Agriculture and Economic Survival

The Role of Agriculture in Ecuador's Development

Edited by
Morris D. Whitaker and Dale Colyer

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PREFACE

The two editors served as agricultural policy advisors to the U.S. Agency for International Development Mission in Ecuador from 1984 to 1990 while on loan from and with the support of Utah State University and West Virginia University. This book is an outgrowth of their experiences. During those years the Agricultural Sector Reorientation Project and two policy analysis agencies were established: the Ministry of Agriculture's Policy Analysis Unit and the Agricultural Policy Institute (IDEA), a non-profit foundation. As part of the continuing policy analysis effort, work on a detailed study of Ecuador's agricultural sector began in February 1988 under the direction of the senior editor. A series of 21 working papers was prepared, revised and integrated into an agricultural sector assessment. This book is based on that report with approval of the Mission.

The working papers were built on a myriad of studies, many developed under the sector reorientation project, plus original analyses from secondary and primary data. There are numerous published and unpublished studies, reports, theses and documents about economic and agricultural development in Ecuador. The approach employed was to review and interpret these studies and to synthesize and incorporate their findings into the appraisal. The more important and germane studies are cited in the references; others are covered in an annotated bibliography by the co-editor.

This evaluation of Ecuador's agricultural sector addresses critical issues that must be faced if the country is to fully benefit from its superb agricultural potential. It investigates the role of agriculture in economic development, identifies constraints to progress and makes recommendations for faster growth and development. The conceptual foundation that undergirds the assessment comprises three interrelated elements: the induced innovation model of agricultural development, the pervasive effect of macroeconomic polices on agricultural growth, and the emergence of a new global economic order. Specific analyses and studies of the agricultural sector include: an overview of theoretical constructs; macroeconomic and sectoral policies; agricultural growth, trade and nutrition; renewable natural resources; population growth and the labor market; the production milieu and factor use; public irrigation projects; marketing; credit; social institutions and gender; public sector institutions; and the human capital and science base.

The conclusion is that the principal challenge facing Ecuador's economy is to make the transition from a low-productivity agriculture primarily dependent on natural resources to a highly productive sector based on science and investment in human capital. The specific analyses tend to reveal the same major constraints: discriminatory macroeconomic policies that subsidize industry, home goods and urban people at the expense of agriculture, tradeables and rural people; and major deficiencies in the human capital and science base resulting in low agricultural productivity. An outward-oriented growth strategy is proposed with two principal recommendations: (1) rationalize the inward-oriented macroeconomic policy matrix by reducing and eliminating trade barriers, reducing government expenditures and deficits, unfettering capital markets and unifying the exchange rate; and (2) greatly strengthen the science base for agriculture by making research autonomous; paying competitive salaries for scientists; greatly increasing research funding; consolidating extension services, technical high schools and university faculties; linking the various components of the science base both nationally and internationally; and improving rural education.

Ecuador is an Andean country and as such it shares many of the difficulties of its

neighbors, Colombia and Peru. However, it has been able to avoid many of the problems those countries face with their intertwined guerilla movements and drug trafficking. With the discovery of oil in its eastern Amazonian area, Ecuador leaped from its status as one of the poorest South American countries to middle income status during the 1970s, but falling oil prices, natural disasters and the emergence of the international debt dilemma have produced economic crises in the 1980s.

The Ecuadorian economy has been stagnant for nearly a decade, with per capita output lower in 1989 than in 1980. The country is heavily dependent on petroleum exports but is expected to become a net importer of petroleum products shortly after 2000. As petroleum reserves become increasingly exhausted, dependence on agriculture as the principal economic sector will grow. But if agriculture is to make its maximum and sustained contributions to Ecuador's economy, the recommendations of this evaluation must be implemented expeditiously. Thus, one purpose of this book is to focus debate and discussion that will lead to the development of improved policies for agricultural development.

We are indebted to Mr. Frank Almaguer, Director of USAID/Ecuador, Mr. Richard Peters, Chief of the Office of Agriculture and Natural Resources and Ing. Nepatalí Bonifaz of IDEA for financial support as well as conceptual contributions to the effort. We also are grateful to Joe Goodwin, former agricultural officer in USAID/Ecuador, who helped conceptualize the sector reorientation project and the need for a sector assessment. The strong support of four successive Ecuadorian Ministers of Agriculture, Marcel Laniado de Wind, Marcos Espinel, Enrique Delgado and Mario Jalil, was crucial for carrying out essential policy analyses and dialogue.

We also are appreciative of the insights we gained about Ecuadorian agriculture from many discussions with Jorge Soria, IDEA; David Franklin and Grant Scobie, Sigma One Corporation; and Jaime Flores, José Orellana, Fernando Ortiz, Marco Peñaherrera and Scott Smith, of USAID. We also thank Ramiro Lopez and Alfonso Moscoso who contributed insights about the realities of farming in Ecuador. Important additional contributions were made by the following colleagues who reviewed drafts of the manuscript and provided access to data: Alfonso Mosquera, ANCO; Manuel Jaramillo, Catholic University; Victor Mendoza and Guillermo Ojeda, CEDEGE; Patricio Leon, Central Bank; Patricio Toledo, CLIRSEN; Nelson Toledo, DINAF; Manuel Durini, ENDESA; Jorge Chang, Francisco Muñoz, Tomas Dousdebes, Bolívar Navas and Jorge Uquillas, FUNDAGRO; Pablo de la Torre, IDEA; Carlos Criollo, INEC; Jorge Sotomayor, Arturo Orquera and César Sarmiento, INERHI; Juan Vega, INIAP; Carlos Basantes, MAG/Marketing; Mario Lalama, Mónica Acosta and Mauricio Cuesta, MAG/PAU; Franklin Maiguashca, Office of the President; Ralph Franklin, Rigoberto Stewart, Kelly Harrison and Lloyd Brown, Sigma One Corporation; Patricio Izurieta, Ricardo Izurieta, Galo Izurieta, Antonio Teran, Nícolas Guillen and Ignácio Pérez, the private agricultural sector; and William Goodman, Guillermo Jauaregui, Fausto Maldonado, Patricio Maldonado, Robert Mobray, David Nelson, and Bambi Arellano, USAID. We express appreciation to the large number of other people who provided information and contributed in other ways to this endeavor.

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The findings, conclusions and recommendations plus any errors are the responsibility of the authors and do not necessarily represent the positions of the U.S. Agency for International Development or of the Government of Ecuador.

ACRONYMS

AIMA Wood Industry Association, Asociación de Industriales Madereros.
AFABA Feed Manufacturers Association, Asociación de Fabricantes de Alimentos Balanceados.
ANCO National Association of Sheep Growers, Asociación Nacional de Criadores de Ovejas.
APPY Association of Producers and Processors of Cassava, Asociación de Productores y Procesadores de Yuca.
ASA Agricultural Service Agency, Agencia de Servicios Agropecuarios.
BCE Central Bank of Ecuador, Banco Central del Ecuador.
BNF National Development Bank, Banco Nacional de Fomento.
CAF Andean Development Corporation, Corporación Andina de Fomento.
CAME Ecuadorian Agrarian Military Draft, Conscripción Agraria Militar Ecuatoriana.
CARE Cooperative for American Relief Everywhere, Cooperativa Americana para Ayuda Mundial.
CEA Center for Studies and Analysis, Centro de Estudios y Análisis.
CEAS Ecuadorian Center for Social Action, Centro Ecuatoriano de Acción Social.
CEDEGE Study Commission for the Development of the Guayas River Basin, Comisión de Estudios para el Desarrollo de la Cuenca del Rio Guayas.
CEDIG Ecuadorian Center for Geographic Research, Centro Ecuatoriano de Investigación Geográfica.
CELADE Latin American Demographic Center, Centro Latinoamericano de Demografía.
CENDES Center for Industrial Development, Centro de Desarrollo Industrial.
CEPAL Economic Commission for Latin America, Comisión Económica para América Latina (U.N.).
CEPLAES Planning and Studies Center, Centro de Planificación y Estudios.
CESA Ecuadorian Center for Agricultural Services, Centro Ecuatoriano de Servicios Agrícolas.
CFN National Finance Corporation, Corporación Financiera Nacional.
CGIAR Consultative Group on International Agricultural Research, Grupo Consultivo para la Investigación Agrícola Internacional.
CIAT International Center for Tropical Agriculture, Centro Internacional de Agricultura Tropical (CGIAR).
CIM Interamerican Commission on Women, Comisión Interamericana de Mujeres (MAG).
CIP International Potato Center, Centro Internacional de la Papa (CGIAR).
CLIRSEN Center for the Survey of Natural Resources by Remote Sensing, Centro de Levantamientos Integrados de Recursos Naturales por Sensores Remotos.
CONACYT National Council on Science and Technology, Consejo Nacional de Ciencia y Tecnología.
CONADE National Development Council, Consejo Nacional de Desarrollo.
CONFCA National Council of Agricultural Science Faculties, Consejo Nacional de Facultades de Ciencias Agropecuarias.
CONUEP National Council of Universities and Polytechnic Schools, Consejo Nacional de Universidades y Escuelas Politécnicas.

