	48.79
Rural	59.6	28.45	7.75	49.9	25.47	19.50
National	53.3	31.68	18.11	40.20	24.41	35.53

Source: MINEFI/INS (2002b).

explained by an increase in the total population, which is growing at an annual rate of 2.8 percent and the urban population growth rate of 4.2 percent per year (Herbel, 2000). The ever-growing export of food products to bordering countries (CEMAC countries and Nigeria) also contributes to the deficit.

Trends in malnutrition levels

Malnutrition has intensified since 1991 (Table 18). In ten years, the proportion of children suffering from severe malnutrition has more than doubled, rising from 3 percent in 1991 to 6.4 percent in 2001. This upward trend in malnutrition is paralleled by the trend chronic malnutrition and weight deficiency, although the latter has improved in the past five years.

Although chronic malnutrition is more prevalent in rural than urban areas, it increased less (64 percent, as opposed to 67 percent in urban areas).

Household level food security

The percentage of the population below the poverty threshold of US$1 per day has fallen from 53 percent to 40 percent during the second phase of reforms (1996-2001). However, the improvement has largely resulted from higher urban incomes and has had less impact in the rural areas where the majority of the poor live (Table 19).

Household food security is greatly affected by wages, the prices consumers pay for food, and the prices farmers receive for their output.

Following the 1994 devaluation, the price of food products initially rose by 42 percent and continued to rise at a much slower rate thereafter (Table 20). Between 1994 and 1997, real wages, by contrast, decreased at an annual average of 6.6 percent (Table 21).

TABLE 20
Annual change in the consumer price index of selected agrifood products, 1994-2000 (percent)

	1994	1995	1996	1997	1998	1999	2000
Foods, beverages and cigarettes	40.8	9.8	2.0	7.2	1.5	3.1	2.2
Food products	42.1	8.6	1.9	7.1	1.4	2.7	3.4
Cereals and other cereal products	45.8	20.3	5.7	6.3	-0.8	2.4	-3.1
Starchy foods	10.0	27.2	-5.9	24.3	-13.9	-7.9	31.0
Vegetables, leguminous and seeds	127.3	-13.9	-8.6	-1.8	20.8	5.2	-13.5
Fruits and nuts	37.4	-2.0	-4.0	2.5	15.4	6.0	-4.1
Milk, dairy products and eggs	35.9	5.3	4.8	6.7	0.9	-1.8	-3.2
Oils, fats and others	39.1	7.4	5.4	3.2	5.8	17.0	-4.2
Meat, cooked meat and poultry	22.3	11.5	5.3	3.3	3.0	0.5	5.5
Fish, sea food and molluscs	45.2	5.1	10.2	6.2	-0.4	-2.1	12.0
Beverages and cigarettes	33.7	15.4	2.6	7.2	2.4	3.9	-3.0
General index (inflation)	28.4	9.3	3.2	5.0	8.0	11.5	-2.2

Source: Authors' computation from MINEFGI/INS (2002a).

TABLE 21
Change in the agricultural sub-sectors' annual average real wage, 1990/93-1997 (percent)

	1990-93	1994	1995	1996	1997
Subsistence agriculture	-10.6	-17.0	-8.9	-3.6	-1.9
Perennial agriculture	-7.2	-9.8	-11.2	-7.5	-3.7
Forestry and logging	0.6	-13.4	-9.5	-6.7	-4.2
Stock breeding, hunting and trapping	10.8	-9.0	-12.7	-6.3	-3.4
Fishing	-5.7	-4.4	-11.7	-6.0	-7.8
National	-5.0	0.9	-12.2	-5.8	-9.2

Source: Authors' computation from MINEFI/DSCN (1999).

Real producer prices for the main cash crops recorded a negative trend between 1989 and 1993 and only a slight increase is recorded between 1994 and 1999 after the devaluation and associated reforms. Agricultural output has grown, but not enough to compensate for the decrease in producer prices and wages and the increase in consumer prices.

