# Ethiopian Development Research Institute:

# Data Systems and Economywide Modeling to Support Policy Analysis in Ethiopia

### Project Proposal

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## A. Acronyms

| | |
|---|---|
| ADLI | Agriculture Development Led Industrialization |
| CBO | US Congressional Budget Office |
| CGE | Computable General Equilibrium |
| CSA | Central Statistical Authority |
| DAG | Donor Assistance Group |
| EDRI | Ethiopian Development Research Institute |
| EEPRI | Ethiopian Economic Policy Research Institute |
| ERS/USDA | Economic Research Service of the U.S. Department of Agriculture |
| FTAA | Free Trade Area of the Americas |
| FTA | Free Trade Area |
| GAMS | General Algebraic Modeling System |
| IDS | Institute of Development Studies, University of Sussex |
| IDRC | International Development Research Centre |
| IEQ | Tunisia: Institut d'Economie Quantitative |
| IFPRI | International Food Policy Research Institute |
| IO | Input-Output |
| ITC | International Trade Commission |
| MDG | Millennium Development Goals |
| MERRISA | Macro Economic Reforms and Regional Integration in Southern Africa: research project based at IFPRI |
| MOFED | Ministry of Finance and Economic Development |
| MOTI | Ministry of Trade and Industry |
| NAFTA | North American Free Trade Agreement |
| NBE | National Bank of Ethiopia |
| NBS | Tanzanian National Bureau of Statistics |
| PRSP | Poverty Reduction Strategy Paper |
| SAM | Social Accounting Matrix |
| SDPRP | Sustainable Development and Poverty Reduction Program |
| UNAIDS | United Nations Program on HIV/AIDS |
| UNDP | United Nations Development Program |
| VAT | Value Added Tax |
| WTO | World Trade Organization |

# 1. Executive Summary

Ethiopia is facing a number of serious policy challenges that call for economywide analysis to support policy makers in their work. Examples of such issues that have arisen recently include:

- Ethiopia will be negotiating entry into the WTO. What would be the impact on the economy of different scenarios concerning entry into the WTO?
- More generally, what would be the impact on Ethiopia of different international trade scenarios, including joining regional trade agreements as well as global liberalization scenarios under the current round of WTO negotiations?
- How can Ethiopia best approach the achievement of the Millennium Development Goals (MDGs), which it has committed to do?
- What specific policies are required by Ethiopia to achieve the MDGs and its own PRSP known as the Sustainable Development and Poverty Reduction Program (SDPRP)?
- What are the potential impacts of different choices of development strategy on economic performance in Ethiopia, including growth and poverty reduction? Is an "agriculture led industrialization strategy" (ADLI) the best approach? What should be the role of expanded international trade in such a strategy?
- What are the potential impacts on Ethiopia of major currency realignments and changes in capital flows that may occur if there are future changes in the world financial system? Potential changes include the emergence of new institutions of macro and monetary coordination within the Asian trade bloc, and realignment of the US dollar in currency markets.
- What would be the impact of changes in the Ethiopian tax system, including the balance among value added taxes, trade taxes, and direct taxes?
- Ethiopia may be affected by global shocks, and may require structural adjustment programs to manage the effective response to such shocks. How can such programs be designed to respond effectively, but also maintain growth and poverty reduction?
- Ethiopia is a large country, with wide regional heterogeneity and income disparities. What is the potential impact on the economy of increased economic integration of factor and product markets, including the impact of improved transportation and communication infrastructure? What are the potential impacts of increased regional and rural-urban migration?
- The Ethiopian government as part of its overall aid harmonization objectives wants donors to commit more assistance as direct budget support rather than through individual projects and other activities. Although there is willingness among several donor countries to funnel more assistance through direct budget support, there are outstanding reservations on fiscal policy estimations and their impacts on achieving the MDGs and the SDPRP. Economy-wide analysis is required to answer some of the specific questions that will be raised concerning the impacts of fiscal policies on the economy and in meeting the various objectives in the SDPRP and hence the MDGs.
- A major interest both for the government and the donor community is the monitoring and evaluation of the SDPRP. The research component of the M&E

will benefit from economy-wide analysis of policies and shocks on household welfare and poverty reduction.

These issues all require economywide analysis, as well as detailed analysis that traces the impact of policy changes and "shocks" emanating from the world economy on the macro economy; the sectoral structure of production, employment, and trade; and finally on household income and poverty. Such multi-level analysis requires a comprehensive approach to data generation and analytic support to policy work.

In policy analysis, there is a converse to Gresham's Law: good numbers drive out bad numbers.[1] Although some policy formulation and debate does not rely on any numbers at all, experience in policy debates covering a variety of issues in a variety of countries supports the conviction that good analysis does matter and can affect policy choices. But to be effective, policy analysts must provide policy makers with relevant, transparent and timely analysis. The methods and models must meet acceptable standards of validation. Credibility in policy debates is greatly enhanced when a variety of different approaches and models are applied and there is a consensus about the results.

The Ethiopian Development Research Institute (EDRI) has established an Ethiopian economywide modeling project that seeks to develop analytic capability to support economywide policy analysis, and is currently preparing the foundation to begin building such models in Ethiopia. The project at EDRI is based on two interrelated strands of work. First, EDRI will cooperate with various government agencies to develop a comprehensive data system that can support policy analysis at different levels. Such a data system is crucial for supporting any policy analysis, from descriptive methods to empirical models. Second, the EDRI will develop the capacity to build and maintain economywide empirical models that can be used by both policy analysts and researchers.

EDRI is approaching this project on sequential basis. The first phase will focus on assembling an economywide data base to support policy analysis—including national accounts, a Social Accounting Matrix (SAM), input-output table, and related micro-focused survey data—and then proceed to a second phase of developing economywide models for policy analysis, including macro-econometric models and multi-sector, input-output and computable general equilibrium (CGE) models. Such models have been used in many countries to support policy analysis. While viewed as separate "phases", these two strands of work will proceed in parallel, with model development and analysis proceeding along with development of new data.

To accomplish this task, EDRI has agreed to collaborate with the Institute of Development Studies (IDS) at the University of Sussex in the United Kingdom. It has also identified about thirty individuals and formed a core group to implement the project at EDRI and IDS. These individuals are drawn from economists and advisors to economic policy makers at the federal level in Ethiopia, as well as from non-governmental think thanks and research centers, institutions, and universities.

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[1] Gresham's Law is stated as: "bad money drives good money out of circulation"—if a monarch debases the currency, people will keep the "good" money and use only the debased currency.

The project duration is estimated to be three years, each with an annual work program. In the first year, starting in 2005, the project team will work with government agencies to build a disaggregated SAM and input-output table for Ethiopia. This data base will support various kinds of analysis, including various multiplier models and CGE models. In years two and three, the data system and modeling capability will be expanded and refined, focusing on research and policy issues identified before the start of each phase. In each year of the project, the annual work program for the project will be set in a process of consultation between the project team and stakeholders, including government agencies. The process will generate a set of research topics that will be tackled in the following year, including establishing a list of deliverables.

Capacity building at EDRI and elsewhere in Ethiopia will be a major focus of the project. This process has already begun with a workshop held on December 9–11, 2004, at EDRI, given by Professor Sherman Robinson from the University of Sussex. This was the first of a series of proposed workshops, which are part of the capacity building effort, focused on the uses and influence of economywide models in development policy analysis. The purpose of the workshop was to strengthen the analytical and practical understanding of policy analysis through the use of economywide models; to familiarize participants with data requirements for economywide analysis, including the SAM and input-output data framework; and to provide background information on how the data system and modeling capability can be established in Ethiopia. Finally, the workshop provided an opportunity to start the process of building a team among participants who are interested in working on the project. In addition, in-house training by EDRI staff is being provided every two weeks to augment the overall training effort. Currently the core group has begun constructing the macro SAM that will be the starting point for both the detailed input output table and micro SAM.

The project team at the IDS will be headed by Professor Sherman Robinson, who is a Professor of Economics at the University of Sussex and is also a research fellow at IDS. Professor Robinson is an international authority in the area of policy-oriented economywide modeling. He has applied such models in many countries to the analysis of policy issues related to international trade, macroeconomic policy, choice of development strategy, inter-sectoral linkages, agricultural development, income distribution, and poverty.

The IDS team will collaborate with EDRI in designing data systems, developing models, and producing reports analyzing policy issues and describing methodologies. There will be continuing contact between IDS and EDRS staff, as well as a series of training workshops, probably three times a year at EDRI, to solidify the capacity building effort. There will also be scope for formal graduate training of Ethiopian researchers at the University of Sussex. Both the Economics Department and the IDS have degree-granting graduate programs in economics and development studies.

## 2. Introduction:

Ethiopia is facing a number of serious policy challenges that call for economywide analysis to support policy makers in their work. Examples of such issues that have arisen recently include:

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- Ethiopia is a large country, with wide regional heterogeneity and income disparities. What is the potential impact on the economy of increased economic integration of factor and product markets, including the impact of improved transportation and communication infrastructure? What are the potential impacts of increased regional and rural-urban migration?
- What specific policies are required by Ethiopia to achieve the MDGs and its own PRSP known as the Sustainable Development and Poverty Reduction Program (SDPRP)?
- The Ethiopian government as part of its overall aid harmonization objectives wants donors to commit more assistance as direct budget support rather than through individual projects and other activities. Although there is willingness among several donor countries to funnel more assistance through direct budget support, there are outstanding reservations on fiscal policy estimations and their impacts on achieving the MDGs and the SDPRP. Economy-wide analysis is required to answer some of the specific questions that will be raised concerning the impacts of fiscal policies on the economy and in meeting the various objectives in the SDPRP and hence the MDGs.

Ethiopia is among the 189 nations that agreed on the Millennium Declaration at the Millennium Summit in 2000, which later was adopted by the United Nations General

Assembly, calling for a holistic perspective on global development. In order to implement the Millennium Declaration, a road map was set out containing eight specific goals that are popularly known as the Millennium Development Goals (MDGs). Among the MDGs, the first goal calls for reducing by half the proportion of people living in extreme poverty. In order to realize the MDGs, the Ethiopian government has formulated policies and strategies under an umbrella of main strategy document known as Sustainable Development and Poverty Reduction Program (SDPRP). Guided by this framework, the government envisages on reducing poverty by half and meeting the MDGs by 2015. However, although the overarching objective of the government's poverty reduction strategy is to reduce poverty by half within the targeted timeframe, it also has to maintain macroeconomic stability and ensure that the economy is growing at least above 6% per annum in real terms until 2015 to reduce poverty by half from its current level. This will require sound economic policies that take into account among other things the likely changes in income distributions, sectoral structure of output, trade, demand, employment, and or prices. Furthermore, the government's strategies must take into account foreign aid and concessional lending from multilateral agencies and show the effects of all government policies, including macroeconomic and structural policies on poverty. This requires analytic tools that can integrate the micro and macro elements of a poverty reduction strategy.