CORDES Corporation for Development Studies, Corporación de Estudios para el Desarrollo.
CREA Center for the Economic Recovery of Azuay, Cañar and Morona-Santiago, Centro de Reconversión Económico del Azuay, Cañar y Morona Santiago (MAG).
CRM Center for the Rehabilitation of Manabi, Centro de Rehabilitación de Manabí (MAG).
CRS Catholic Relief Services, Servicios Católicos de Ayuda.
DAC Development Assistance Committee, Comité para la Ayuda al Desarrollo (OECD).
DINACONTES National Directorate for the Control of Narcotics, División Nacional Contra el Tráfico Ilícito de Estupefacientes.
DINAF National Forestry Directorate, Dirección Nacional Forestal (MAG).
EAP Economically Active Population, Población Economicamente Activa.
EMSEMILLAS National Seed Company, Empresa Mixta de Semillas.
EMBRAPA Brazilian Public Corporation for Agricultural Research, Empresa Brasileña de Investigación Agropecuaria.
ENAC National Agricultural Storage and Marketing Company, Empresa Nacional de Almacenamiento y Comercialización (MAG).
ENPROVIT National Company for Basic Products, Empresa Nacional de Productos Vitales (MAG).
FAO Food and Agriculture Organization, Organización para la Agricultura y la Alimentación (U.N.).
FENACOMI National Federation of Retail Merchants, Federación Nacional de Comerciantes Minoristas.
FERTISA Ecuadorian Fertilizer Company, Fertilizantes Ecuatorianos, Compañía de Empresa Mixta.
FIDA International Fund for Agricultural Development, Fondo Internacional de Desarrollo Agrícola.
FODERUMA Fund for Marginal Rural Development, Fondo de Desarrollo Rural Marginal (BCE).
FONARYD National Fund for Irrigation and Drainage, Fondo Nacional para Riego y Drenaje.
FUNDAGRO Foundation for Agricultural Development, Fundación para el Desarrollo Agropecuario.
GDP Gross Domestic Product, Producto Interno Bruto.
GOE Government of Ecuador, Gobierno del Ecuador.
GTZ Agency for Technical Cooperation, Sociedad para Cooperación Técnica (West Germany).
ICNND Interdepartmental Committee on Nutrition for National Defense, Comité Interdepartamental de Nutrición para la Defensa Nacional.
IDA International Development Association, Asociación Internacional para el Desarrollo (World Bank).
IDB Inter-American Development Bank, Banco Interamericano de Desarrollo.
IDEA Agricultural Policy Institute, Instituto de Estratégias Agropecuarias.
ICDR International Center for Development Research, Centro Internacional para la Investigación de Desarrollo (Canada).
IERAC Ecuadorian Institute for Agrarian Reform and Colonization, Instituto Ecuatoriano de Reforma Agraria y Colonización (MAG).

IETEL Ecuadorian Institute of Telecommunications, Instituto Ecuatoriano de Telecomunicaciones.
IFPRI International Food Policy Research Institute, Instituto de Investigación de Política Alimentaria Internacional (CGIAR).
IGM Military Geographic Institute, Instituto Geográfico Militar.
IICA Interamerican Institute for Agriculture Cooperation, Instituto Interamericano de Cooperación para la Agricultura (OAS).
IMF International Monetary Fund, Fondo Monetario Internacional.
INAMHI National Institute of Meteorology and Hydrology, Instituto Nacional de Metereología e Hidrología.
INCAP Nutrition Institute of Central America and Panama, Instituto de Nutrición de Centro América y Panamá.
INCRAE Institute for the Colonization of the Amazon Region, Instituto Nacional de Colonización de la Región Amazónica Ecuatoriana.
INEC National Institute of Statistics and Census, Instituto Nacional de Estadísticas y Censos.
INECEL Ecuadorian Electrification Institute, Instituto Ecuatoriano de Electrificación.
INEM National Employment Institute, Instituto Nacional de Empleo.
INERHI Ecuadorian Institute of Water Resources, Instituto Ecuatoriano de Recursos Hidráulicos (MAG).
INIAP National Institute of Agricultural Research, Instituto Nacional de Investigaciones Agropecuarias (MAG).
ININMS National Institute for Nutritional Research and Social Medicine, Instituto Nacional de Investigación Nutricional y Medicina Social (MSP).
INNE Ecuadorian National Institute of Nutrition, Instituto Nacional de Nutrición del Ecuador (predecessor of ININMS).
IRRI International Rice Research Institute, Centro Internacional de Investigación del Arroz (CGIAR).
ISNAR International Service for National Agricultural Research, Servicio Internacional para la Investigación Agrícola Nacional (CGIAR).
ISS Institute of Social Studies, Instituto de Estudios Sociales (Holland).
JUNAPLA National Planning Commission, Junta Nacional de Planificación (predecessor of CONADE).
MAG Ministry of Agriculture, Ministerio de Agricultura y Ganadería.
MBS Ministry of Social Welfare, Ministerio de Bienestar Social.
MEC Ministry of Education and Culture, Ministerio de Educación y Cultura.
MICEI Ministry of Industry, Commerce and Integration, Ministerio de Industrias, Comercio y Integración (predecessor of MICIP).
MICIP Ministry of Industry and Commerce, Ministerio de Industrias, Comercio, Integración y Pesca.
MOP Ministry of Public Works, Ministerio de Obras Públicas.
OAS Organization of American States, Organización de Estados Americanos.
OECD Organization for Economic Cooperation and Development, Organización para el Desarrollo y la Cooperación Economica.
ORSTOM Office of Overseas Science and Technology Research, Office de Recherche Scientifique et Technique d'Outre-Mer (France).
PAU Policy Analysis Unit, Unidad de Análisis de Políticas (MAG).
PETROECUADOR Ecuador Petroleum Company, Petroleos del Ecuador (successor agency of CEPE).

