IMPACT ASSESSMENT OF IFPRI'S RESEARCH AND RELATED ACTIVITIES BASED ON ECONOMYWIDE MODELING

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ACRONYMS

AGE	Applied general equilibrium [model]
AIDS	Acquired Immunodeficiency Syndrome
CASER	Centre for Agro-Socioeconomic Research [of the Indonesian government]
CEM	Country Economic Memorandum [from the World Bank]
CEPAL	Economic Commission for Latin America and the Caribbean [of the UN]
CGE	Computable general equilibrium [model]
CIMMYT	International Wheat and Maize Research Improvement Center
CoPS	Centre of Policy Studies [Monash University, Australia]
DfID	Department for International Development [government of the United Kingdom]
DP	Discussion paper
DSGD	Development Strategy and Governance Division [of IFPRI]
ECA	Economic Commission for Africa [of the UN]
EPTD	Environment and Production Technology Division [of IFPRI]
ERS	Economic Research Service [of USDA]
ESCAP	Economic and Social Commission for Asia and the Pacific [of the UN]
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCND	Food Consumption and Nutrition Division [of IFPRI]
FOI	[Danish] Institute for Food Economics
FTA	Free trade agreement
FTAA	Free Trade Agreement of the Americas
GAMS	General algebraic modeling system
GATT	General Agreement on Tariffs and Trade
GTAP	Global Trade Analysis Project [based at Purdue University]
HIV	Human Immunodeficiency Virus
ICRIER	Indian Council for Research in International Economic Relations
IDB	Inter-American Development Bank
IDRC	International Development Research Center [government of Canada]
IEHA	Initiative to End Hunger in Africa [of USAID]
IEQ	Institut d'Economie Quantitative [of Tunisia]
IFPRI	International Food Policy Research Institute
IICA	Inter-American Institute for Cooperation on Agriculture
IIE	Institute for International Economics
IMF	International Monetary Fund
IMPACT	International Model for Policy Analysis of Agricultural Commodities and Trade [of IFPRI]
I-O	Input-Output
IPC	International Policy Council
ISI	Institute for Scientific Information [now Thomson ISI]
MERRISA	Macroeconomic Reforms and Regional Integration in Southern Africa [of IFPRI]

MSSD	Markets and Structural Studies Division [of IFPRI]
MTID	Markets, Trade, and Institutions Division [of IFPRI]
NAFTA	North American Free Trade Agreement
NBER	National Bureau of Economic Research [of the United States]
NBS	National Bureau of Statistics [government of Tanzania]
NGO	Nongovernmental organization
OECD	Organisation for Economic Co-operation and Development
PAANSA	Poverty Analysis and Advisory Network for South Asia [of IFPRI]
PIDS	Philippine Institute for Development Studies
PRSP	Poverty Reduction Strategy Paper
RAs	Research analysts and research assistants [including senior ones, of IFPRI]
R&D	Research and development
SAM	Social accounting matrix
SARS	Severe acute respiratory syndrome
TMD	Trade and Macroeconomics Division [of IFPRI]
UN	United Nations
UNAIDS	Joint United Nations Program on HIV/AIDS
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USITC	United States International Trade Commission
VAT	Value-added tax
WHO	World Health Organization
WTO	World Trade Organization

PREFACE

The International Food Policy Research Institute (IFPRI), which is based in Washington, DC, systematically reviews the impact of its major research and related outreach programs (see the impact assessment papers at http://www.ifpri.org). It is part of a process aimed at improving the effectiveness of IFPRI's work and of documenting for donors the wisdom of investing in it. The terms of reference of this study, commissioned by the director general of IFPRI to be undertaken in the first half of 2003, are:

> "To carry out a study evaluating the impact of research and related activities by IFPRI that use economywide models. These activities involve the development of databases and economywide models, the application of these to the analysis of issues of trade and macro policy that are relevant to food policy in developing countries, capacity-strengthening activities targeted at developing-country researchers, and the dissemination of research results and outputs. The study will include:
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> - documenting the *outputs* from these activities;
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> - articulating the *outcomes* from these outputs;
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> - identifying *policy responses and other effects* generated by these outputs and outcomes; and
>
> - measuring the ultimate *impacts,* in quantitative terms where feasible.
>
> Particular emphasis will be given to the role of the international public-goods component of the program."