These issues all require economywide analysis, as well as detailed analysis that traces the impact of policy changes and "shocks" emanating from the world economy on the macro economy; the sectoral structure of production, employment, and trade; and finally on household income and poverty. Such multi-level analysis requires a comprehensive approach to data generation and analytic support to policy work.

In policy analysis, there is a converse to Gresham's Law: good numbers drive out bad numbers.[2] Although some policy formulation and debate does not rely on any numbers at all, experience in policy debates covering a variety of issues in a variety of countries supports the conviction that good analysis does matter and can affect policy choices. But to be effective, policy analysts must provide policy makers with relevant, transparent and timely analysis. The methods and models must meet acceptable standards of validation. Credibility in policy debates is greatly enhanced when a variety of different approaches and models are applied and there is a consensus about the results.

The Ethiopian Development Research Institute (EDRI) has established an Ethiopian economywide modeling project that seeks to develop analytic capability to support economywide policy analysis, and is currently preparing the foundation to begin building such models in Ethiopia. The project at EDRI is based on two interrelated strands of work. First, EDRI will cooperate with various government agencies to develop a comprehensive data system that can support policy analysis at different levels. Such a data system is crucial for supporting any policy analysis, from descriptive methods to empirical models. Second, the EDRI will develop the capacity to build and maintain economywide empirical models that can be used by both policy analysts and researchers.

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Analytically, the project will focus on the development of structural models of the Ethiopian economy. Structural economywide models, including multi-sector computable general equilibrium (CGE) models, have been widely used in developing countries to analyze the economywide effects of shocks and policy changes. These models, by design, incorporate more institutional and structural detail than typical econometric models, which usually are specified as reduced form models with weak specification of the behavior of individual actors in the economy. While such macro-econometric models are useful, and will be developed in this project, it is difficult in these models to trace out the links between policy variables and outcomes, and therefore the results are often difficult to explain in terms useful for policy analysis. A mix of modeling approaches thus seems appropriate, with a focus on understanding and quantifying the links between policy choices and economic outcomes.

EDRI is approaching this project on sequential basis. The first phase will focus on assembling an economywide data base to support policy analysis—including national accounts, a Social Accounting Matrix (SAM), input-output table, and related micro-focused survey data—and then proceed to a second phase of developing economywide models for policy analysis, including macro-econometric models and multi-sector, input-output and computable general equilibrium (CGE) models. Such models have been used in many countries to support policy analysis. While viewed as separate "phases", these two strands of work will proceed in parallel, with model development and analysis proceeding along with development of new data.

To accomplish this task, EDRI has agreed to collaborate with the Institute of Development Studies (IDS) at the University of Sussex in the United Kingdom. It has also identified over thirty individuals and formed a core group to implement the project at EDRI and IDS. These individuals will be drawn from economists and advisors to economic policy makers at the federal level in Ethiopia, as well as from non-governmental think thanks and research centers, research institutions, and universities.

Capacity building in Ethiopia is a major goal of the project. Serious capacity building requires creation of an environment where some of the brightest minds in the country can carefully consider critical policy choices, using the best available tools, and then cogently present policy options to decision-makers in government, as well as contribute to the debate on economic policy options within civil society. This proposal seeks to create the mechanisms by which serious capacity in the area of modeling and the use of such models will be encouraged. Moreover, the three-year time frame envisioned in the proposal recognizes the long-term nature of the capacity building process.

Experience leaves little doubt that, while capacity building is hard, it can be achieved. A commitment to capacity building within the Ethiopian government and the donor community is crucial. We believe that this commitment exists, and we believe that significant strengthening of the institutional capabilities of the various governmental, non-governmental, research and academic institutions, from which the participants that

will be trained in modeling under this project are drawn, can be realized by the end of the project duration.

To ensure that the modeling capacity built during the project life continues to develop beyond the three year time frame of the project, systems must be put in place that attract exceedingly bright people to work with the core modeling team that is being trained under this project at the various policy research institutes and government ministries. They can train them in the use of appropriate tools, and place them in positions where their talents can be best utilized. Even though joint analysis of key issues and mentoring will be critical elements within the capacity building process, this proposal does not contain a long list of studies to be performed. Rather, it focuses on strategies, tailored to the context in which policy analysis in Ethiopia can develop to meeting the various developmental goals of the country through well analyzed and articulated policy options.

A viable strategy and commitment from within the Ethiopian Government and donor community in general and EDRI and IDS in particular are necessary preconditions for success. A team of talented and experienced people is necessary to perform the job. This proposal features an excellent technical assistance team with diverse skills and demonstrated personal as well as professional commitments to the economic development of Ethiopia. This team is in focus in this section. Institutional capabilities and management procedures for the technical assistance team are also presented in here. Other areas discussed in this section are the background and some of the challenges faced in providing quality policy analysis in Ethiopia, and a strategy for the development of quality policy analysis. This section also considers the institutional context of the EDRI and IDS and opportunities that should be exploited within this context. Other sections in this document present basic operational plans for the project explaining the various phases and the expected outputs in each phase, uniqueness and complementarity of the economywide modeling project with other modeling initiatives in Ethiopia and experiences of economy-wide modeling in different countries. Finally, we present the budget required for the entire duration of the project separated in phases as an annex to this document.

## 2.1 Background and Challenges:

Policy analysis in Ethiopia currently faces daunting challenges that will not be solved unless policy analysts and economic advisors are equipped with tools to help them analyze and present policy makers with a number of policy options and likely scenarios of various policy decisions. Some of the fundamental challenges are:

2.1.1. Inadequate capacity in almost all federal government ministries and research institutions, and even worse in regional offices, to analyze the economywide effects of policies, the impacts of aggregate as well as distributional impacts of various policy decisions to mention a few.

2.1.2.  A very small pool of qualified economists in Ethiopia in general.

2.1.3. An institutional environment throughout the various government agencies of the country where a continuous series of short-term needs chronically distract from capacity building objectives.

These challenges have a number of rather straightforward implications. For starters, the lack of capacity in modeling in particular and the very thin pool of qualified economists in Ethiopia in general necessarily put the accent on training for existing staff who exhibit high potential and recruitment of young staff with very high potential but relatively little training or experience. The various government ministries that are responsible to analyze and draft policies in the country are highly unlikely to simply be able to hire staff with the desired level of training and experience. Rather, serious capacity building has to take place by identifying individuals with high potential and train those individuals. Some elements of the capacity building effort include:

2.1.4. <u>Make government ministries exciting and professionally stimulating places to work.</u> While government usually cannot offer the highest salaries, it can offer a high quality work environment combined with a sense that the work being performed matters to the economic development of the country. These factors, plus training opportunities, provide powerful incentives that can be used to attract and retain the best people.

2.1.5. <u>Provide time and space for research and learning.</u> Implement a management scheme that permits selected analysts to focus on studies of issues of policy relevance for a defined period of time. Furthermore, there is a need to direct training resources towards the most promising individuals. From the pool of current government staff, each year send the two most promising analysts abroad for long-term degree training at the Masters level. Masters programs at the University of Sussex will be considered first so that opportunities for collaboration with members of the technical assistance team based at these institutions can be capitalized upon. Theses will, of course, be on topics relevant to Ethiopia.

## 2.2. The Team: Institutional and Personnel

The Ethiopian Development Research Institute (EDRI) in collaboration with the Institute of Development Studies (IDS) at the University of Sussex will implement this project. Other institutions, specifically the International Food Policy Research Institute (IFPRI), will in the first instance collaborate in the agricultural and water portions of the model building (including capacity) as well as analysis of the project phases. Sherman Robinson, from the University of Sussex will serve as the head of the project at IDS while Hashim A. Ahmed serves as the coordinator of the project at EDRI. Ultimate decision-making authority for project activities will reside with the Executive Director of the EDRI.

In addition to the core management group, a number of collaborators will assist with project activities. While some collaborators are affiliated with one of the two institutions

that implement this project, individuals affiliated with other institutions have committed to work under the project, contributing specialist expertise. Statements of institutional capabilities are limited to EDRI and IDS. The following sub-sections introduce the core management personnel and present institutional capacity statements for EDRI and IDS at the University of Sussex.

## 2.2.1. Core Management Personnel:

Sherman Robinson from the University of Sussex will serve as the head of the project at IDS. Professor Robinson is an international authority in the area of policy-oriented economywide modeling. He has applied such models in many countries to the analysis of policy issues related to international trade, macroeconomic policy, choice of development strategy, inter-sectoral linkages, agricultural development, income distribution, and poverty. Before joining IFPRI in 1993, he was a professor at the University of California, Berkeley, and also served as a senior staff member at the Council of Economic Advisers in the Clinton Administration and as a visiting scholar at the Congressional Budget Service and the Economic Research Service, U.S. Department of Agriculture.

At IFPRI, he was Director of the Trade and Macroeconomic Division, and also directed a major research project in southern Africa called MERRISA—Macroeconomic Reform and Regional Integration in Southern Africa—with the collaboration of country-based and international research institutions. The country-study component of the MERRISA project aimed to contribute to a better understanding of recent macroeconomic policy adjustments in selected Southern African countries, and of their implications for economic growth and equity. The methodology of the project used both historical analysis and formal economywide; in particular, CGE modeling, with special attention to the links between agriculture and the rest of the economy. The country CGE models incorporated special structural features that better reflected Southern African characteristics, such as own household consumption, non-separability of farm-household consumption and production decisions, informal non-agricultural production and employment, factor-market segmentation, high transportation and transactions costs, government-controlled price on staples such as maize, and quantitative trade restrictions. Each country database was organized into a SAM, with a special emphasis on the agricultural sector and different household groups.

Professor Robinson is in a very special category, both as an academic and as a professional policy analyst. He is one of the world's leading authorities on policy oriented general equilibrium models and he has over the years contributed top quality development research. Finally, he has worked with a wide range of government agencies and bilateral as well as multilateral development institutions, including the World Bank.

## 2.2.2. Technical Assistance Team:

**Sherman Robinson:** Sherman Robinson from the University of Sussex will serve as the head of the project at IDS. Professor Robinson is an international authority in the area of policy-oriented economy-wide modeling.

**Hans Lofgren:** Hans Lofgren is a Senior Economist in the Development Prospects Group at the World Bank. His work is focused on the analysis of long-run development strategies at the country level and their impact on social and economic objectives, including poverty reduction and other targets that form part of the Millennium Development Goals (MDGs). He joined the World Bank in June 2004. Prior to this he was a Senior Research Fellow at the International Food Policy Research Institute (IFPRI). He has conducted several research projects and has published works using economywide models, including SAMs and CGE models. With Rebecca Lee Harris and Sherman Robinson, he developed a "Standard CGE model" at the Trade and Macroeconomics Division of IFPRI. Dr. Lofgren will be participating in the capacity building and analysis of various issues using the models that would be created. His participation will complement his earlier work on Ethiopia's economy and currently work on analyzing the impacts of various government policies on reducing poverty and achieving the MDGs for the World Bank.