PIP Product Research Program, Programa de Investigación en Producción (INIAP).
PREALC Regional Employment Program for Latin America and the Caribbean, Programa Regional del Empleo para América Latina y el Caribe (U.N.).
PREDESUR Regional Program for the Development of Southern Ecuador, Programa Regional para el Desarrollo del Sur (MAG).
PROFOGAN Livestock Development Project, Proyecto de Fomento Ganadero.
PRONAMEC National Program for Agricultural Mechanization, Programa Nacional de Mecanización Agrícola (MAG).
PRONAREG National Program for Agrarian Regionalization, Programa Nacional de Regionalización Agraria (MAG).
PROTECA Program for the Development of Agricultural Technology, Programa de Desarrollo Tecnológico Agropecuario (MAG).
PVO Private Voluntary Organization, Organización Privada Voluntaria.
REE Research, Education and Extension, Investigación, Educación y Extensión.
RRA Rapid Rural Appraisal, Investigación Rural Rápida.
RTTS Rural Technology Transfer System, Sistema para la Transferencia de Tecnología Rural (USAID).
SCIA Interamerican Cooperative Agricultural Service, Servicio Cooperativo Interamericano de Agricultura.
SEAN National System of Agricultural Statistics, Sistema Estadístico Agropecuario Nacional (INEC).
SEDRI Subsecretariat of Integrated Rural Development, Subsecretaría de Desarrollo Rural Integral (MBS).
TGC Tribunal of Constitutional Guarantees, Tribunal de Garantías Constitucionales.
TSE Supreme Electoral Tribunal, Tribunal Supremo Electoral.
UAPPY Union of Cassava Producer and Processor Associations, Unión de Asociaciones de Productores y Procesadores de Yuca.
UNDP U.N. Development Program, Programa de Desarrollo de las Naciones Unidas.
UNFPA U.N. Fund for Population Activities, Fondo para las Actividades Poblacionales de las Naciones Unidas.
USAID U.S. Agency for International Development, Agencia para el Desarrollo Internacional de los Estados Unidos.
USDA U.S. Department of Agriculture, Departamento de Agricultura de los Estados Unidos.
WFP World Food Program, Programa Mundial de Alimentos (U.N.).
WHO World Health Organization, Organización Mundial de la Salud.

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AGRICULTURE AND ECONOMIC GROWTH

Morris D. Whitaker

Economic growth and development in any modern society are concerned fundamentally and primarily with improving the well-being of people. One major objective is to increase the production of goods and services as rapidly as possible as the basis for improving the quality of life and standard of living. This goal reflects the economic behavior of *Homo sapiens* from a wide variety of political and cultural backgrounds around the world. While this concept is fundamentally materialistic, the collective aspirations of people, expressed through the political process, universally encompass a concern for adequate nutrition, housing, clothing, health care, education, arts and other basic human needs. Concomitantly, there is a universal tendency to value expanded opportunities for the individual and freedom of choice in consumption and production activities. The standard measure used to compare economic progress among nations is the rate of growth in the value of goods and services produced in the economy, expressed in constant prices (real gross domestic product or GDP). The rate of growth in real GDP is compared with the rate of growth of the population to determine if people are, on average, better off.

The second major objective of growth and development in today's world is to distribute production more equitably. Concentration of income and wealth among a small share of the population usually is not sustainable politically. Consequently, more egalitarian sharing of the fruits of economic progress is another important goal of development among countries of all ideological persuasions. This concern often is expressed by strong emphasis on increasing employment opportunities for the growing labor force, which usually is concentrated among lower-income masses, especially in developing countries. It also is expressed in progressive tax systems which redistribute income in favor of the poor and in social welfare programs which transfer resources to meet the basic human needs of poor people. While progressive tax systems and welfare programs tend to be the domain of the developed world, the developing nations are increasingly adopting these mechanisms. Thus, measures of the distribution of income and wealth are other important indices, along with per capita GDP, of achievement of the objectives of economic growth and development.

The role of agriculture in overall economic growth and development has not been well understood, until recently, either by economists, or by economic planners and policymakers in developing countries. Agriculture was consigned to a secondary,

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policymakers in developing countries. Agriculture was consigned to a secondary, poorly defined role in most of the formal models of economic development that have been in favor during the last few decades. Policymakers compounded the errors inherent in these flawed models as they attempted to make inadequate economic premises fit with political expediency.

A substantial body of new theoretical and empirical knowledge about the role of agriculture in economic development has been produced by agricultural and developmental economists, especially during the last two decades. Policymakers in many developing countries have utilized this new knowledge, albeit with a lag of perhaps a decade or more, as a basis for modifying and improving economic development policies. These countries are in various stages of transition away from the development models of the past and toward more enlightened policy matrices for economic growth which recognize and exploit the potential contributions of agriculture. However, several Latin American countries, including Ecuador, still are following outmoded development models which discriminate against agriculture. As a consequence their economic growth is constrained well below the possible and their distribution of income may be more unequal.

This chapter provides a conceptual foundation for the study of agriculture and its role in Ecuador's economic development presented in the following chapters. The following sections review and analyze: several general economic development models that were the basis for Ecuador's post World War II development strategy and their failure to explain how agriculture is to produce a surplus to fuel the development process; the concept of the agricultural surplus; and the body of more recent, theoretical and empirical findings about the role of agriculture in economic development, the necessary conditions for producing the surplus and the implications of the emerging world economy for developed and developing nations.

Development Models of the Past[1]

Industrialization was proposed as the principal basis for economic development by development economists in the early 1950s. Such a position was rooted intellectually in the dual-sector models and growth-stage models of economic development. It also was based on the dependency theories of economic development advanced about the same time.

Dual-Sector and Growth-Stage Models

Dual-sector models emphasize the dichotomy between the traditional and modern sectors of the economy and suggest that economic growth must be based on development of a modern industrial sector. Dual-sector models can be classified as static or dynamic. The static model was first elaborated by Boeke. Dynamic models are based on the classic article by Lewis and include those developed by Ranis and Fei, and Jorgenson (1961, 1966).

Stage theories of economic growth suggest that the economy moves by steps from a traditional agrarian structure characterized by low productivity to an industrialized state with commercialized agriculture and high productivity. Growth-stage theories can be divided into two schools of thought, structural transformation and leading sectors. The structural transformation school stressed the shift from primary to secondary and tertiary activities as development occurred (Clark). The "leading

sectors" school developed later and is credited mainly to Rostow.[2]

The Rostow, Ranis and Fei and Jorgenson models emphasize development of a modern industrial sector in a closed economy. All identify the generation of a surplus as an explicit and initial role for agriculture in promoting general economic development. Both Ranis and Fei and Jorgenson clearly recognize that increases in agricultural productivity will be necessary in order to produce a sustained surplus to drive modernization of the industrial sector.

None of the models adequately explains how the agricultural surplus is to be generated. Indeed, they devote only limited attention to the agricultural surplus, although it is critical to their central thesis. Both Ranis and Fei and Jorgenson argue that agricultural productivity can be increased sufficiently to produce a sustained agricultural surplus through land improvements and other labor-intensive capital formation. In fact, it is now well known that a sustained process of technical change in agriculture requires substantial investments, especially in human capital, and a relatively long gestation period (Hayami and Ruttan 1985, Chapters 5 and 6). A second shortcoming of the models is the assumption that all the agricultural surplus is available for development of the industrial sector. In fact, demand for a whole series of marketing services such as transportation, storage, wholesaling and retailing increases substantially as resources flow from the agricultural to the emerging industrial sector. This occurs because the income elasticity of demand for such services tends to be relatively high. Thus, a substantial portion of the agricultural surplus is drawn off to support development of the services sector which is ignored in the dual-sector and growth-stage models.

A third weakness, explicit in the modern dual-sector models and implicit in the growth-stage models, is the assumption that the industrial sector will generate sufficient new, higher-paying jobs to accommodate labor released from the rural sector. The capital-intensive nature of industrialization generally has limited creation of jobs. Also, industry generally demands skilled labor and rural labor largely is unskilled. Consequently, many migrants are forced to seek employment in the informal service sector.

Dependency Models

The structuralist model of economic development has been the principal conceptual basis for Ecuador's economic development policy since the late 1950s (see Chapter 2). The model was formulated almost simultaneously but independently by Hans Singer and Raul Prebisch (1950). Prebisch (1959, 1963) and his colleagues at the U.N. Economic Commission for Latin America (CEPAL) developed the theory most completely. Their model focuses on a dependency relationship between developing and developed countries. They argued that there is a tendency for the external terms of trade to turn against developing countries that export primary goods, relative to developed countries that export manufactured goods. This occurs because of low income elasticities of demand in the developed countries for primary goods and high income elasticities for industrial products in the peripheral countries. They also argued that primary products had to compete in competitive markets while industrial products were sold in monopolistic markets. Finally, they suggested that productivity growth is much slower in production of primary goods in the periphery than for industrial goods in the center. They concluded that the potential for rapid and sustained economic growth from exports of agricultural products was nil. Their principal policy

prescription was for developing countries to promote domestic production of imported industrial products as a much more viable development model. The Prebisch-CEPAL structuralist model of development attracted considerable attention, especially in Latin America, where it has been followed almost dogmatically. Prebisch (1981) has since modified his views about import substitution.