An analysis of the food products structure shows that imported components have pulled average prices up. Apart from vegetables and seeds, whose prices have more than doubled, those of other products excluding import-substitutes (fruits, nuts and starchy foods) registered slow progress and the sharpest decrease after 1994. Generally, farmers have benefited very little from the price increases caused by devaluation, especially in the case of food deficit households that have to purchase food on the market.

Greater price instability as a result of market liberalization and the withdrawal of the state from price controls in 1990 has also had a negative impact on food security for poor farming households.

Since the advent of the economic crisis in 1987, Cameroon households have encountered growing difficulties in obtaining proper nutrition and a balanced diet. Inflation (deepened by the 1994 devaluation), the downturn in the payroll of public

TABLE 22
Change in household food expenditure structure, 1984-2001 (percent)

	1984	1996	2001
Food and beverage expenses in total expenditure	53.0	46.0	46.4
Food and beverages consumed within the home	47.0	44.0	
Food consumed outside the home	6.0	2.0	
Share in food and beverage expenditures:			
Cereal and cereal products	17.8	18.4	
Starchy foods and others	10.4	14.8	
Vegetables and leguminous plants	9.3	13.1	
Fruits and nuts	3.3	3.4	
Milk, dairy products and eggs	2.5	1.4	
Oils, fats and others	13.9	8.0	
Meat-cooked, poultry and insects	18.7	10.7	
Fish, prawns and molluscs	12.8	11.5	
Beverages and cigarettes	11.3	7.6	
Others		11.1	
Total	100.0	100.0	

Sources: EBC/DSCN (1984) and ECAM/DSCN (1997).

and private sector workers, and layoffs greatly reduced the purchasing power of households (FAO, 1995). The fall in purchasing power was closely followed by a reduction in food expenditure, which constitutes the most important item of household expenditure: 53 percent in 1984 and 46 percent in 1996 (Table 22).

The reduction in food expenditure was accompanied by a contraction in food consumption and the substitution of foods rich in animal protein with relatively less expensive foods. Expenditure on meat dropped from 18.7 percent to 10.7 percent of household food expenditure between 1984 and 1996, whilst expenditure on starchy foods increased from 10.4 percent to 14.8 percent during the same period.

In real terms, food expenditure per inhabitant has increased significantly since 1984. Results from ECAM (1997) show that in 2001, household expenses were about 80 percent greater than those obtained by the Household Budget-Consumption Survey of 1984. As compared to the pre-reform period, an annual average increase in consumption expenditure of about 2.8 percent is recorded, and of 5.2 percent during the second phase of reforms.

This relative improvement of global household consumption expenditure obscures an uneven regional and gender evolution. During the second phase of reforms, urban households recorded an average annual increase in consumption expenditure of only 1.3 percent compared to 10 percent for rural households; for female-headed households the increase was about 2.2 percent against 6 percent for male households. However, during the first phase of reforms female households recorded the biggest increase in consumption expenditure, with a 9.3 percent annual average against 2 percent for male households.

The great disparity observed by gender during the second phase is consistent with men being more involved with cash crop production, whose producer prices were increasing during the period, which in turn helped them to acquire food products while women concentrated more on food crops for self-consumption until the price increases of the 1990s, which motivated them to sell part of their produce and

TABLE 23
Real food consumption expenditure per inhabitant

		1984	1996	2001	1984-1996	1984-2001	1996-2001
		(In constant 1994 CFA Franc)			Growth in percent		
Whole country		796.8	1 087.8	1 428.8	36.5	79.3	31.3
Residential areas	Urban		1 636.8	1 760.7			7.6
	Semi-urban		1 148.2	1 414.6			23.2
	Rural		776.8	1 229.6			58.3
Sector of activity of household head	Formal		1 650.9	1 838.0			11.3
	Informal		905.9	1 292.2			42.7
Farmers	Land tenants	453.8		1 201.2		164.7	
	Dependents	684.4		1 168.3		70.7	
Gender of household head	Male	814.6	1 030.8	1 392.9	26.5	71.0	35.1
	Female	615.8	1 363.8	1 543.7	121.5	150.7	13.2

Sources: EBC/DSCN (1984), ECAM/DSCN (1997) and MINEFI/INS (2002b) deflated by CPI.

devote part of earnings to purchasing other food products whose real prices were decreasing.