**Xinshen Diao:** Xinshen Diao is a senior research fellow at the International Food Policy Research Institute (IFPRI) in Washington DC. She is also a senior researcher in the Ethiopian Strategic Support Program (ESSP) a collaborative project between IFPRI and EDRI. At IFPRI, Diao works on issues related to agricultural development, economic growth, intersectoral linkages, international trade, regional trade integration, and the World Trade Organization. Before coming to IFPRI, she was an assistant professor of applied economics at the University of Minnesota, stationed at the Economic Research Service, U.S. Department of Agriculture. She has also held positions at the World Bank, the Economic Reform Institute of China and the Research Center for Rural Development of the State Council (RCRD), both in Beijing. Currently Diao's research focuses on Markets and Trade: Public Policies Towards Development of Local, Regional, and Global Markets.

**James Thurlow**: James Thurlow is a senior staff at the International Food Policy Research Institute (IFPRI) in Washington DC. His work focuses on single and multi-region agricultural and poverty-focused computable general equilibrium models for countries in the Southern African region.

**Scott McDonald:** Scott McDonald is a reader at the University of Sheffield. He has done extensive work on SAMs in Africa and is currently working on a project in South Africa that involves economy-wide CGE modeling. Professor McDonald is an expert on the UN system of National Accounts (SNA) and on SAMs. In addition, he has with Karen Thierfelder and Sherman Robinson developed a multi-country world trade CGE model using the GTAP data base. The model starts from a standard single-country CGE model, and is designed so that one can fit a good single-country model into the world model framework.

**Hashim A. Ahmed:** Hashim A. Ahmed is an associate research fellow at EDRI and the resident coordinator of the Economy-wide Modeling Project. He is the author of several works on Ethiopia including an analysis of the impacts of Ethiopian land tenure policy using a SAM based CGE model; a study funded by the Institute on Black Life at the University of South Florida. His most recent works include the *Challenges of Democratization and Economic Development is Sub-Sahara Africa*—submitted to the Journal of Political Economy—and *Reconciling Data Using Maximum Entropy Econometric Estimation Techniques*. Ahmed's research interests focus on the analysis of the determinants of growth in developing economies using economy-wide models.

## 2.2.3. Institutional Capabilities:

### The Ethiopian Development Research Institute (EDRI):

The Ethiopian Development Research Institute is an emerging "think tank" engaged in research, training, and consultancies. Founded on August 1999 as a semi-autonomous government development research institute, its research focuses on issues related to macroeconomics, agriculture and rural development, industrial growth, international economics, and human resources.

Linked to the Office of the Prime Minister in Ethiopia, EDRI's mission is to conduct objective and high quality research on the development of the Ethiopian economy to inform policy makers. The goals and objectives of EDRI are to conduct and promote high quality, objective policy research; disseminate the results of policy research; build professional excellence and capacity in socio-economic and policy analysis; develop a policy research responsive to needs of policy makers rooted in a rigorous analysis; create a research agenda that examines both short, medium and long term issues; and finally serve as an effective forum for discussing about development issues among key stakeholders.

Research activities at EDRI are led by some basic principles such as demand driven, objective and independent, participatory and one that promotes partnership among different institutions. In order to achieve the policy research objectives, EDRI implements regular forum of consultation among researchers and users; different training seminars for various groups often drawn from economists and advisors to economic policy makers at the federal and regional levels, as well as from non-governmental think-thanks and research centers, international and academic institutions; various capacity building initiatives for its staff and other pertinent institutions; diversification of its linkage and partnership schemes; and finally adopted entrepreneur governance style.

Some of EDRI's initiated activities include research on Ethiopian Firms Survey; Micro and Small Enterprise Survey; and Agricultural Extension, Adoption, Diffusion and Impact Assessment Survey. It has also conducted various research activities in collaboration with IFPRI including on governance system in three national forests; Assessing the Impact of Policies for Rural Service Provision on Agricultural Productivity, Marketing and Food Security in Ethiopia; Risks, Consumption Preference

and Production Choices of Ethiopian Farm Households; Post Harvest Grain Management Practices and Food Security in Ethiopia: Farmers Perception of Risk, Post harvest Management Choices and its Impacts on Household Food Security; and Demystifying Urban Agriculture: Status Analysis and Policy Implication for Urban Food Security: The Case of Addis Ababa City and Ambo Town in Ethiopia.

EDRI also regularly organizes knowledge forums and conducts different workshops and seminars focused at recent economic problems. With a nearly 50 strong staff, EDRI conducts more research and boasts of publications than most research institutes, governmental or otherwise, in Ethiopia.

## Institute of Development Studies (IDS) at the University of Sussex:

The Institute of Development Studies is one of the longest established and largest centers in Europe for interdisciplinary graduate studies in development issues. From its earliest years, IDS has had a tradition of teaching and training with distinctive emphasis on plural and interdisciplinary study. Furthermore, IDS organizes its research work thematically. This provides a focus, but also allows for interdisciplinary work on cross-cutting issues. Some of the research focus at IDS include governance, globalization, poverty and social policy, health and social change, participation and the environment.

IDS is an internationally-renowned centre for research and teaching on development. Established in 1966, it also hosts many innovative information and knowledge management services. Its research and teaching programs are complemented by a strong team of faculty and staff and its close bonds with the economics department of the University of Sussex.

The Economics Department at the University of Sussex has major research capability in two main areas: (1) trade and development and (2) the empirical analysis of labor markets. These areas encompass the work of about three quarters of the department and represent a number of overlapping activities. The Poverty Research Unit at Sussex (PRUS), based in the Economics Department, has a central role as a focus of research efforts within the department, and there are also close links with other institutes base at the University: the Sussex European Institute (SEI), the newly established Migration Research Centre, and the Institute for Development Studies (IDS).

Faculty in the trade and development group, including staff associated with the SEI and the IDS, have generated considerable external research funding, assumed the editorships of two major journals (*Journal of Common Market Studies* and the *World Bank Economic Review*), engaged widely in public policy debate and official training programs, and published widely. Work by Sussex faculty on the regulation of international trade, the world trading system, regional trading arrangements and international aspects of migration is widely recognized internationally. For example, Alan Winters has temporarily left his professorship at Sussex in order to serve as Director of the Development Economics Group at the World Bank. Sussex is also a leading center for research on trade and poverty, including gender dimensions. The addition of Professor

Sherman Robinson to the staff strengthens the department's capabilities in these areas. Finally, both the IDS and the Department of Economics at the University of Sussex have thriving post-graduate programs at both the Masters and PhD levels.

## 2.2.4. Collaboration and Core Project Team:

There are several institutions and government ministries that directly collaborate on this project. Furthermore, the core project team members (see first annex), come from these ministries and institutions. Thus, the project not only has strong administrative and other forms of support from the various government agencies and institutions, but also most of these government agencies and institutions involved are direct beneficiaries (in terms of the capacity building effort) and consumers (in terms of the models and analysis) of the project's outputs. There is therefore a strong link between these agencies and institutions and the project. This is further exemplified by the high level advisory board for the project that comprises most of the ministries and institutions involved in the project. The advisory board and its roles are presented in a separate section in this document.

This project also benefits from a special collaboration and relationship with the International Food Policy Research Institute (IFPRI). As mentioned earlier, IFPRI supports this project mainly and in the first instance in the agricultural and water sectors of the project's endeavors, although it is entirely conceivable that other areas of collaboration might come up as the project progresses.

IFPRI is a prestigious international agriculture research institute with a bold vision of a world free of hunger and malnutrition. It is a Future Harvest Center supported by the Consultative Group on International Agricultural Research (CGIAR), a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural Centers that work with national agricultural research systems and civil society organizations including the private sector.

IFPRI's mission is to provide policy solutions that cut hunger and malnutrition. To achieve this mission, IFPRI's research focuses on identifying and analyzing alternative international, national, and local policies for improved food security and nutrition, with an emphasis on low-income countries and poor people and on the sound management of the natural resources base that supports agriculture; contributing to capacity strengthening of people and institutions in developing countries conducting research on food policies; and actively engaging in policy communication, making research results available to all those in a position to apply or use them, and carrying out dialogues with those users to link research and policy action. Through its policy analyses, which are of broad relevance to the developing world, IFPRI directly supports developing-country policymakers, nongovernmental organizations (NGOs), and civil society in their efforts to help the poor. In addition, the Institute's published research indirectly affects policy changes through opinion leaders, donors, advisers, and media who influence national and international decision-making. IFPRI conducts food policy research and disseminates it through four research and outreach divisions, a communications division, and the 2020 Vision initiative.

Ethiopia is among the developing countries IFPRI has an in country presence and robust relationship. This came about when it was requested by the Ethiopian government in January 2003 to develop a Strategy Support Program, based at EDRI in Addis Ababa, to provide research and knowledge support to the implementation of Ethiopia's agricultural development strategy. Under this program, IFPRI has carried out several research endeavors that directly complement this project and thus enhance the quality of policy analysis in Ethiopia. A multi-market model has been developed by Xinshen Diao focusing on agriculture and spatial disaggregation. This model includes 34 detailed agricultural commodities/sectors and two aggregate non-agricultural sectors, industry and services. In the model, incomes are endogenously determined by production side and prices for non-traded goods are determined by market clearing conditions. However, due to data constraints, the model does not include input-output tables, and the sector linkages in production are through cross price elasticities in supply functions by sector, while the backward consumption linkages are fully captured by the consumer demand function for each good, which is the same as in a CGE model. With such shortcomings, the model has its significant advantages in terms of sector and spatial disaggregation. Furthermore, not only does the model include much more detailed agricultural sectors (34 in total), but it also explicitly includes 56 zones in both production and consumption of each good. The zonal level income generated from zonal level production is further linked to household level data and hence poverty analysis can be conducted with growth analysis. Thus, this project will enormously benefit from this multi-market model in the process of developing a national input-output and micro SAM for Ethiopia and also use either the model itself or versions of it in the development of a CGE model that will be based on a fully disaggregated SAM database.

In addition to the nearly completed multi-market modeling analysis by Xinshen Diao, IFPRI has recently initiated, under the direction of the Strategy Support Program's national advisory group, a research project to be undertaken over 2005 on agricultural-nonagricultural linkages, which is extremely useful for building an input-out put and SAM models and the CGE modeling work the EDRI/IDS project is currently undertaking.

In conclusion, there are obvious areas of complementarities and collaboration between this project and IFPRI. This collaboration will be further facilitated by the personal knowledge and good working relationships the technical assistance team members have with each other and the already existing administrative framework between IFPRI and EDRI.