Other dependency models also are relevant to Ecuador because they tend to be identified with and reinforce the policy implications of the structuralist model. The neo-Marxian dependency model, developed about the same time as the structuralist model, also focuses on the economic relationship between the developed center and the underdeveloped periphery (Baran).[3] It argues that the developed center extracts resources from developing countries of the periphery as they become integrated into the world economy. In this view, exportation of advanced technologies from the center results in the development of a coalition in the periphery of newer industrial-commercial interests with the traditional, landed class. This new power group controls the economic and political system and the majority of rural and urban workers are isolated and oppressed.

DeJanvry (1975, 1981) has proposed a dependency model of generalized rural poverty and agricultural development in Latin America along the general lines of the neo-Marxian dependency model. He conceptualizes three levels of exploitation that result in marginalization of the rural poor: (a) the center exploits the periphery through trade of industrial goods for raw materials, *a la* the structuralist model; (b) the emerging industrial-commercial sector of the periphery exploits the subsistence sector and laborers in agriculture; and (c) landlords exploit subsistence farmers and laborers. He argues that farmers are increasingly marginalized by the process of modernization and incorporation in the market economy. He also argues that a coalition of industrial interests and landlords control the political and economic power and conspire to exploit the rural poor.

The DeJanvry model has been criticized on several grounds (Schuh 1984): there is serious doubt that the terms of trade has deteriorated[4]; the labor theory of value, which DeJanvry implicitly assumes, has been generally and widely discredited; trade has evolved principally between the center countries, not between the center and the periphery, which pattern raises serious questions about the predictive power of the model; the substantial political power of urban wage groups throughout Latin America vis-à-vis DeJanvry's industrial-agricultural elite is ignored; the large masses of rural workers are unskilled and have little value to the industrial sector, which requires highly skilled workers; the foreign exchange constraint was not imposed from abroad but was internally generated by a policy matrix that subsidized import-substitution industrialization and neglected the traditional export sector during a period when world trade was growing rapidly; the lag in technological development of the periphery was largely self-imposed and not the result of collusion among the center countries which have had a high degree of competition in research and development; labor services can be made more inexpensive by increasing labor productivity which would have been in the interest of DeJanvry's supposed industrial-agricultural coalition; and high rates of population growth, which explain much of the lag in per capita income of the periphery, are treated superficially. Perhaps the most serious weakness of the DeJanvry model is its failure to clearly specify policies for modernizing agriculture and integrating marginalized rural people into the economy.

The principal conclusion of the dependency models is that rapid and sustained economic growth is possible only by constraining commerce with the center and focusing on development of a modern industrial sector based on internal markets.

Notwithstanding the serious weaknesses of the various models discussed above they have contributed to a better understanding of the development process. Dependency theories focus on trade as one of the important sources of economic growth and development. They also clarify that social and institutional structures are important determinants of the distribution of the gains from trade and of overall social welfare occasioned by trade. These are important factors which the dual sector and growth stage models ignored. The dual sector models provide substantial insight into the interrelationships between the traditional and modern sectors of the economy and especially intersectoral labor markets. They also correctly identify the critical role of the agricultural surplus in fomenting overall economic development. The dependency models failed to address these important elements of the development process. While the various theoretical constructs discussed above each have enhanced understanding, they failed to identify appropriate policies for more rapid and sustained agricultural and economic growth. This failure is due mainly to their simplistic natures and the lack of empirical foundation for many of their questionable assumptions.

Ensuing Strategies and Results

The synthesis of growth-stage, dual-sector, structuralist and neo-Marxian models provided a foundation for broad-based political support for autonomous, internally-focused growth strategies throughout Latin America and much of the developing world for most of the period since World War II. The principal feature of such strategies has been the development of a highly protected, modern industrial sector to produce previously imported consumer durables for the internal market. A second feature has been the isolation of the economy from international economic forces with reliance on growth from expansion of internal markets. A third generalized feature has been the socialist orientation of ambitious welfare and labor legislation that attempts to assure the well-being of poor and disadvantaged groups. Such strategies generally have ignored and depreciated the role of agriculture and tradeables as a basis for more rapid growth because of the weaknesses and shortcomings of the intellectual abstractions underlying these strategies.

Several Latin American countries which adopted import-substitution industrialization in the 1950s had experienced disappointing results from this development model by the mid-1960s (Hirschman). Stagnation occurred as import-substitution opportunities were exhausted and internal markets saturated. Employment generation also was much lower than expected despite initial rapid growth.[5] Subsequently, these countries modified their development policies and have moved toward externally-oriented growth strategies with much greater reliance on agriculture.

Ecuador has followed this general pattern but has lagged well behind other Latin American countries in introducing necessary policy reforms. Macroeconomic policies improved during the 1980s and significant reforms were proposed in early 1990 for implementation during 1990-1993. However, the country still employs an inward-oriented development strategy based on import-substitution industrialization as its primary development model at the beginning of the 1990s, with significant political opposition to the proposed reforms. As a consequence, Ecuador's agricultural development and economic growth continue to be constrained, as agriculture still is taxed to subsidize the industrialization process and urban people (see Chapter 2).

Ecuador's agricultural sector could have and can yet play a much greater role in more rapid, sustained and equitable economic growth and development. The next

section briefly reviews the role of agriculture in the development process and the nature of the agricultural surplus. Then the necessary and sufficient conditions for producing a sustained surplus are set forth in the light of new conceptual and empirical knowledge about agriculture's role in economic development.

The Agricultural Surplus

Development of a modern agricultural sector capable of contributing to overall economic growth is a dynamic process whereby the efficiency with which food and fiber products are produced and marketed is increased. Public investment is essential to increase the productive capacity of the sector, to improve efficiency in product and factor markets, and to provide basic social services--especially effective education--if the sector is to be modernized. Provision of these public services induces increased private investments in production and marketing and in the host of service sector activities associated with them. As a consequence of such investments, the productivity of the agricultural sector increases and the intersectoral flows of products and factors is facilitated.

Sustained increases in productivity in the agricultural sector result in what economists have referred to as a "surplus" to facilitate development of the modern sector (Ranis and Fei; Jorgenson 1961, 1966; Nicholls). Increases in productivity cause the supply of agricultural commodities to increase faster than demand. Prices of food and fiber fall and the internal terms of trade (the price of agricultural products relative to nonfarm products) shifts against the agricultural sector.[6] The falling prices of agricultural products put pressure on owners of resources to shift them out of the sector and cause the real incomes of consumers to increase.

The agricultural surplus consists of two main components: (a) redundant resources in agriculture; and (b) increased real incomes. Both components are fundamental to the development process because they provide a source for shifting resources to the nonagricultural sector in support of general economic development, without reducing agricultural output.[7] However, if transfers of resources are to have maximum impact in the nonfarm sector, careful attention must be paid to rural people.[8] Labor is the most important factor of production in agriculture in developing countries but many rural people are illiterate and unskilled. If such people are to find more remunerative employment outside agriculture and the informal sector in urban areas they must be provided with marketable skills. Also, careful attention must be given to improving the efficiency of intersectoral labor markets.

Redundant resources result from decreasing prices of agricultural goods and tend to become relatively more valuable in the nonfarm sector than in agriculture. Owners of such resources must seek alternative employment outside agriculture if they are to earn the same return as before the sustained technical changes began. Subsequent resource transfers facilitated by public investments (such as education) lead to increased levels of production in the economy. The surplus derived from redundant resources may be viewed as the increase in product value that can be obtained if labor and other resources are utilized in their best alternative uses outside agriculture.