POLICY LESSONS

The 1994 fiscal and monetary reforms put the entire Cameroon economy, including agricultural and food product sectors, back on the right track to growth. However, competitiveness gains due to these reforms and the favourable international situation began to disappear by the year 2000. One of the most significant effects of the economic reforms was the greater market integration of a majority of the country's agricultural products. Since 1994, variations in international prices have had a greater influence on domestic prices.

In terms of income and food security, contradictory results are found at the national and household levels. A net improvement of income, food consumption and food security was registered at the national level between the mid 1990s and the year 2000. The improvement of national aggregates must not however be attributed only to the reforms; the evolution of the international economic situation and prices could have also played a considerable role. At the household level, a deterioration of the food situation was observed, with a net increase in malnutrition between 1991 and 2001. This situation is partially explained by the decrease in producer prices and wages and the increase in consumer prices.

A predominance of malnutrition in rural areas supports the hypothesis that the improvement observed in the national food security indicators is attributable to unequal economic growth, which has benefited some but not others.

This suggests that Cameroon must not only continue its economic reforms for more sustained growth, but also reform distribution policies towards improving the incomes of the most vulnerable. These reform should not only focus on direct income distribution channels (including transfers, salary increments, etc.) but must also take into account indirect channels, like improving support structures for production and marketing, developing enabling institutions for the integration of the most vulnerable into markets, improving infrastructure (transport, storage,

marketing) and access to credit, and creating incentives for greater labour mobility and the creation of small scale enterprises.

The lack of credit mechanisms and, even more importantly, high input costs resulting from price decontrol have led to the low use of chemical fertilizers A policy of actively promoting the use of inputs is important in maintaining soil fertility and increasing production. The reduction in the role of the State in input and output markets has caused some farmers to pay higher prices for their inputs while receiving lower prices for their outputs. Such an outcome may be advocated for prices to move toward market levels, but in these circumstances complementary measures could have been designed to cushion the impact of the reforms on low-income producers. For example, access to credit may have assisted rural small-scale farmers. Microfinance institutions were set up in 1992, but they remain poorly distributed throughout the country and sometimes lack credibility and professionalism.

More careful design and implementation of policy reform measures appears to be very important for this country. As well as helping to improve and sustain economic growth, they can assist with improving food security for the most vulnerable groups in the country.

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Chile

Eugenia Muchnik and Rosa Camhi[1]

EXECUTIVE SUMMARY

By the end of 1973, the Chilean economy was practically isolated from the world and highly regulated in many sectors including food and agriculture. In the first phase of reform (1974–1983) numerous measures to deregulate trade, privatize the economy, create a free capital market and reform fiscal and monetary policy were introduced. The second phase of reforms (1984–1989), was characterized by adjustments to exchange rate policies, an expansionary fiscal policy, a debt conversion programme and an active policy of export promotion.

Impact on intermediate variables
After the economic crisis of 1982/83, the domestic price of wheat and maize has followed changes in world prices, but in the reform period 1984-89 the upward increase in the exchange rate helped to off-set the negative impact on prices of the reduction in tariffs and other policy effects, while in the post-reform period the fall in domestic prices was even greater as a result of a decrease in the exchange rate and continued tariff reductions. These effects were partially offset by added protection from other factors.