## 3. Project Objectives:

The main objectives of this project are: (1) to construct a data system to support economywide policy analysis; (2) to create various structural economywide models that can be used to analyze the economywide effects of policies; and (3) to build local capacity to create and maintain such models in the future, and use them for policy

analysis. Despite the widespread use of such models in many countries for analyzing a wide range of policy issues, such models are not used in Ethiopia.

## 3.1. General Objectives:

The project aims at achieving the following general objectives:

3.1.1. To construct a data system to support economywide policy analysis, including assembling in an integrated SAM framework: national accounts data, input-output tables, trade data, government accounts, and related survey data.

3.1.2. To create and strengthen analytical and practical understanding of policy analysis through the use of economywide models among policy analysts, academics and the research community

3.1.3. To familiarize policy analysts, academics and the research community with various models such as SAMs, Input-Output, and CGE models and their uses in policy analysis.

3.1.4. To provide capacity building on how models can be constructed and used in Ethiopia through a series of workshops and training seminars to various groups drawn from economists and advisors to economic policy makers at the federal and regional levels, as well as from international, non-governmental and academic institutions.

## 3.2. Specific Objectives:

The specific objectives of this project are within the framework of the overall general objectives and goals and the policy of the Ethiopian government as embodied in the Sustainable Development and Poverty Reduction Program (EDPRP). These objectives are:

3.2.1. To create models that will be used to provide relevant and timely policy analysis and support the government in its endeavors to meet the challenges of the Millennium Development Goals (MDGs) of 2015.

3.2.2. To build structural economywide models in Ethiopia through well articulated and structured phases, and use these models for policy analysis

3.2.3. To create models that link values of policy variables to economic outcomes of interest to policy makers and useful in policy debates.

3.2.4. To provide a diversity of approaches in the current policy analysis practice. Validating results from policy models is greatly strengthened by analysis using a variety of models and at different levels of aggregation. Such diversity tests the robustness of the results and the importance of assumptions made in the various approaches.

3.2.5. To build local capacity such that such models can be built and updated in the future. In this respect, although various workshops and training seminars will be given to participants drawn from economists and advisors to economic policy makers at the federal and regional levels, as well as from international, non-governmental and academic institutions, the project's specific objective calls for forming a core group that will be intensively trained on building, updating and using such models in Ethiopia. This process has already began at EDRI with fifteen individuals drawn from economists and advisors to economic policy makers at the federal and regional levels, as well as from non-governmental think-thanks and research centers, international and academic institutions. Thus, by the end of the project duration, there will be a serious local capacity to model and analyze policies using models.

# 4. Project Design

## 4.1. Project Strategy

To accomplish the tasks setout in the objectives, two parallel approaches are suggested. First, in order to create the models themselves, a core modeling team of over thirty people has been formed. These individuals will gain intensive hands-on training on data manipulation and acquire the necessary computational skills needed to create and update all the proposed models. It is currently planned and has already started for the core group to meet every two-three weeks to discuss various issues around specific assignments and tasks.

Developing a data base to support modeling and policy analysis starts with the development of a macro SAM for Ethiopia, using national accounts data. This aggregated SAM provides the data framework for incorporating disaggregated input-output data and detailed data on government accounts, trade, and the distribution of income to household groups. The core modeling team gets technical support, reading materials, and practices on using a programming language known as the General Algebraic Modeling System (GAMS), on which the models will be simulated.

Second, a series of seminars and workshops will be given at the Ethiopian Development Research Institute's (EDRI). This will help create general awareness and interest in such models and on how to create, update and apply them. Furthermore, the core group will meet several times a year with the technical team and including on an un planned short notices to help solve outstanding technical difficulties. There will also be several trips between Addis Ababa, London, and Washington to discuss on methodology and strategies to accomplish different tasks.

Capacity building will be further supported by sending team members to the University of Sussex for extended training mainly for the one year and two years intensive masters programs. Under this scheme, up to two students a year could be supported during the duration of the project.

Finally, the project presents an ideal environment for research collaboration between Ethiopian researchers with researchers from the various institutions that will be involved in this project even long after the project has ended. This will further strengthen the overall objectives of this project.

## 4.2. Project Management

The project will be managed by a team consisting of the two institutional project directors at EDRI and IDS. Each institution will have an overall project budget and an annual work program set at the beginning of each project year. The project team will meet at the beginning of each year of the project to set the work program for the next year (including specifying deliverables), establish research priorities, and review progress.

The EDRI and IDS will establish a project advisory committee which will meet annually to advise the two institutions on project design and annual work programs, and to review progress, including reviewing project outputs. The composition of the advisory committee will include representatives of major stake holders, including Ethiopian government agencies, and external advisors from international research institutions and universities. Interested parties from civil society and donor agencies will also be included, as appropriate.

## 4.3. Stakeholder Roles: National Advisory Committee

The Data Systems and Economy-wide Modeling project will be formally guided by a high-level National Advisory Committee composed of key stakeholders and potential consumers and beneficiaries of the project. Some of the suggested members include:

- The Executive Director of the EDRI
- The Director of the IDS
- The Minister of Internal Revenue
- The Minister of Trade and Industry
- The Minister of Finance and Economic Development
- The Minister of Agriculture and Rural Development
- The Director of the Ethiopian Economic Policy Research Institute
- Governor of the National Bank
- The President of the Centre for Human Environment and Development-a local NGO
- Members of the DAG
- Members of the Economics Department of the Addis Ababa University
- Director of the Central Statistical Authority

In addition, other committee members may include regional level policymakers and civil society. The specific role and tasks of the national advisory committee are:

- to discuss priorities of the program
- to provide feedback on the progress of the program

- to review and evaluate the work plan of the program
- to facilitate collaborative linkages and partnerships with the respective members' institutions

An inaugural meeting of the national advisory committee will be held with a short time to agree on the direction and structure of the program. The inaugural meeting will also address the program of work for the first year. Following this, the advisory committee will meet on annual basis to review progress and to advise on the work plan.

## 5. Project Output

The project output will be measured on three separate phases.

### 5.1. Phase One

Phase one will start in 2005 and, during this period, the core group will build a disaggregated SAM and Input-Output table that the SAM will also utilize. Once these data sets are completed, various SAM and input-output multiplier models will be generated and analysis will begin on the performance of the Agriculture Development Led Industrialization (ADLI) policy, the Value Added Tax (VAT) regime and its economywide impact, Ethiopia's prospects to join the World Trade Organization (WTO) and on the various reforms that Ethiopia will be demanded to implement through the bilateral and multilateral negotiations and their impact on various sectors of the economy and households. In short, at the end of phase one, tools will be available to analyze various policies and their impact on the overarching goal of the government to meeting the MDGs.

Two major outputs at the end of phase one will be the publication of an Input-Output table and a Social Accounting Matrix that will also incorporate the IO table for Ethiopia. In addition to these two models, various SAM multipliers will be available for policy analysis. These results will be within the public domain and anyone can use them to analyze any desired policy or academic objectives. The publications will contain several chapters that will introduce the background of the model construction project, the concepts and compilation of the models, and on sources and methods. These publications will present individual parts of the model construction, coverage, statistical sources, calculation methods, and preliminary results as well as final results after balancing the square matrix. These publications will contain detailed chapters on a relatively new and sophisticated balancing technique called entropy. The mathematical intuition behind entropy as well as the balancing process using the General Algebraic Modeling System (GAMS) programming language will be described and the programming code will be presented as an appendix.

On the capacity building front, at the end of phase one, members of the core group will have the technical know-how to build and update both IO tables and SAMs in Ethiopia. This will be a significant achievement and will enhance the quality of policy analysis in Ethiopia.

## 5.2. Phase Two

Phase two of the project, continuing for a year, will start in 2006 and will focus on building CGE models that will also utilize the SAM as database. Initially confined to universities and research institutions, CGE models today are routinely used by governments in policy formulation and debate. Modeling capacity, either in government agencies or policy research institutions can be found in several countries around the world. CGE models by design incorporate more institutional and structural detail, and thus will be an invaluable tool to analyze a host of policy issues including trade policies, public finance, structural adjustment policies, and income distribution. Furthermore, since CGE models provide analysts with a laboratory controlled simulation experiments; various mixes of policies in various second best environments can be explored and analyzed. In the end, the results of these analyses will provide a combination of various policies to reduce poverty and answer various interesting questions on say, how would the poor have fared in either the absence or presence of a policy or a combination of policies.

Due to the complexity of CGE models, an entire year will be needed to train on building and using such models. At the end of phase two, the CGE model for Ethiopia will be available and again this model will be within the public domain. Furthermore, various research endeavors will be undertaken analyzing a host of issues mentioned above. Some of the research using CGE models will be completed by the end of phase two and will be available for policy makers and the general public.

On the capacity building front, at the end of phase two, members of the core group will have the technical know-how to build CGE models in Ethiopia. By any standard, this will be a significant achievement and will enhance the quality of policy analysis in Ethiopia.

## 5.3. Phase Three

Phase three will start in 2007 and will largely focus on effective utilization of these models. There are various cases where models have been abused by forcing them to analyze issues for which they are not designed. The domain of applicability is a crucial issue that needs focus and training. A notable example where structural models, particularly complex models like CGEs, have been misused in policy debates is in the case of a national debate about South Africa's fiscal deficit. Gibson and Seventer (1994) published a column in the newspaper where they described simulations with their CGE model of South Africa that revealed that a slight increase in the fiscal deficit would increase the GDP growth rate. It turned out that this result was achieved by assuming that public spending crowds in private spending. However, the critical parameter that determines the extent of crowding in (the effect of pubic spending on private investment) was assumed to be quite large in the Gibson-Seventer model, with almost no empirical evidence to substantiate the assumption. It was not surprising, therefore, that they obtained this unusual result. Inasmuch as there were several models of the South African economy engaged in the debate, and the Gibson-Seventer model was alone in showing a positive GDP growth effect of an increase in the fiscal deficit. Phase three will see

publications on various issues of interest to policy makers and the international community.

In the course of the three phases, various policy issues will be analyzed with the aim of supporting the overall policy making process in the country. In the meantime, capacity on modeling and the effective use of models will have been built in the country as well. The effective completion of the project will certainly elevate the quality of policy analysis in Ethiopia and will help sharpen and focus policy debates. Thus, it will make it more plausible for Ethiopia to achieve its stated goal of meeting the MDGs by 2015 through the effective use of well analyzed policies.

## 6. Expected Benefits of the Project

Some of the expected benefits of the Ethiopian Economywide modeling project are:

**a.** Policy analysis requires on identifying the winners and losers from proposed policy changes. Thus, policy analysts need tools to identify who is affected by policy changes in order to understand the tradeoffs between distributional and aggregate impacts. For policy analysis, tracing out the impacts of shocks on changes in the structure of production, trade, and employment is at least as important as generating aggregate welfare measures. The availability of economywide models provide policy analysts with a simulation laboratory that support individual, controlled experiments, where empirical results from such models are explained in terms of parameters, structural data, and behavioral specification. The economywide modeling project seeks to create models like CGEs that can accomplish such tasks.