Increases in real income, the second component of the agricultural surplus, tend to be realized in both urban and rural areas. In urban areas, increases in real income result only from decreases in the price of agricultural products. Since the demand for these products tends to be price inelastic, expenditures decrease as prices fall. The savings occasioned by reduced agricultural prices also may be viewed as an increase in

the real income of urban consumers. Since agricultural products are the most important wage good for the majority of urban consumers in a developing country, the increase in the real income of the average consumer can be substantial.[9] This increased income is available for purchase of wage and investment goods produced in the nonfarm sector and more desireable agricultural products. The result is an increase in demand and investment in those sectors, with increased markets and more rapid development.

In rural areas, decreases in the price of food and increases in productivity both affect real incomes. Just as in urban areas, decreases in the price of food tend to reduce the expenditures for food in rural areas and increase the real income of the rural consumer. Since rural consumers are almost always producers, however, their incomes are simultaneously being reduced by decreasing prices (induced by technical change). Thus, increases in income from decreased food costs tend to be offset by decreases in farm revenues. Technical changes, however, will cause costs of production to fall faster than farm revenues, especially for early innovators. The combined effect will result in increased real incomes for producers who adopt the cost-saving technologies. Others will be under pressure to seek alternative employment for their resources as falling revenues are likely to swamp the effects of lower food costs.

Increased incomes in the rural sector also can be invested or used to purchase consumption goods. The impact of such increases in real incomes can be significant in view of the large proportion of the population concentrated in the agricultural sectors of most developing countries. When combined with the increases in urban incomes, the increase in demand from falling food prices due to technical innovations in agriculture can be substantial. Rising real incomes in both rural and urban areas leads to broader and deeper national markets and contributes to the development of the services and industrial sectors.

The production of an agricultural surplus has three other implications for economic development. First, price decreases tend to shift the distribution of income in favor of the low-income masses, who normally constitute a majority of the population. This happens because low-income people spend a larger proportion of their income on food than the more well-to-do. Second, the nutrition of the population tends to improve as consumers gain access to foods with needed nutrients that were previously too expensive. The improved health of the population can lead to further increases in productivity and production. Third, products of the agricultural sector become more competitive in the world market with subsequent increases in exports, domestic production of previously imported products and increased foreign exchange earnings.

Most developing countries are characterized by a relatively large agricultural sector with low levels of productivity. The conclusion drawn here is that modernization of agriculture and production of a surplus in such countries can contribute substantially to an improved rate of economic growth and a more equitable distribution of income. As noted above, past development models and associated strategies generally have recognized the importance of agriculture and the agricultural surplus. They have failed, however to explain how such surpluses are generated.

What are the conditions for producing sustained increases in agricultural productivity and an agricultural surplus? The next section considers a body of new theoretical and empirical knowledge about agricultural development that addresses this question.

Generating a Sustained Surplus

A substantial body of new theoretical and empirical knowledge about agricultural growth and overall economic development has been developed during the last two decades.[10] This body of knowledge provides much better understanding of the nature of agricultural development and of the policy variables which affect modernization of the sector. It also contains a much clearer explanation of the importance of agriculture in fostering economic development. Increases in agricultural productivity and market incentives are identified as critical elements for generating an optimum rate of economic growth. Concurrent development of the various sectors of the economy, rather than dependence on a leading sector, also is recognized as necessary for rapid and sustained economic growth by most development scholars.

This section briefly reviews three major, interrelated elements of this new set of knowledge, including: (a) a theory of induced agricultural development proposed and refined by Hayami and Ruttan (1971, 1985) which focuses on technical and institutional change; (b) the effects of macroeconomic and sectoral policies on agriculture based on a substantial number of theoretical and empirical studies principally by South American economists (Valdés) and the World Bank (Krueger, Schiff and Valdés 1988); and (c) the implications of the emergence of an international economy for developed and developing countries (Schuh 1974, 1976, 1986 and 1987). These new theoretical constructs and empirical findings provide the principal conceptual bases for the analyses which follow in the rest of this study.

Induced Innovation in Agriculture

Yujiro Hayami and Vernon W. Ruttan (1971, 1985) have proposed a general theory of induced agricultural development, which builds on and extends the seminal work of Schultz. Their model of agricultural development is widely accepted and their book is considered a classic by agricultural economists (Johnson). Schultz, in what has come to be known as the "high-payoff input model" (Hayami and Ruttan 1985, pp. 59-62) hypothesized that poor farmers in developing countries allocate their meager resources efficiently and are constrained by traditional technologies and poverty. Consequently, little or no gains are to be had from reorganizing traditional factors of production. He further argued that agricultural technologies generally are highly location specific and cannot be readily transferred among countries. Schultz suggested that rapid increases in agricultural output can be obtained primarily from technical changes and utilization of more modern factors of production, which form part of the package of inputs necessary to adopt the improved technology.

The policy implications for agricultural development of the high-payoff input model are threefold: (a) development of a publicly supported science base for agriculture which can produce and extend flows of new technology; (b) production of modern inputs which incorporate and complement the new technical knowledge; and (c) education of farmers so that the new technical knowledge can be adopted and utilized. The various hypotheses of the high-payoff input model have been exhaustively tested and generally supported by a large number of empirical studies. Returns to investments in agricultural research, extension and education have been shown to be uniformly high in both developed and developing countries for a variety of individual crops and in aggregate (Evenson, Waggoner and Ruttan; Lockhead, Jamison and Lau; Huffman). Farmers of all economic classes around the world generally have been

found to be efficient allocators of factors of production.[11] A significant literature about principles of organization and management of agricultural research, both nationally and internationally, has evolved (Arndt, Dalrymple and Ruttan; Pinstrup-Andersen; Ruttan). This latter body of knowledge strongly supports Schultze's intuitive premise that agricultural technologies are location specific and not easily transferred.

The high-payoff input model clearly has had a substantial impact on agricultural development strategies in many developing and developed countries around the world. The principal contribution of the model is the identification of specific investment targets for increasing agricultural productivity. The model, however, treats technical changes as exogenous and fails to explain how technical changes are induced, especially in the public sector.

The Hayami-Ruttan model of induced innovation in agriculture incorporates all the elements of the high-payoff input model but treats technical changes as endogenous to the sector. In their conceptualization, innovations occur in the public as well as the private sector in response to price signals from the product and factor markets. Furthermore, interactions occur between technical changes and institutions, with induced institutional innovations allowing individuals or groups to internalize returns from technical progress. Finally, in dynamic sequences of technical change and economic growth, technical progress that resolves one critical constraint often leads to another kind of bottleneck with a resultant induced innovation to resolve that bottleneck.[12]

The principal challenge of successful agricultural growth in the Hayami-Ruttan model is to attain an efficient path of technological change which saves the relatively scarce factor of production. In their model, technical changes permit substitution of abundant resources for those in scarce supply. If labor is the limiting resource in the development process then an efficient path of technical change must be labor-saving. Innovations are generally mechanical in this case and permit machines and capital to substitute for labor, thus increasing the use of land and raising the productivity of labor. In essence mechanical innovations permit abundant land to be substituted for scarce labor. If land is relatively limited and labor is in abundant supply, then innovations must save the scarce land. Chemical-biological innovations will permit various technical inputs (such as improved seeds and fertilizers) to substitute for the scarce land, thus increasing its productivity and the use of relatively abundant labor. Thus, chemical-biological innovations permit abundant labor to be substituted for scarce land.

In the induced innovation model of agricultural development, an efficient path of technical change reflects the original endowment of resources and changing relative prices of products and factors. Farmers seek technologies which save the scarce (expensive) factor and reduce their costs. They turn to both public research agencies for improved technologies and to the commercial-industrial sector for modern inputs which can substitute for the limiting factor. Public sector researchers are induced to work on the technological constraints and the private commercial-industrial sector to produce modern technical inputs which incorporate and complement new technical knowledge. This process results in what Hayami and Ruttan (1985 pp. 133-37) conceptualize as a meta-production function which permits the continuous and sustained substitution of new technical knowledge and inputs for the scarce factor of production.