Agricultural GDP has grown twice as fast as it did during the pre-reform decade as the sector has diversified away from traditional import-competing crops towards the production of high value-added products, particularly for the export market, and as land and labour productivity have increased.

Impact on target variables
Food security indicators show a positive evolution between 1980 and 2000. Malnutrition, declined. Between 1990 and 1998 poverty was reduced in all four regions selected for this study, and in the rural sector, the reduction of poverty was greater in regions linked to a more modern agriculture.

The size of the labour force employed in agriculture increased between 1976 and 1998 period, but the share of agricultural employment in total employment is decreasing.

Incomes derived from farming the land are insufficient to provide food security for small rural households, who have mainly benefited from the reforms by off-farm employment opportunities created in the commercial export-oriented segment of agriculture.

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Policy lessons

Openness to trade and the elimination of policy distortions affecting the terms of trade contributed to agricultural and economic growth. Nevertheless, poverty and food insecurity have not been eliminated for all groups within society. Vulnerable groups remain among those lacking sufficient education and physical assets, particularly in some areas of the country, where the benefits of economic growth have been lower.

The impact of economic reforms on the food insecure, mediated by the price and output changes for the main commodities produced or consumed by the poor, are of much less significance than other mechanisms, such as the off-farm income generation opportunities derived from growth in the agricultural sector and the broader economy.

In the regions that remain linked to traditional, less-competitive agriculture, such as the southern regions, the incidence of poverty continues to be higher than elsewhere. Those left behind are the ones with the least schooling. This limits their own farm productivity as well as opportunities for earning off-farm incomes.

INTRODUCTION: CONTEXT AND NATURE OF THE REFORMS

The role and level of development of the agriculture sector

Tables 1 and 2 show some key changes which took place after the reforms were introduced (between the mid 1970s and the end of the 1980s). Despite a reduction in annual cropping land, agricultural output grew at a higher rate during and after the reforms, than in the pre-reform period. Agricultural value added increased significantly after 1974, on average doubling the growth rate of the pre-reform period. This is due to a significant improvement in yields and diversification towards export crops. Diversification and the adoption of new technologies have significantly improved efficiency in the use of all resources, especially land. The area sown to annual or traditional crops has diminished, whilst the production of fruits, vineyards and horticulture and flowers has expanded.

Exports grew rapidly at over 14 percent annually during the first stage of the reforms (1974–1980), growing from US$300 to US$790 million over this period. During the economic crisis of 1982–1983 exports declined drastically (-9.8 percent) but resumed growth afterwards, totalling US$18 428 million in 2000.

Farmland in the hands of smallholders decreased during the post-reform era. While in 1976 smallholders (with less than 20 basic irrigation ha.) owned 53 percent of agricultural land[2], they controlled only 23 percent in 1997 (Table 3). Of this total, 10 percent is used in annual cropping and 70 percent in prairies for cattle production. The commercial farms (medium-sized and large farms) control 77 percent of agricultural land.

Smallholders are more involved in traditional crop farming, vegetables and livestock than commercial farms. In the case of vineyards, they are associated with the traditional low quality varieties, grown under upland conditions, and used for locally consumed, low priced wines.

[2] Source: Valdés, Hurtado and Muchnik, 1990.

TABLE 1
Key agricultural indicators 1965-2000

	1965-73	1974-81	1982-83	1984-89	1990-2000
Agriculture GDP growth rate	1.6	2.4	-3.4	6.4	3.8
Agricultural GDP/ national GDP (%)	7.3	8.5	8.5	8.5	6.3
Public spending in agriculture (% of agricultural GDP)	16.9*	6.6	2.4	4.4	3.8
Agricultural employment (thousands)	423*	547	534	712	775
Agricultural export (US$) growth rate (annual accumulated rate)	-	14.5	-9.8	12.6	8.9**
Agricultural exports/total exports	(1974)	(1980)	(1989)	(1997)	(2000)
	8.5%	16.7%	21.4%	25.1%	27.0%

* corresponds to 1971-1973 ** corresponds to 1990-1996.
Sources: Muchnik and Zegers, 1981; Muchnik and Venezian, 1994; Portilla, 2000.