**b.** The overarching objective of the Ethiopian government's poverty reduction strategy is to reduce poverty by half and meet the MDGs challenge. However, it also has to maintain macroeconomic stability and ensure that the economy is growing at least above 6% per annum in real terms until 2015 to reduce poverty by half from its current level. This will require sound economic policies that take into account among other things the likely changes in income distributions, sectoral structure of output, trade, demand, employment, and or prices. Furthermore, the government's strategies must take into account foreign aid and concessional lending from multilateral agencies and show the effects of all government policies, including macroeconomic and structural policies on poverty. This requires analytic tools that can integrate the micro and macro elements of a poverty reduction strategy. Through the successful implementation of the Ethiopian economywide modeling project, such tools will be available for use in the country.

**c.** Simply put, the successful completion of the economywide modeling project will enhance the quality of policy analysis in Ethiopia and create local capacity to sustain beyond the life of the project. By any standard this will be a significant accomplishment for any country in the world.

**d.** Input-Out put tables are often the bases for more extended models. For instance, Social Accounting Matrices (SAM) are simply extensions of Input-Out put tables, filling in the links in the circular flow from factor payments to household income and back to demand for products. And the development of SAMs will facilitate the means to create more complex models like the CGE models which are always based on SAMs. Thus, the creation of an Input-Out put and SAM models for Ethiopia will provide the bases for the creation of other models that can be used for policy analysis purposes.

**e.** Since economywide models like Input-Output and SAMs are important analytical tools for analyzing the structure of production and consumption in an economy, they will provide planners and policy analysts to know what part of the output of a sector is consumed as intermediate product and what part is left for final consumption. Such information is essential in the process of appropriate policy formulation.

**f.** A Social Accounting Matrix contains much useful information and provides a link with, and is, a statistical framework for a national accounting system. Because of the importance of SAMs in many applications of economic policy, it is vital to have an accurate and reliable database. In many ways, this project helps in the improvement of statistical data.

**g.** The various workshops and seminars the project will organize will help create interest and build local capacity on how to construct, update and apply structural models for policy analysis purposes.

# 7. Uniqueness and Complementarity of the Project

Currently economywide models are also being built for use at least in three different institutions in Ethiopia; the National Bank of Ethiopia (NBE), the Ethiopian Economic Association (EEA), and MOFED. How is it then that the EDRI economywide modeling project different from these attempts at the aforementioned institutions? And more importantly, even if the EDRI project is unique to these other attempts, why then is it better to have several modeling approaches rather than one large model? After all, there is only one economy; so why have more than one model?

## 7.1. Uniqueness of the Project

Currently, the various economywide models being built by at least the three institutions are fundamentally macro-econometric models, which are inherently different from the structural economy-wide models being proposed and built at EDRI.

Macro-econometric models by nature are reduced form models that are mainly used to analyze the causal effects of variables utilizing the notion of ceteris paribus analysis. In most tests of economic theory, and certainly for evaluating public policy, the policy analyst's goal is to infer that one variable, say education, has a causal effect on another variable, such as worker productivity. Simply finding an association between two or more variables might be suggestive, but unless causality can be established, it is rarely compelling. The notion of ceteris paribus, which means other relevant factors being equal, plays an important role in causal analysis.

The macro-econometric models currently built at the three institutions mentioned above will be looking for a ceteris paribus solution and largely be used to analyze the changing behavior of economic agents. There are two areas of primary interest for policy analysts, the short term business cycle analysis and forecasts and the aggregate and the distributional effects of policies as well as their medium to long term time horizon effects on growth and poverty.

Macro-econometric models are needed as instruments for short term business cycle analyses and forecasts. They are often demand driven, although newer models have lately been developed to incorporate important characteristics such as the integration of demand and supply side modeling. Macro-econometric models provide a framework for such analyses that allows to embed partial relationships into a general structure and to analyze the interaction of different relationships. At the same time econometric models are tools that allow generating quickly quantitative forecasts that can be used in further analyses.

The EDRI models are structural economy-wide models that will be used to analyze the aggregate as well as distributional impacts of a policy or combination of policies. The models also provide the medium and long run effects of proposed policies on growth and poverty. In this sense, the EDRI models are not only different from the macro econometric models being built at the other three institutions, but they are also uniquely suited to analyze the impacts of a policy or combination of policies on fulfilling the MDGs.

## 7.2. Complementarity of the project with other modeling projects

The introduction of various policies towards meeting the MDGs and the increasing economic integration with the rest of the world that might be made possible through Ethiopia's accession to the WTO, will represent changes in the structural framework of the economy that may induce some changes in economic behavior. When considering such facts, from a methodological point of view, structural breaks in the relations of macro-econometric models are possible, that is changes in the form of the structural relations and in the corresponding parameters that are used to describe the behavior of economic agents. This leads to the question of what are the chances to capture these changes appropriately in a macro-econometric model and to derive meaningful statements from such a model with regard to the economic process given the changes in the framework.

Whether this is possible or not depends crucially on the dimension of the structural breaks and on the possibilities to infer from observations from past relations that are relevant in the new framework. For model building, this implies the question of whether there are stable structural relations that are also valid in the new framework and in which way the changes in the framework will affect the economic processes. If it is possible to capture these relationships in a model, at least in principle predictions can be made with regard to the effects of the structural changes.

Precisely because of the above reasons, structural economywide models are often desired to analyze the economywide effects of policies since such models by design incorporate more institutional and structural detail than reduced form macro-econometric models. The major argument in favor of structural models like the CGE is that reduced form models do not take into account the economywide effects of policies. That is, they typically do not incorporate explicit links between policy variables and economic outcomes. In the event that they do, the reduced form structure of such models makes it difficult, if not impossible, to identify the underlying structural relations among various actors in the economy. Hence it is difficult to trace out the links between policy variables and outcomes and therefore the results obtained from such models are often difficult to explain.

Like in most other countries where successful policy analysis is performed using several models, in Ethiopia, both macro-econometric methods and more disaggregated structural approaches to policy analysis must be used to analyze economic policies and to prepare short term forecasts. Besides short term analyses of the business cycle, there is also a need for medium and long term estimates of economic growth. In many cases the medium and long term effects of policy measures and of changes in the economic framework are more important than the short run impact and as a consequence policy analyses need to assess these effects. In addition, medium and long term forecasts are needed as a basis for more detailed analyses of structural changes for example over industries or on the regional level. Thus, the various models being built in Ethiopia, including that of EDRI's complement each other and in the end improve the quality of policy analysis in the country.

## 7.3. The need to use several models:

John Maynard Keynes in a letter to Roy Harrod in July 1938 wrote: *Economics is a science of thinking in terms of models joined to the art of choosing models which are relevant to the contemporary world.*

But there is an important prior question: why bother with models at all? Could policy judgments not simply be based on observation of current economic developments, in the light of lessons from past experience of how the economy works? That is indeed the basis for policy judgments, but making them without the aid of models would be extraordinarily difficult, if not impossible, especially if the goal is to maximize the effects of policies on poverty reduction and growth. The lessons of past experiences are by no means immediately—if ever—clear, nor is it easy to gauge how the economy might be operating differently now from how it has done in the past.

But why then is it better to have several modeling approaches rather than one large model? After all, there is only one economy; so why have more than one model? There are three reasons, all of which are based on the fundamental point that economic models are tools that help to solve economic problems by way of judicious simplification. The first reason is that different problems call for different tools. For example, from a policy making perspective, it is important to take into account the effects of a given policy proposal among other things, its impact on income distributions, sectoral structure of output, trade, demand, employment, and or prices. Furthermore, in the case of a least developed country like Ethiopia, the government's strategies must take into account foreign aid and concessional lending from multilateral agencies and show the effects of all government policies, including macroeconomic and structural policies on poverty. This requires analytic tools that can integrate the micro and macro elements of a poverty reduction strategy. Macro-econometric models are not usually designed to assess issues of these kinds, which have detailed microeconomic and supply-side implications. Therefore, separate tools must be employed in their analysis.

Second, models are deliberate simplifications, but for any given problem it is usually not obvious how far to simplify and how much to abstract from. One aspect of this concerns the level of aggregation. Should demand be analyzed as a whole, or split into consumption, investment, government spending, exports and imports? Should the manufacturing and services outputs be separated? What is the appropriate level of disaggregation for the purposes of analyzing a given policy option and its impact on say inflation and or growth?

Pluralism involves running several complementary approaches in parallel. Thus alongside macro-econometric models being built at the aforementioned institutes, there is a pressing need to build and use more disaggregated structural economy-wide models that can be used to analyze policy questions that are impossible to analyze through the use of macro-econometric models.

The third broad reason for the pluralist approach to modeling concerns the issue that is sometimes simplistically expressed as 'theory versus data'. Most mainstream macro-econometric models assume on theoretical grounds a set of basic long-run economic relationships—for example, between consumption, income and wealth. The parameters of those relationships, and their short-run dynamics, are then econometrically estimated on the basis of past experiences. This approach can be criticized from two opposing directions.

One line of criticism argues that macro-econometric models can sometimes be unreliable as a basis for policy evaluation. This is because their estimated relationships reflect a composite of deeper structural relationships e.g. deriving from the fundamentals of preferences and technology, and the way that expectations are formed. Should any of these features of the economy change, it may be difficult to predict how the parameters of an estimated model would alter. One strand of this argument—the Robert Lucas (1976) critique—argues that the estimated relationships of macro-econometric models will no

longer hold good if the policy regime changes, because expectations are likely to depend on the regime. For example, the behavior of nominal earnings growth in recent years may have been altered by the introduction of inflation targeting as the framework for monetary policy.

The empirical importance of the Lucas critique is a matter of debate. But to mitigate these effects, however, other structural models like the CGE are used both as a way of validating and improving policy analysis. In the event where building CGE models are difficult for a variety of reasons, including lack of capacity and or data, macro-econometric models have been modified to include some structural features. The second line of criticism argues that too many unproven theoretical assumptions are used in building macro-econometric models.

What ever the theoretical arguments, the case for using both approaches in parallel is not only simply a prudent practice in an uncertain world to try different perspectives, but it is also that the complementarities between approaches can be usefully exploited. For example, structural models can be especially helpful when there is reason to believe that structural economic change has occurred, and so they may be used to guide adjustment to the macro-econometric models' equations. Furthermore, they can also help to diagnose the sources of shocks that have affected core model relationships.

To conclude, there are three broad reasons for a pluralist approach to modeling. Different problems call for different tools; it is useful to work at alternative levels of disaggregation; and it is helpful to employ several modeling methods that vary in terms of how much theoretical structure is placed on data-based estimation. These cases make a compelling argument that the EDRI economywide modeling project meets a pressing need in Ethiopia.