The induced innovation model provides several new insights about agricultural growth and overall economic development. Perhaps most important is that transition from a natural resource-based to a science-based agriculture is the sine qua non of

both agricultural and overall economic development. There are several policy implications associated with this finding: (a) substantial resources will be required to develop a viable system capable of producing, extending and adopting continuous flows of new technical knowledge because it is a very capital intensive process; (b) human capital at scientific, technical and general levels must comprise a significant part of the investment in the agricultural science base; (c) the public sector will have to undertake most of the investments in research because the efficient path of technical change for most developing countries is chemical-biological in nature and private investors generally cannot internalize the gains from such research; and (d) organization and management of the public science base for agriculture will be a major challenge and of critical importance to achieving more rapid growth, given the alternative, multiple paths of possible technical innovation.

The induced innovation model also confirms the generally held view among development economists that transfers of the agricultural surplus to the nonfarm sector are essential for higher rates of economic development. An equally important but seldom discussed implication is that how the nonfarm sector is developed with the agricultural surplus has a major, direct effect on the rate of economic growth. In the words of Hayami and Ruttan (1985 pp. 440-41):

> In many developing countries, the income streams generated in the agricultural sector have been used to purchase a nonviable industrial sector or a nonproductive military and administrative bureaucracy....The experience of the last several decades indicates that although it may be easy for poor countries to acquire an industrial sector that produces manufactured products that were formerly imported, it is much more difficult to purchase an industrial sector that is capable of making a sustained contribution to income streams comparable to those generated by the agricultural sector.
>
> If the intersector income transfers resulting from technical change in agriculture are to result in a cumulative contribution to economic growth, the new sectors purchased by these transfers...must be capable of producing the new industrial materials needed to sustain the process of agricultural development.

The policy implication is clear: economic development policies must recognize the interdependencies of the various productive sectors and exploit the comparative advantages of each, if the rate of economic growth is to be maximized.

A third key finding of the induced innovation model is the important role of market forces in inducing both technical and institutional change. Price distortions in product and factor markets resulting from government policies and interventions have limited the prospects for more rapid and sustained agricultural and general economic growth. These distortions have constrained opportunities in the public and private sector for technical changes and in many countries have constrained the possibility of moving onto an efficient path of technical change. The pricing system must reflect the actual scarcity of products and factors in allocation decisions of public and private sector officials if an efficient path of technical change is to be attained. The policy implications are clear: a more modern system of factor and product markets must be developed with government support for improved information and communication, grades and standards, and transportation and storage within and among principal economic sectors; and distortions and subsidies inherent in misguided public policies must be removed by adopting a more rational macroeconomic and sectoral policy matrix.

While the induced innovation model of agricultural development does recognize the negative effect on agriculture of overvalued exchange rates and price and interest rate controls, the effect of macroeconomic and sectoral policies is not formally incorporated into the model.

Macroeconomic and Sectoral Policies

There is a large and growing body of evidence that the macroeconomic and agricultural sector policy matrix utilized by many developing countries during the last few decades significantly constrained public and private investments in agriculture. These countries almost uniformly adopted policies to promote import-substitution industrialization and self-reliant growth. Principal macroeconomic policies included: overvalued exchange rates; protection of domestic industry through tariff and non-tariff barriers to trade; direct subsides to industry and commerce including tax exonerations and subsidized credit; and highly subsidized importations of capital equipment and intermediate goods.[13] Such countries simultaneously maintained a set of negative sectoral policies for agriculture including: price ceilings for most food and fiber products, which translated into lower producer prices; taxes on exports of primary agricultural products; export prohibitions; state interventions in product and factor markets; and taxes on imports of agricultural inputs in some cases. Finally, such countries also attempted to help agriculture by subsidizing credit and other inputs and through investments in irrigation, storage and transportation infrastructure; land reform and titling; and research, education and extension.

The World Bank has recently completed an exhaustive review of the effect of macroeconomic and sectoral policies on agriculture in 18 countries around the world for the period 1975-1984 (Krueger, Schiff and Valdés 1988). Included are Argentina, Brazil, Chile, Colombia, Ivory Coast, Dominican Republic, Egypt, Ghana, Republic of Korea, Malaysia, Morocco, Pakistan, Philippines, Portugal, Sri Lanka, Thailand, Turkey and Zambia. These countries represent a wide range of development and all the principal low-income regions of the world. Each country was studied independently by different researchers who utilized a common methodology to provide comparability.[14] Each study empirically measured the effect of direct, sector-specific policies (both negative and positive) and of indirect, economy-wide macroeconomic policies on agricultural incentives for principal exportable and importable agricultural products. The impact is measured relative to what prices would have been with a free-trade regime and no direct sectoral interventions (either positive or negative). The reference price is the border price for all tradeables, appropriately adjusted for various marketing costs.

The results indicate clearly that sectoral and macroeconomic policies have discriminated substantially against agriculture in almost all the countries studied. The net effect of direct, positive and negative sectoral policies was equivalent to a tax on exportables (-11 percent on average) and to a subsidy to importables of 20 percent. Thus, direct, sectoral policies favor importable agricultural commodities while depressing incentives for exportables. The indirect effect of macroeconomic policies taxes both exportables and importables at about the same magnitude (-29 and -27 percent, respectively). The indirect effects are relatively large and dominated the direct effects. Moreover, the total effect, on average for the 18 countries, taxed both exportables (-40 percent) and importables (-6 percent). Thus, the average price of exportables is only about 60 percent and of importables is 95 percent of what would

have existed under a free-trade macroeconomic policy matrix and no direct sectoral interventions.

These results conclusively demonstrate the pervasive and dominant effect of indirect, macroeconomic policies over sectoral policies for both exportable and importable agricultural commodities throughout a large number and wide variety of developing countries. Producers of agricultural exports have suffered significant reductions in incentives both from direct, sectoral interventions and especially from macroeconomic policies. Producers of importable agricultural commodities have been the recipients of relatively large subsidies from direct policies, only to have these eroded and swamped by indirect policies.

These results illustrate a puzzling anomaly, raised by Krueger, Schiff and Valdés (1988 p. 264): "...agricultural producers often have larger interests in macroeconomic policies than they do in agricultural pricing policies, yet their representatives usually concentrate on the latter." They suggest a partial answer is in the search by consumers of importables and by producers of exportables for internal price stability. However, the magnitude of the disincentives from indirect policies is so great that farmers surely would be greatly concerned if they clearly understood the negative impacts of such policies. The knowledge base about the effect of indirect and direct policies on agriculture is quite new. It is very likely that many farmers do not understand the effects of such policies. Moreover, the urban-commercial-industrial elite, who benefit from directly from the subsidies inherent in such policies, are a strong political coalition which likely would vigorously resist attempts to change the status quo.

There are two other important studies which strongly support the conclusions of the World Bank studies. Valdés provides a summary of the effect of commercial and macroeconomic policies on agricultural growth for South America. He sets forth a valuable methodological contribution by focusing on the real exchange rate, and provides results for Argentina, Brazil, Chile, Colombia, and Peru from several empirical studies.[15] He concludes that agriculture throughout South America has been constrained by inappropriate macroeconomic and commercial policies. He suggests that diversification and expansion of exports may be the most important structural adjustment facing South America. Valdés argues that taking advantage of the opportunities for growth in the international economy, especially for agriculture, will require an alignment of the real exchange rate to stop taxing the sector.

Finally, there is evidence from eight South American countries that agriculture responded positively to post-1982 adjustments in their macroeconomic policy matrices (IICA). These policies were changed in a series of structural adjustments that became necessary after the onset of the international debt crisis in mid-1982, and because of low growth rates and stagnation. These adjustments corrected distortions and reduced or eliminated disincentives associated with import-substitution industrialization and internally oriented growth strategies. While the response of each of the eight countries has been somewhat different, all tended to experience increases in agricultural growth. One principal conclusion of the study is that the macroeconomic policy matrix should continue to be modified in order to eliminate the anti-agricultural policy bias that has existed for decades. The study recognizes the: "...high supply response capacity of the agricultural sector to favorable macroeconomic policies, basically an increase in the real effective exchange rate and free market internal prices." (IICA p. 13, translation by author.)