TABLE 2
Land use in selected activities, 1965-1973 (thousand hectares)

	1965-73	1974-81	1982-83	1984-89	1990-2001
Annual crops	1 269	1,115	963	1 121	849
Vegetables and flowers	88	87	-	107	124
Fruits	62	75	105	142	190
Vineyards	117	113	80	60	126

Source: Muchnik and Zegers, 1981 and Office of Agricultural Policies data.

TABLE 3
Land use by product and farm size 1997 (percent)

	Small and subsistence farmers	Medium and large farmers
Total hectares in use	23	77
Forests	16	84
Annual crops	45	55
Vegetables	45	55
Fruits	30	70
Vineyards	40	60
Sown prairies	26	74
Cattle	43	57

Source: Agricultural Census of the National Statistics Institute, 1997.

Degree of openness of the economy prior to the reforms

As a consequence of the trade policies of the preceding 40 years, the Chilean economy was practically isolated from the world economy by the end of 1973. High tariffs and multiple non-tariff barriers were the norm; imports were concentrated in intermediary goods, capital goods, and a few essential consumer goods. Exports were dominated by copper, and private capital inflows were almost non-existent. During the Allende administration (1970-73), the Government took control of a substantial part of production, the banking system was nationalized, multinationals were expropriated, there was a large fiscal deficit, high inflation, black markets and finally a balance of payments crisis.

During the period 1964-73, the agricultural sector had been the battleground where the fight to transform Chile into a socialist country had taken place. As part

of this process, a vast programme of land reform was initiated in the second half of the 1960s and intensified during the Allende administration. Food prices were fixed by the authorities and food marketing and trade were regulated. Agricultural credit, interest rates and input markets were also controlled by the government.

Motivations for the reforms

The reform of the Chilean economy took place after a military coup in late 1973 and the process continued until the end of the 1980s. A profound transformation took place during the second half of the 1970s.

During the initial years of the reforms (1975–77), and in the context of an international oil crisis, fiscal reforms and price liberalization policies led to economic crisis, with high unemployment, high inflation, and a sharp fall in wages. During the ensuing years there was a period of rapid recovery and economic growth during which inflation declined. However, in 1982 and 1983, the country experienced a second economic crisis, probably the most severe in its history. GDP fell by 15 percent during this period and unemployment rose by 30 percent. As a result, a second phase of reform was implemented during the 1980s.

Macro and sectoral components and the policy instruments used

Structural adjustment was initiated in Chile in 1974, earlier than in other Latin American countries, with the process lasting a decade and a half. The economic and social reforms have been maintained over time, allowing macroeconomic and social stability.

First phase of reforms and the economic crisis (1974-1983)

Trade liberalization and economic deregulation

All non-tariff barriers to trade were lifted, tariffs were reduced from an average rate of 105 percent in 1973 down to a uniform 10 percent in 1979; imports and exports were freed; the multiple exchange rate system was abolished as were foreign exchange controls; price controls and subsidies were eliminated; import operations were deregulated and a crawling peg system for determining the exchange rate was introduced. Reforms were also implemented in the labour market to make it more flexible, by drastically reducing the power of labour unions and restricting collective wage and salary negotiations. Direct government interventions in salary negotiations were also eliminated.

Privatization of the economy

Land and industries seized during the former period were returned to their original owners in the latter case and/or distributed to smallholders in the case of land, and the principle of private property was restored. Many public enterprises were privatized, as well as the banks and the national pension funds, and in general, there was a drastic reduction of the size of the public sector and its participation in economic activities.

Financial liberalization and the creation of a capital market

Credit controls and interest rate restrictions were eliminated, and the creation of financial intermediary institutions was promoted. Until then, bank credit was