## 8. The Implications of the Project on Policy Analysis in Ethiopia

How does one know the impacts of various policies on households' welfare and if at all such policies are effective in accomplishing their desired goals? Policy analysis requires on identifying the winners and losers from proposed policy changes. Thus, policy analysts need tools to identify who is affected by policy changes in order to understand the tradeoffs between distributional and aggregate impacts. For policy analysts, tracing out the impacts of shocks on changes in the structure of production, trade, and employment is at least as important as generating aggregate welfare measures. Economy wide models provide policy analysts with a simulation laboratory that support individual, controlled experiments, where empirical results from such models are explained in terms of parameters, structural data, and behavioral specification. In policy analysis, it is crucial to decompose any policy results through the use of controlled experiments to determine the empirically important causal chains at work.

The goal of this project, besides capacity building, is to develop better and broad-based tools that will be used to analyze various policy scenarios including on specific policies required by Ethiopia to achieve the MDGs and its own PRSP known as the Sustainable

Development and Poverty Reduction Program (SDPRP). Along this issue, the family of models being developed by this project can also be deployed in effectively monitoring and evaluating the SDPRP and the Millennium Development Goals.

The development of economy-wide models is a data-intensive process that focuses attention on the capacity of the statistical system to deliver the data. It provides an important opportunity not only to identify the demand for data at such a low level of disaggregation, but also to highlight areas where investment and improvements are needed. The model building process also emphasizes data quality and requires an assessment of the different data collection systems and processes. It demands a comprehensive approach, requiring information and analysis at the level of the macro and micro economy for individual sectors, including both productive and social sectors, and at the household or individual level. Examining data sources and undertaking such a comprehensive analysis can help to identify gaps in coverage and inconsistencies in data series, highlighting instances of duplication and waste of resources devoted to data collection. Thus, the project will help strengthen the data collection system and enhance the broad and fast dissemination and usage of data to prospective users.

The project aims at institutionalizing the entire process of model building and policy analysis using models such that it will continue well after the project's lifetime. One way of achieving this aim is by appropriately allocating division of labor and provide training along such divisions among the various government agencies and institutions involved in the project, starting from data production at the CSA to the National Accounts department at MOFED which will construct and update the national IO/SAM, all the way through the building of CGE and econometric models by the macroeconomic policy and management department of MOFED that is currently entrusted to construct such models in Ethiopia. Other users such as the welfare monitoring units and planning departments at MOFED, the National Bank and other government ministries and research institutions in the country can use such models for policy analysis purposes. In the end, this will create the necessary and enabling environment to solidly support analysis both qualitatively and quantitatively at low levels of aggregation on effectiveness of proposed policy options, welfare outcomes and inputs of already implemented policies as deemed necessary, via new data collection, integration of existing data and advanced analysis of all available data using sophisticated models such as those proposed in this project.

## 9. Regional and Global Implications: Including the SAM and IO Models into the GTAP Database

Trade liberalization is increasingly viewed as essential for economic growth. However, the impact of trade liberalization on poverty reduction remains unclear and there is concern that it may increase poverty, at least during a transition period, as liberalization causes shifts in the structure of trade, production, and employment that will involve sectoral job losses as well as gains. The impact assessment of trade liberalization on poverty must be done on a case-by-case basis. It is important, however, to consider the

impact on Ethiopia of global trade liberalization, which will occur whether or not Ethiopia undertakes liberalization.

To analyze such effects, researchers have created the GTAP (Global Trade Analysis Project) data base that details global trade flows and comparable national SAMs, linked in a global CGE trade model. Within this framework, researchers can analyze a wide range of concrete policy scenarios and trade liberalization simulations by altering or adjusting elements of the model and data.

Ethiopia is not currently part of the GTAP data base. The project would undertake the task of adding an Ethiopian SAM to the world GTAP data set, which would then support analysis of the impact on Ethiopia of different regional and global trade scenarios.

## 10. Impact of Economy-wide modeling: country case studies

Stories about the impacts of economy-wide modeling research on poverty alleviation and food and nutrition security via the policy reform process are worth examining because there is a continuing need to justify investment in an applied policy research program such as EDRI's economywide modeling project. Thus, the following specific country experiences and the influences and impacts of economy-wide models are presented.

### China

Two recent CGE papers have already had a significant impact in China. The first paper, *How China's WTO Accession Affects Rural Economy in the Less Developed Regions: A Multi-Region, General Equilibrium Analysis.* Diao, X., S. Fan, and X. Zhang. 2002; is one of the earliest to focus on the regional impact within China of its WTO accession and was presented at a conference in China just after the country finalized its agreement to join the WTO. TV and newspaper media covered the story, and the findings of the study were relayed to Chinese President Jiang Zemin during a post-seminar meeting. The paper stressed the need for more growth-enhancing investments in rural education and agricultural R&D in western provinces to ensure that incomes of poor farmers in those regions would not decline following the opening up of China's food markets to more imports.

Another paper, which combines sectoral econometric estimations with economy-wide CGE modeling to account for sources of growth in the Chinese economy by focusing not only on input and technology changes but also structural changes (thereby, as a by-product, adding to the growth accounting literature). The results have been widely cited in China, most notably by the influential economist Hu Angang in his *China Regional Development Report 2002*.

### Latin America

With the active encouragement and financial support of UNDP, various projects have been undertaken in recent years in compiling SAMs and constructing CGE models for 18

countries in Latin America. Each has a micro-simulation model so as to be able to show the effects of macroeconomic changes and reductions in trade barriers to goods and capital flows on growth, inequality, and poverty. Following a recent conference in Buenos Aires, the papers reporting these models have been published as a book.

Meanwhile, numerous training sessions and workshops have been held in the region and participants and other stakeholders have been able to access outputs from this project via its website at www.undp.org/rblac/drafts. The availability of these 18 models has already begun to generate a stream of research activities by local and international institutions as well as by the regional government bodies to examine the likely effects of regional trade agreements and development strategies on growth and poverty in various countries of the region.

An important feature of this project was its strategy to ensure the participation of a high number of prominent analysts from the best institutes, who would be in a good position to use the models or variants thereof that they themselves developed to analyze a variety of policy options. These analysts include Mario Arana, Nicaragua's Minister of Commerce; Daniel Ortega of the Office of the Chief Economist in Venezuela's National Assembly; Jairo Nuñez, Colombia's Vice Minister of Social Protection; Alonso Segura of Peru's Ministry of the Economy and the IMF; Jose de Gregorio, Chile's former Minister of the Economy and now Director of the Central Bank; Wilson Jimenez and Rodney Pereira, head of the Unidad de Análisis de Políticas Sociales y Económicas (UDAPE) and Bolivia's Minister of Finance. Other's included José Antonio Ocampo of Colombia, Director of the U.N. Economic Commission for Latin America and the Caribbean (CEPAL). In addition, Ricardo Paes de Barros, Chief of Poverty Research at the Instituto de Pesquisa Econômica Aplicada (IPEA) in Brazil, published an influential paper based on standard CGE model to estimate the impact of trade liberalization and growth on poverty and income distribution in Brazil.

Through this UNDP-funded and IFPRI-assisted project, members of the CGE project team have given extensive policy advice to senior government leaders, including the president of Costa Rica. Based on analysis using the various CGE models, IFPRI and UNDP economists also offered strategies to reduce poverty faster in Costa Rica and assisted with the development of a poverty reduction strategy paper (PSRP) in Paraguay. Also, during a project workshop in the Dominican Republic, a number of the CGE project researchers met with all the senior ministers in the social sectors to discuss poverty reduction strategies and to offer advice on a proposal being formulated for poverty reduction.

Static CGE models have also been used in sorting out how much of the observed change in poverty in the 1990s was due to the significant trade liberalization that took place between 1985 and 1995 in virtually every country in the region. The results were needed to provide a better understanding of both trade liberalization and capital account shocks. In both cases, current and capital account liberalization has been blamed for the failure of the region to reduce either poverty or inequality. The CGE model results suggested that this view was wrong. Trade liberalization by itself reduces poverty and has little effect on

inequality. They also suggested that capital inflows are positive, even if there is an exchange rate appreciation, something not widely believed in Latin America.

Another important area where CGE models have been effectively deployed to enhance policy making processes have focused on the impact of different globalization scenarios on the agricultural sectors of four countries in Latin America (Argentina, Chile, Colombia, and Costa Rica). Research in this area using CGE models were conducted jointly by the Inter-American Institute for Cooperation on Agriculture (IICA), IFPRI and the governments of those four countries. The full report includes simulations using a world CGE model in which technological change in the production functions of different primary products depends on government expenditures on agricultural research. The results from the simulations of WTO and FTAA negotiations show improvements in welfare, but suggest that production of oilseeds and cereals in Colombia and Central America is going to be under greater pressure under an FTAA (where production subsidies by the United States and other industrialized countries are not eliminated) than in a WTO scenario (where subsidies are reduced). Simulations including additional investments in agricultural R&D clearly show important additional benefits for the countries expanding those investments in terms of welfare, production, consumption, and trade balance. Those simulations also suggested that, if countries that are producers and exporters do not keep up with R&D investments undertaken by other competitors, they may be worse off. For net food-importing countries, the terms of trade benefits of lower food prices resulting from R&D in other countries improve their aggregate welfare, but agricultural production may contract. This research is drawing policymakers' attention to the strategic role of agricultural R&D as a complement to trade policy reform and already the countries involved have began allocating funds for agricultural research, attesting to the fact that the research and its findings have had a positive influence on policy decisions.

### Malawi and Mozambique

In 2001, the Malawi government decided to consider introducing a value-added tax (VAT). An evaluation study of the impact of the tax drew extensively on work that had been undertaken earlier using economy- wide models by Bunda College, the Reserve Bank of Malawi, and the National Economic Council with assistance by international organizations under the project entitled Collaborative Research and Capacity Strengthening in Southern Africa. For that project, a SAM was constructed and a CGE model formulated. The process of transforming the new tax reform proposal into an Act of Parliament included a technical committee presenting its study results first to the Cabinet Committee on the Economy for approval and then to the bipartisan Parliamentary Committee on Commerce, Trade and Industry, after which the draft bill was debated in Parliament before being implemented in October 2002.

Similarly, in Mozambique the Ministry of Planning and Finance has used SAMs and CGEs developed under the MERRISA project to examine revenue collection and other aspects of alternative tax-collection policies. As part of that, CGE analysis was an important input into the evaluation of a VAT for Mozambique, which was implemented in late 1999. In addition, the National Institute of Statistics (responsible for producing

national accounts) has produced the 1997 national accounts data in a social accounting matrix framework using the 1995 SAM that was developed under the MERRISA project.
**Morocco**

CGE models have been heavily used to catalyze oilseed policy change in Morocco. Under a 1999 USAID partnership grant, a detailed policy proposal for reform of the oilseed complex has been developed using CGE model simulations and analysis. The proposal dealt with trade, production, processing, marketing, and consumer demand, using an economy-wide CGE model. In October 2000, the government of Morocco adopted this policy proposal. Since that success, further research has continued through a World Bank-funded project that employs a CGE model to analyze the linkages between water and macro and trade policies in Morocco.