Sectoral policies will become much more important once macroeconomic policies have been rationalized. Improvements in macroeconomic policies will provide the greatest increase in incentives to agriculture and of about equal magnitude to

exportables and importables according to the results of the World Bank studies. Substantial increases in incentives then can be realized through appropriate positive sectoral policies since their effect will not be dampened and swamped by discriminatory macroeconomic policies or negative sectoral policies. The net effect of past positive and negative sectoral policies in the 18 countries studied by the World Bank was to modestly tax exportables and to heavily subsidize importables. These data suggest policymakers will need to be especially careful to introduce more neutral, positive sectoral policies as macroeconomic policies are rationalized and negative sectoral policies are eliminated.

Extracting resources from agriculture through macroeconomic and negative sector policies when no surplus is being produced contributes to an increase in the real internal terms of trade in favor of agriculture (that is, an increase in the shadow price of agricultural commodities relative to non-agricultural products). In this situation there would be pressure for resources to flow into agriculture, if markets were allowed freely to perform their allocation function. Government policies which extract resources from agriculture in such a situation lead to an even more inefficient allocation of resources. The main criticism noted here is that such a policy matrix is not extracting surpluses nor can it stimulate surplus production. While it does extract resources, the real internal terms of trade are turned increasingly in favor of agriculture. The existence of discriminatory macroeconomic and sectoral policies implies that agricultural surpluses do not exist and that agriculture is bearing an unduly heavy tax to support the nonfarm sector. In the long run, such a policy matrix reduces the well-being of all consumers.

An Emerging World Economy

A truly international, global economy began to emerge after World War II, and now is growing vigorously. The world economy is substantially different than it was even in the early 1960s, with increasingly interdependent economic relationships and greater specialization among nations. The reality of the new international economic order, and the high probability that it will continue to grow and develop, has significant implications for both developed and developing countries. Macroeconomic and sectoral policies must be consistent with the realities of the international economy if national economies are to maximize their rate of economic growth and development.

A key factor which appears to underlie the emergence and growth of the international economy is continuing technological innovation in information. Rapid scientific advances in communications and computers have substantially reduced the costs of producing, analyzing and transmitting information. This has resulted in the development of a global communications network in which people in every nation are regularly informed of events around the world.

There have been significant changes in the international economy during the past few decades. These changes have impinged directly on almost every country of the world and especially those with relatively open economies. Schuh (1974, 1976, 1986, 1987) has identified several major changes and analyzed their impact on the U.S. economy.[16] The rest of this section summarizes four of Schuh's main findings and their implications for developing countries in their quest for more rapid and equitable economic growth.

First, there has been a substantial increase in international trade throughout the world, with especially significant increases between the developed countries.

Dependency on imported foreign goods increased in most countries. Concomitantly, exports increased rapidly, especially in countries that exploited economic growth potentials inherent in the emerging international marketplace. Several countries that were underdeveloped in the early 1960s have graduated into the status of newly developed countries by exploiting their comparative advantages in the rapidly growing international economy. Others have experienced much slower development as they have followed internally oriented growth strategies. Almost all countries, however, are much more open than they were twenty-five years ago, and some have experienced quite remarkable changes from basically closed to highly open economies. The expectation is that international trade will continue to grow, and that major opportunities for economic growth for both developing and developed will lie in the international market place.

A second major change is the emergence of a pervasive, well-developed international capital market based, at least in part, on advances in communications technology. The size of the market is phenomenal, at US$42 trillion in 1984 compared to US$2 trillion in international trade (Schuh 1987, p. 2). This market has grown very rapidly and still appears to be expanding. It essentially functions in an international environment, unconstrained by national boundaries. It provides access to the huge pool of international savings for investors in those countries which are willing to recognize and abide by the market forces which allocate capital in the global marketplace. But countries which have erected barriers to the free functioning of this market have found themselves penalized in terms of capital flight, reduced access to international lending and lower credit-worthiness.[17]

Third, there have been major and dramatic changes in comparative advantage of nations and regions. Moreover, changes in comparative advantage are continuing and apparently at a faster pace. Reference has already been made to the emergence of the newly developed countries, primarily of the Far East. Major industries from steel to automobiles to textiles have moved from the older industrialized countries of Europe and especially the U.S. to Japan, and thence to the Republic of Korea, Taiwan, and then on to Brazil and Mexico. One can predict that such industries, which depend on cheap labor and utilize technologies that are not location specific, will continue to be on the move.

Significant resources are being invested in research and development activities oriented to develop comparative advantages vis-à-vis the international marketplace in a large number of forward-looking developing and developed countries. For example, institutional innovations in agricultural research have resulted in the rapid development of thirteen truly international agricultural research centers, focused on assisting developing countries. These centers have developed improved technologies for tropical food crops, which tend to be location specific. Several developing countries simultaneously have strengthened their own capacity for agricultural research. The end result of all of these efforts, in both agriculture, manufactures and services, will be continuing shifts in comparative advantage that will result in significant reallocation of resources among countries and changes in the mix of products and factors within countries. In short, competition in the international economy will become more and more intense and economic integration greater and greater in the years ahead. Those countries which adopt policies to exploit what appears to be a secular change in international specialization will experience substantially greater growth rates and economic progress than those which adopt inward-oriented policies.

A fourth major change documented by Schuh has been the abandonment of the system of fixed exchange rates in 1973. A system of floating exchange rates for the

major currencies of the world has been adopted, with other currencies tied to the major currencies. Many people in both the developing and developed world pay little attention to the value of their currency in foreign exchange markets. However, as trade has expanded and the size of the capital market has burgeoned, the exchange rate has become one of the most important prices in the economy. When this price is modified by overt government policy, the distortions introduced will result in misallocation of significant resources relative to opportunities in the international market. The result, again, will be constrained rates of growth and failure to exploit comparative advantages in the growing international market.

The new international world economy developed quite rapidly during the last 25 years and the rate at which it is growing and maturing appears to be accelerating. The future obviously can not be predicted with much precision, especially in the longer term. The recent, rapid changes in the international economic order presage, however, continuing integration of national economies into the emerging international economy. The end result of a continuing integration would be eventually a world-wide economy, with fully integrated markets. The rate a which such integration will take place probably will quicken, although the process likely will be characterized by spurts and lapses rather than a smooth continuum. The technological changes which have driven the substantial integration on the last twenty-five years can be expected to continue. Certainly the extent technical innovation and resultant international economic integration to date would have been difficult to predict in the early 1950s, when most nations existed quite independently.

One of the most important lessons from recent changes in the international economy is that domestic economic policies are increasingly unable to modify the effects of international market forces with impunity. In short, policymakers are becoming subject to economic forces largely beyond their control as world markets emerge. Those nations which attempt to insulate their economies from these pervasive and growing international economic forces will pay a high price in terms of foregone growth and development. Such attempts will consign them to a low-growth path and may cause them to fall permanently behind competitor nations in the race for greater productivity and market shares. Other more enlightened countries which develop policies to exploit significant investment opportunities inherent in the increasingly rapid integration of the world economy will experience much greater rates of growth. Some can be expected to emulate the recent experience of the newly developed countries.

This is not to suggest that policymakers should not be concerned with moderating the impacts of adjustments as a country moves toward an increasingly open economy. It may be economically rational to implement policies which help to stabilize price fluctuations while recognizing that domestic policy can have little effect on secular price levels determined in the world market place. Commodity price policy is a case in point. While recognizing the advantages of trade at international prices Mellor and Ahmed (Chapter 4) recommend a domestic price stabilization policy for developing countries with commodity prices set in reference to the world price.

The Rest of the Study

The new empirical and conceptual knowledge set forth above--the induced innovation model of agricultural development, the effect of macroeconomic and sectoral policies on agricultural growth, and the emergence of a new global economic order--comprise the principal conceptual foundation for the analyses that follow in the

rest of this study. The next two chapters provide a perspective on agriculture in overall economic development. Chapter 2 presents a review and analysis of Ecuador's macroeconomic and sectoral policies and provides additional evidence on the negative effects of such policies on agriculture. Chapter 3 reviews economic and agricultural growth; assesses how well agriculture has performed in contributing to economic development in terms of production, foreign exchange earnings and nutrition; and analyzes the extent of rural and urban poverty.

Chapters 4 through 12 treat various aspects of agriculture. Chapter 4 considers the role of natural resources in agriculture, the extent of the agricultural frontier, the general causes of environmental degradation and five critical natural resources issues. Chapter 5 focuses on the demographic characteristics of the population, the labor force and employment and the nature and efficiency of intersectoral labor markets. The production milieu, including production trends, an analysis of the sources of growth in crop production, production of illegal substances and use of modern inputs are treated in Chapter 6. Chapter 7 turns to an analysis of the effectiveness and economic viability of public irrigation and related multipurpose projects and the extent and nature of subsidies to irrigation water. Chapter 8 presents a conceptual framework for analyzing agricultural marketing systems, an assessment of major commodity and input market subsystems and an agenda for market system development. Chapter 9 treats the market for agricultural credit, including subsidized credit policies, principal institutions and the effects of an inflationary macroeconomic policy. Chapter 10 analyzes the role of social institutions in agricultural development based on an original data set gathered for the study, with emphasis on the family and gender issues. The mandates and functions of various public sector institutions serving agriculture, public sector expenditures for agriculture and supporting programs of donor agencies are considered in Chapter 11. Chapter 12 describes and analyzes the human capital and science base serving agriculture, including education, research and extension programs.

The findings and conclusions of the various chapters are integrated and synthesized in Chapter 13 which sets forth the principal obstacles to more rapid agricultural and economic development; lists the accomplishments which serve as a foundation for greater progress; presents recommendations for modernizing agriculture and enhancing overall economic growth; and considers the emerging scenario of Ecuador without petroleum around the year 2000.

NOTES

1. This section considers only those general economic development models that heavily stress industrialization and self-reliant development, the dominant policy thrust of Ecuador during the last three decades. For a more comprehensive review of literature on economic development policy, especially as it relates to agriculture see Hayami and Ruttan (1985 Chapter 1); Eicher and Staatz (Chapter 1); Johnston and Kilby; Johnston; and Mellor. This section draws especially on the insights of Hayami and Ruttan (1985 Chapter 1), and Eicher and Staatz (Chapter 1).

2. Rostow's approach led to the development of several growth-stage models in agriculture. See especially Johnston and Mellor.

3. See Hayami and Ruttan (1985 pp. 33-39) for a more detailed review of dependency models.

4. Spraos concludes that there is no evidence of a clear decline in the terms of trade between primary and industrial goods during 1900-1970. He found a declining trend between 1870 and 1930, however.

5. See Whitaker and Schuh for an analysis of the effects of import-substitution industrialization on labor absorption in Brazil.

6. The dual-sector models of both Ranis and Fei, and Jorgenson (1961, 1966) define the agricultural surplus as a shift in the internal terms of trade against agriculture, which indicates that a process of sustained economic growth is underway.

7. This intersector transfer has been referred to as a production squeeze on agriculture (Owen).

8. Such intersector transfers can be realized either through the market or via public policy instruments. An important question for policy makers concerns the effects of transfers made through alternative public actions on the development process, each relative to the pattern induced by market forces. While this is an important issue, it will not be considered here. Rather, the focus will remain on the nature of the agricultural surplus and its importance in the development of the non-farm sector.

9. The degree to which real income of consumers is increased due to decreasing prices of agricultural products depends on two factors. First, the more inelastic the demand for food and fiber, the greater will be the reduction in expenditures as prices fall. Second, the greater the share of the budget of the average consumer spent on agricultural products, the greater the proportional increase in real income from price decreases.

10. Hayami and Ruttan (1985 Part I) and Eicher and Staatz (Parts I and II) each present a substantial review of literature of the role of agriculture in economic development, and of models and theories of agricultural development, as they have emerged and evolved in the post-World War II period. These two references are highly recommended reading for those who want a better understanding of modern economic thought on agricultural development.

11. See Hopper for a classic example from Asia.

12. For example, original models of grain reapers saved critical harvest labor but led to shortages of labor for raking and binding. This induced invention of self-raking reapers and binders (Hayami and Ruttan 1985, pp. 92-93).

13. The subsidies came both from access to foreign exchange at the overvalued rate and from exonerations from tariffs or prohibitions for importation of capital and intermediate goods.

14. The country study teams met together in Washington, D.C. during February 1988 to compare and evaluate their analyses. A list of the individual country studies and their authors is presented in Krueger, Schiff and Valdés (1988 Footnote 1, p. 257). A summary of the studies is made in Krueger, Schiff and Valdés (Forthcoming).

15. The studies for Argentina, Chile and Colombia cited by Valdés are by the same authors as for the World Bank country studies and are precursors of them.

16. Schuh has provided incisive analyses of the effects of changing international economic conditions on the U.S. economy and particularly agriculture in these four related studies. Most of his findings have equal applicability to any nation facing the challenge of adapting domestic economic policies to the reality of the emerging world economy.

17. Conventional wisdom in South America, and certainly in Ecuador, views the United States and U.S. private banks as the dominant force in this market, *a la* the neo-Marxian dependency thesis. In fact, the center of gravity has shifted from the U.S. and Europe to the Pacific Rim countries. Japan now has the five largest banks in the world and their combined assets are over three times greater than the five largest U.S. banks. Citicorp, the largest U.S. bank, has only about 60 percent of the assets of Japan's fifth largest bank (Economist, The p. 6).

REFERENCES

Arndt, Thomas M., Dana G. Dalrymple and Vernon W. Ruttan. 1977. *Resource Allocation and Productivity in National and International Agricultural Research.* Minneapolis: University of Minnesota Press.

Baran, Paul. 1952. "On the Political Economy of Backwardness." *Manchester School of Economic and Social Studies* 20:January:66-84.

Boeke, J. H. 1953. *Economics and Economic Policy of Dual Societies as Exemplified by Indonesia.* New York: Institute of Pacific Relations.

Clark, Colin. 1957. *The Conditions of Economic Progress.* 3rd ed. London: Macmillan and Co.

DeJanvry, Alain. 1981. *The Agrarian Question and Reformism in Latin America.* Baltimore: The Johns Hopkins University Press.

_____. 1975. "The Political Economy of Rural Development in Latin America: An Interpretation." *American Journal of Agricultural Economics* 57:490-99.

Economist, The. 1989. "International Banking: A Survey." 310(March 25):58 ff.

Eicher, Carl K. and John M. Staatz, eds. 1984. *Agricultural Development in the Third World.* Baltimore: The Johns Hopkins University Press.

Evenson, Robert E., Paul E. Waggoner and Vernon W. Ruttan. 1979. "Economic Benefits from Research: An Example from Agriculture." *Science* 205(September):1101-07.

Hayami, Yujiro and Vernon W. Ruttan. 1985. *Agricultural Development: An International Perspective.* 2nd ed. Baltimore: The Johns Hopkins University Press.

_____. 1971. *Agricultural Development: An International Perspective.* Baltimore: The Johns Hopkins University Press.

Hirschman, Albert O. 1968. "The Political Economy of Import-Substitution Industrialization in Latin America." *The Quarterly Journal of Economics* 82:1-32.

Hopper, David W. 1965. "Allocation Efficiency in a Traditional Indian Agriculture." *Journal of Farm Economics* 47:611-24.

Huffman, Wallace E. 1978. "Assessing Returns to Agricultural Extension." *American Journal of Agricultural Economics* 60:December:973.

IICA (Interamerican Institute for Agricultural Cooperation). 1988. *Ajuste Macroeconómico y Sector Agropecuario in América Latina.* Buenos Aires: IICA.

Johnson, D. Gale. 1989. "Retrospective Review of Hayami, Yujiro and Vernon W. Ruttan, 1971, *Agricultural Development: An International Perspective,* Baltimore: The Johns Hopkins University Press." *American Journal of Agricultural Economics* 71:1062-63.