**South Africa**

In order to develop the capacity to undertake policy analysis in South Africa, the Trade and Industrial Policy Strategies South Africa recently compiled a new database and used this to construct a CGE model for the country. This model has been used for a number of research projects, including one undertaken to assess the impact of the proposed basic income grant in South Africa, requested by the country's two largest political parties. According to the country's main coalition of advocates, a second round of analysis aimed at assessing the financing of the grant has been called for. This study, (also published as *Can South Africa Afford to Become Africa's First Welfare State?* James Thurlow October 2002) has received a positive response from academics, advocates, and policymakers in both the United States and South Africa. The Macroeconomics Department of the Government of Mozambique decided in February 2003 to issue a copy of the paper to all its policy analysts. At the Eastern Economics Association Conference, where the paper was presented to a specialist session on basic income policies, a Brazilian government representative expressed the need for Brazil to undertake a similar analysis using the same approach as in South Africa because Brazil was at the time evaluating such policies.

Following the CGE training course held at the University of Cape Town in July 2001, the standard model was used by a participating Masters-degree student to examine, for the think tank Trade and Industrial Policy Strategies, the issues of wage subsidies for South Africa. The standard model is also being used to analyze the impact of trade liberalization on South Africa, and on the impact of varying the VAT system.

Meanwhile, the South African Treasury in 2003 decided to adopt a CGE model, and James Thurlow, a research analyst at IFPRI has constructed a recursive dynamic model for them. He has also put together an updated and improved SAM for 2000. This new model and database will be used to assess future medium-term budgets for the Treasury, and possibly to provide employment scenarios for the National Research Council.

**Tanzania**

Since 2001, there have been collaborations by a number of international institutions with Tanzanian institutions like the National Bureau of Statistics (NBS) in Dar e Salaam to develop databases appropriate for poverty-focused policy analysis. The initial stage of the work involved the updating of an existing 1992 SAM using a new input-output table and compiling a number of more recent databases drawing on the now available household and labor force surveys conducted in 2000/01. Three two-week workshops held in Tanzania have developed the capacity in the NBS to undertake survey analysis using a number of statistical packages. The most recent workshop completed the databases for the years 1998 to 2001 and set up the necessary skills and mechanisms for their continued compilation.

The project has been prompt in using new structural information about the economic conditions in Tanzania that became available only recently. That information combines a large variety of data sets compiled by various government institutions such as national accounts, foreign trade statistics, balance of payments, and survey information. The result is a comprehensive and consistent data framework that is highly suitable for multisector policy analysis to support the ongoing poverty reduction process under Tanzania's PRSP. The second stage of the work involves a number of research papers that draw on the newly developed databases. These were being prepared for the project's final national conference in mid-2003 and were laying the foundations for further work for the project's Southern and Eastern African regional conference in September 2003. The workshops were funded by the Danish government.

## Tunisia

A project entitled *Impact Evaluation of Establishing a Free-Trade Area between Tunisia and the European Union*, undertaken in 1999/2000, combined research and capacity strengthening activities pertinent to this FTA. It was carried out jointly by the Trade and Macroeconomic Division at IFPRI, at the time headed by Sherman Robinson, and Tunisia's Institut d'Economie Quantitative (IEQ) under the Ministry of Economic Development with funding from the World Bank. At the start of the project, Hans Löfgren and Anne-Sophie Robilliard taught a two-week course on CGE modeling in GAMS to approximately 12 IEQ researchers and commenced working with Tunisian counterparts on the construction of a SAM and the development of a CGE model geared toward the analysis of these issues. A team of three researchers from IEQ visited IFPRI in April-May and October 1999, Löfgren spent two weeks in Tunis in July, and in May 2000 Löfgren and Robilliard attended a concluding workshop at the IEQ.

The project has successfully enhanced sustainable capacity at IEQ that, according to the assessment of a key collaborator, is being utilized intensively as IEQ has become a reference point for this type of analysis in Tunisia. CGE modeling has become one of the cornerstone methods used by IEQ. Since the completion of the joint IEQ-IFPRI project, IEQ has created an updated SAM (with more detail on agriculture) and has undertaken CGE-based analyses of issues related to Tunisia's FTA with the EU. Some of these issues are fiscal effects, impact on food and agricultural trade, wage policy, the dismantling of

the Multi-fiber Agreement, investments in infrastructure, and the effects of fiscal reforms and liberalization on employment and poverty.


## Zambia

In recent years, there has been growing concern in Zambia over the fall in copper prices and the potential collapse of the copper mining sector (the major source of the country's foreign earnings). Because that sector is a huge contributor to the nonagricultural part of Zambia's economy, its fortunes have a substantial impact on demand for food output and on food security. In response to these developments, the World Bank funded a study aimed at determining the possible impacts of falling world copper prices and the complete withdrawal of investment in copper mining in Zambia. The study was conducted under the direction of Sherman Robinson. Upon its completion, the study was included as the main component of the Bank's assessment of the future of copper mining in the country. Following the study's findings, the Bank made funds available to Zambia to prevent the predicted collapse of production in the country from taking place. Again more funds were granted from the Bank to follow up the initial study with one that determines the long-run growth path of the country based on groundwork completed by the Bank. For this purpose, an updated database has been compiled with David Evans from the Institute of Development Studies at Sussex University. The results of this CGE study has formed part of the World Bank's Country Economic Memorandum for Zambia, while the model development and experience gained from this task can be a direct input into future analysis of food issues in Zambia.

## Multi-country Analysis: Tobacco in China, Malawi, Turkey, and Zimbabwe

In 2000, the Trade and Commodities Division of the Food and Agriculture Organization of the United Nations (FAO) funded an FAO project entitled *World Tobacco Demand and Supply by 2015: Policy Options and Adjustments*. As an important component of the project, a team headed by Sherman Robinson conducted CGE analysis for the four key supplying countries: China, Malawi, Turkey, and Zimbabwe. Results of the study were used in an FAO report and were presented at the WHO-organized International Meeting on Economic, Social, and Health Issues in Tobacco Control in Kobe, Japan, in December 2001. As with the analysis of copper in Zambia, this multi-country work is potentially useful for analyzing food issues in these countries where tobacco is an important cash-crop alternative to the production of food.

## Multi-country Analysis: Gender Issues

A project on gender analysis using CGE models developed in collaboration with IFPRI Research Analyst Marzia Fontana, Adrian Wood at the University of Sussex and Channing Arndt at Purdue University, has aroused much interest among researchers and development practitioners following two contributions to the special issue of *World Development* on gender, trade, and macroeconomics (Arndt and Tarp 2000; Fontana and

Wood 2000). Fontana and Wood have been invited to make many presentations to groups such as the U.N. Conference on Trade and Development (UNCTAD), the International Development Research Centre (IDRC), the International Center for Research on Women, the Commonwealth Secretariat, Cornell University, and the University of Bologna. The Washington-based NGO, Women on the Edge (WEDGE), has recommended that the U.S. government use the Fontana-Wood model to assess the gender impact of trade agreements before signing them (see the NGOs website at http://www.womensedge.org). Meanwhile, the European Union invited Fontana and Wood to contribute to its Sustainable Impact Assessment of Trade Policies. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has adopted the Fontana-Wood model as one of the main tools in its gender training courses.

Both European Union and WTO representatives approached Fontana and Wood after their meeting on this issue in Brussels where they expressed interest in encouraging more CGE modeling work on the gender impact of trade. They have also been approached by India's Institute of Social Studies Trust (ISST), which manages the gender component of the IDRC funded Micro Impacts of Macroeconomic and Adjustment Policies network, to assist researchers from India, Nepal, Bangladesh, Sri Lanka, and Pakistan to design and implement gender models applied to their countries.

## Multi-country Analysis: HIV/AIDS Issues

Since early 2000, Channing Arndt of Purdue University has been active in evaluating the economic impacts of the HIV/AIDS epidemic using economy-wide CGE models. Published work to date, focusing on South Africa, has been widely disseminated, including via the South African media. Several reports using CGE analysis have been reported by the Joint United Nations Program on HIV/AIDS (UNAIDS) in its December 2000 *AIDS Epidemic Update*, the major annual publication of UNAIDS. The evaluations then began to appear in the popular press in the United States. For example, Samuel (Sandy) Berger, national security advisor in the Clinton administration, cited these results in an opinion editorial in the *New York Times* on 20 January 2001; and Senator Bill Frist, while chairman of the Senate Subcommittee on African Affairs (currently Senate Majority Leader), cited the results in a 21 March 2001 interview with National Public Radio. Both used the results to argue for an active response to the AIDS crisis from the international community in general and the U.S. government in particular. Shortly after Frist became Senate majority leader, a large U.S. program to address the AIDS issue in Africa was announced.

Work on the economic implications of HIV/AIDS using economy-wide models is ongoing in Mozambique and Tanzania. A study by Arndt on the implications of HIV/AIDS for growth prospects and human capital accumulation using a Mozambiquean CGE model has been influential in that country. The week following a presentation of Arndt's results, the director of the Macroeconomic Studies Unit of the Ministry of Planning and Finance in Mozambique was quoted by the British Broadcasting Corporation as labeling the HIV/AIDS pandemic the number-one development issue in

Mozambique. The paper currently provides some of the intellectual underpinnings for World Bank programs to address HIV/AIDS in Mozambique.

### Multi-country Analysis Using Standard CGE Model in Africa

The U.N. Economic Commission for Africa (ECA), through its African Center for Gender and Development, is planning to use IFPRI standard CGE model developed by Sherman Robinson, Rebecca Lee Harris and Hans Löfgren , as the starting point in a multi-country project that is aimed at engendering economic policy analysis in Africa, particularly fiscal policy analysis. In addition to the modeling component, the ongoing project involves activities aimed at encouraging the collection of time-use data. In this context, Löfgren attended the Ad-Hoc Expert Group Meeting on a Gender-Aware Macroeconomic Model to Evaluate Impacts of Policies on Poverty Reduction, held at ECA headquarters in Addis Ababa in May 2003. The meeting was attended by African and international experts in modeling and data (labor and national accounts) analysis. In the context of a World Bank-funded study on globalization and the African smallholder, FAO plans to use a village-economy version of the standard CGE model in a multi-country study of the impact of globalization on smallholders. The study will benefit from the model's straightforwardness for use in implementing comparable policy experiments across different villages (each of which is represented by a separate database file).

### Multi-country Analysis: Agriculture-Related Trade Issues

Analyzing multilateral and regional trade policies continues to be one of the most important areas CGE models are being used, which have also formed the backbone of the models used by policy analysts and researchers in several countries. One example is the adoption in 1994 of a CGE trade model by the U.S. International Trade Commission. A more recent example is evident in *Agricultural Policy and Reform in the WTO: The Road Ahead*, a publication of the U.S. Department of Agriculture's Economic Research Service (USDA/ERS). The results of economywide models analysis provided a major contribution to that report, the welfare results of which have been cited by U.S. Presidents Clinton and George W. Bush and by many U.S. government officials. Other CGE modeling results were also drawn on for the 2003 *Hunger Report* of Bread for the World Institute, a U.S. nongovernmental organization. Congressman Ed Royce (Republic of California) used the conclusions of that modeling work in his opening statement as chairman of the Africa Subcommittee of the House International Relations Committee, in its June 2003 hearing on the adverse effect of U.S. cotton subsidies on African farmers.

### United States and Mexico: the case of NAFTA

In 1990, the Mexican government formally asked the U.S. government to negotiate a free trade agreement (FTA) between the two countries. Since the U.S. had recently completed such an agreement with Canada, the negotiations quickly involved all three countries and

resulted, in late 1993, in Congressional approval of the North American Free Trade Agreement (NAFTA). Starting with the request to Congress by the first Bush Administration for fast track authority to negotiate NAFTA through to its final approval during the Clinton Administration, CGE models were widely and effectively used to inform the policy debate. The models were used both in the negotiating process and in the political debate regarding approval of the final deal. A number of questions were raised early in the debate, and continued to be the focus of analysis throughout the negotiations. Some of these issues were:

(1) What would be the benefits and costs to the three countries if NAFTA were implemented? While there was some mild interest in whether the U.S., Canada, and Mexico would gain in terms of some aggregate measures of welfare, most of the concern and policy debate centered on identifying winners and losers.

(2) What would be the impact on labor in the U.S., both in terms of employment and wages? US labor unions argued that there would be, in the words of Ross Perot, a presidential candidate at the time, a giant sucking sound of jobs moving to Mexico as employers took advantage of cheap Mexican labor, resulting in loss of jobs and lower wages in the U.S. Proponents argued that increased U.S. trade in North America would help U.S. exports, resulting in increased employment in relatively high wage jobs in exporting sectors.

(3) What would be the impact of NAFTA on migration between Mexico and the U.S.? Migration was a contentious issue well before NAFTA was proposed, but the NAFTA debate gave it a new focus, even though NAFTA, as proposed and as finally passed, did not include any provisions concerning migration.

(4) What would be the impact at the sectoral level in the three countries? A few sectors were particularly sensitive and the focus of much debate: agriculture, autos, and textiles. However, in the negotiations and in the political debate in the U.S. Congress, there was an enormous amount of policy attention to detailed analysis of sectoral and commodity impacts.

(5) What would be the impact of NAFTA on the U.S. and Mexican trade balances, particularly the bilateral balance between Mexico and the U.S.? Coupled with this was a concern about the impact of the agreement on flows of private financial capital to Mexico. US labor unions worried about capital flight from the U.S. to Mexico. The financial community wanted more open financial markets. Only a few economists were concerned about the overvaluation of the Mexican peso and whether capital inflows into Mexico were sustainable.

**CGE Models in the NAFTA Debate**

At the time NAFTA was proposed, a great deal of work was already underway to analyze the impact of the ongoing Uruguay Round of GATT negotiations, which had started in 1987. A number of single-country and multi-country CGE models had been developed to analyze various reform scenarios in the Uruguay Round, and researchers quickly adapted

these models to look at the potential effects of NAFTA. There were also many detailed industry and sectoral studies underway, which could be, and were, adapted to look at NAFTA. The result was that, from the beginning and throughout the negotiations, high quality economic analysis was available on a timely basis to inform the debate.
Most of the analysis in the U.S. was either performed by or done in close collaboration with government agencies, particularly the Economic Research Service of the U.S. Department of Agriculture (ERS/USDA), the International Trade Commission (ITC), the Department of Labor, the Department of Commerce, and the Congressional Budget Office (CBO). All these agencies either produced or used CGE models, as well as detailed partial-equilibrium studies.

Many contended that for the first time in the United States, the CGE trade policy-modeling community found itself in the limelight, providing direct input for the government's trade policy process. Ambassador Hills employed these studies in her frequent statements in favor of the agreement before the Congress and the public. Furthermore, policy makers in both Mexico and Canada also had access to and used CGE models to analyze the impact of NAFTA on their countries. In the case of Mexico, the lead minister responsible for the negotiations, the Secretary of Commerce and Development, was Jaime Serra-Puche, who had done his Ph.D. thesis on a CGE model of Mexico. Various other government officials in Mexico, including in the important Ministries of Agriculture and Foreign Affairs were familiar with these models and effective consumers of the work.

The CBO study summarized the results as a thorough review of the myriad changes brought about by NAFTA, and of their interactions, leads to the single resounding conclusion that the net effect on the U.S. economy would be positive and very small. The biggest changes introduced by NAFTA would be those related to Mexico. These evaluations appear to have been correct, as Burfisher, Robinson, and Thierfelder (2001), in their survey of studies of the actual impact of NAFTA on the U.S. since it was passed, concluded that the mainstream forecasts during the NAFTA debate were basically correct: NAFTA has had relatively small positive effects on the U.S. economy and relatively large positive effects on Mexico.

Burfisher, Robinson, and Thierfelder (2001) also surveyed the prospective CGE studies of NAFTA which addressed the issue of whether NAFTA, as a preferential trade agreement, would be net trade creating or net trade diverting. The studies of NAFTA, whether in a single or multi-country context, all concluded that NAFTA was net trade creating and would benefit all three countries, with the largest relative gains for Mexico. They also concluded that the prospective studies were correct. Post-NAFTA studies, at various levels of aggregation, have concluded that NAFTA has been net trade creating, and that actual trade diversion was much smaller than had been feared during the NAFTA debate.

These results, and the consistency of results across many studies, contributed to raising the level of the NAFTA debate, essentially preventing studies based on weak analysis from ever dominating the discussion. For example, the book by Perot and Choate *Save*

*Your Job, Save Your Country: Why NAFTA Must be Stopped Now! (1993)*, arguing that NAFTA would devastate the U.S. labor market, was quickly discredited for its weak analytic foundation and baseless conclusions.

In conclusion, it should be clear from the litany of examples and country case studies presented above, economywide models, particularly CGE models which utilize SAMs and Input-Output models as databases, have influenced major policy decisions and enlightened the debate on policy implications on a number of issues. As a result, several workshops and conferences on these models are being organized by many international organizations not to mention university research centers.

Examples include:
• Carnegie Endowment for International Peace
• Center for Development Research (ZEF at the University of Bonn, Germany)
• Economic Research Forum for the Arab Countries
• Institute for International Economics
• Inter-American Development Bank
• International Association of Agricultural Economists
• International Agricultural Trade Research Consortium (coordinated by USDA)
• International Center for Trade and Sustainable Development
• International Consortium on Agricultural Biotechnology Research
• International Policy Council
• Organization for Economic Co-operation and Development
• World Bank
• World Meteorological Organization

Through the MERRISA project, capacity building on how to build and use economywide models has also been a focused attention in many sub-Saharan countries including Mozambique, Tanzania, South Africa, Zambia, Malawi, and Zimbabwe.

## 10. Project Monitoring and Evaluation:

The Ethiopian Economywide Modeling Project will be subjected to internal project evaluation and review schemes of both EDRI and IDS, with the aim of identifying indicators and milestones for achievements as well as to solving impediments to the project's overall success. The review and evaluation will largely depend on how well the respective phase is being implemented, if the tasks setout in the particular phase are being or can be achieved within the allotted timeframe and budget, and based on other indicators particularly on the capacity building front. These reviews will be conducted twice a year and a progress report on each review outcome will be provided to each member of the DAG and the UNDP.

The project will also be subject to in-country review by key stakeholders and beneficiaries. Thus, on an annual basis, the national advisory committee will evaluate the progress of the program vis-à-vis its work plan and stated objectives.

In addition, other performance evaluation and joint review schemes for the DAG and UNDP can be instituted. All of the DAG members as well as the UNDP, by being locally based, would have a strong sense of the direction in which the project is oriented and the overall performance of each of the project's phases. Thus, with these monitoring mechanisms in place, the project will be closely followed in a phase by phase basis.

**Annex One**

## Core Team Member List

| No. | Name | Organaization |
|---|---|---|
| 1 | Tadele Ferede | AAU |
| 2 | Fantu Guta | AAU |
| 3 | Eyasu Tsehaye | MOFED (National Accounts) |
| 4 | Asrat Haile | MOFED (National Accounts) |
| 5 | Tamru Terefe | MOFED (Welfare) |
| 6 | Amin Abdella | MOFED (Macroeconomic Policy & Mgt.) |
| 7 | Dawit Woldeyesus | MOFED (Macroeconomic Policy & Mgt.) |
| 8 | Abuwa Tilahun | MOFED (Macroeconomic Policy & Mgt.) |
| 9 | Mezgebu Amha | MOFED (Macroeconomic Policy & Mgt.) |
| 10 | Getahun Negera | MOFED (Macroeconomic Policy & Mgt.) |
| 11 | Jonse Gedefa | MOFED (Macroeconomic Policy & Mgt.) |
| 12 | Kassahun Tadesse | EEPRI |
| 13 | Zekarias Mamma | EEPRI |
| 14 | Desalegn Yigzaw | MOTI (WTO) |
| 15 | Fikrte Fenta | MOTI (Textile & Leather Industry) |
| 16 | Birkinesh Gonfa | MOTI (Textile & Leather Industry) |
| 17 | Yohannes Ayalew | NBE (Economic Research) |
| 18 | Fekadu Ketema | NBE(Economic Research) |
| 19 | Eskinder Tenaw | CSA/Methodology |
| 20 | Addis Assefa | CSA/Industry |
| 21 | ZenaSillasie Seyum | CSA/Household |
| 22 | Habekirstos Beyene | CSA/Agriculture |
| 23 | Mageru Haile | CSA/Trade |
| 24 | Eleni Kebede | CSA/Data Processing |
| 25 | Demirew Getachew | Min. of Revenue (Planning & Research) |
| 26 | Tadesse Mezgebo | EDRI |
| 27 | Kiflu Gedefe | EDRI |
| 28 | Gemechu Ayana | EDRI |
| 29 | Mekonnen Bekele | EDRI |
| | Other Support Members | |
| 1 | Getachew Adem | MoFED: Welfare Monitoring Unit Head |
| 2 | Fantahun Belew | MoFED: Macroeconomic Policy & Mgt., Head |
| 3 | Meshesha Getahun | MoFED:  National Accounts Head |
| 4 | Samia Zakaria | Central Statistical Authority: Director |