The impacts of particular interest are those laid out in IFPRI's latest strategy paper, *Towards Food and Nutrition Security* (March 2003), on such crucial indicators as reducing hunger and malnutrition, alleviating poverty, sustaining livelihoods, and enhancing the natural environment.

Following Sherman Robinson's appointment in late 1993 as director of IFPRI's Trade and Macroeconomics Division (TMD), these economywide modeling activities were a major part of the division's work, as well as a minor part of the work of some other divisions (including their collaborative work with TMD). The program had the potential to impact directly through influencing policies in individual developing countries or regional or multilateral trading arrangements, as well as indirectly through the provision of international public goods such as data sets, models, research methodologies, and training programs that together enhance policy research and analytical capability pertinent to developing countries.

A reorganization of IFPRI during April 2003 saw the reallocation of TMD's work program and staff to two other divisions: a new Development Strategy and Governance Division (DSGD) and the newly named Markets, Trade, and Institutions Division (MTID). The single-country modeling capacity is now primarily in DSGD, while the

multicountry trade modeling is mainly in MTID. This impact evaluation will be an input into the decision regarding how much of TMD's work with economywide models will be retained/expanded in the new structure.

EXECUTIVE SUMMARY

The Trade and Macroeconomics Division (TMD), which has undertaken almost all of IFPRI's economywide modeling, has spent about $15 million in nominal terms between 1994 and April 2003, when the division was closed. During this period, TMD employed an average annual staff of 7.4 researchers, 7.8 research assistants, and 2.0 administrative assistants. The budget per researcher, at just over $100,000 per year on average, is comparable with other benchmark groups. How well has that money and time been spent and what legacies have the division's economywide modeling efforts left?

TMD was a prolific generator of economywide modeling outputs by both internal and external standards. Its publications per researcher are close to, or exceed, the average for IFPRI, and it has produced and made publicly available numerous social accounting matrices (SAMs) and economywide models, plus methodologies associated with both. These modeling outputs are state-of-the-art, with some pushing the knowledge frontier. TMD also engaged in substantial capacity strengthening via training workshops in many locations in Africa, Asia, Latin America, and the Middle East. The output rate has been high partly because of considerable co-authorship between TMD and either non-IFPRI staff or graduate student research assistants. And the range of policy issues analyzed and countries and products covered by IFPRI's economywide modelers has been extraordinarily wide for such a small group of core staff.

The uptake of those economywide modeling outputs has been equally impressive. Website downloads of TMD discussion papers (DPs) over the 15 months to March 2003 exceeded 105,000, or an average of 980 per paper for the 108 papers published since 1994, or 65 per paper per month. The rate for the eight most popular papers, 313 downloads per month, compares favorably with a rate of 220 per month during 2000–2001 for the eight most popular publications from IFPRI's 2020 Vision Initiative, especially given the high degree of promotional expenditure on the latter and its widespread audience relative to that for the narrower field of economywide modeling. True, one DP was extraordinarily popular, with 22,400 downloads, but a further 26 had more than 1,000 downloads each and virtually all 108 enjoyed several hundred downloads. Despite their greater degree of technicality, the most popular DPs were the modeling papers. This high degree of uptake would not have been possible had TMD's modeling work not been highly regarded by the economics profession. Further evidence of that reputation is the many copies of the Microcomputer Series of papers on IFPRI's standard computable general equilibrium (CGE) model (more than 150 per month) and the training exercise manuals that have been requested over the past two years, and the hundreds of requests per year to generate and share SAMs, discuss methodological developments, present model results, take part in short-term policy missions, supervise Ph.D. students, and conduct training courses throughout the world.

How much impact this economywide modeling program has had is difficult to gauge. The standard attribution problem in assessing the impact of any methodological and policy research is made all the more difficult in this case because this particular

research program: (a) covered the full spectrum from basic to applied research and its dissemination, plus major data compilation, engagement in short-term missions, and provision of training programs; (b) covered all developing country regions as well as multilateral and regional trade policy issues; and (c) covered all products and factors of production so as to ensure that the food sector's interactions with other sectors were fully taken into account. To circumvent this problem, we surveyed a range of stakeholders and drew on narratives provided by IFPRI staff and others.

The survey revealed that the majority of even the least-informed respondents believe that economywide modeling offers an extremely valuable contribution to food policy analysis, notwithstanding its complexity and the associated difficulty of communicating its results. Its main advantages are seen as quantifying the effects of nonfood policies on the food sector, and of structural or policy shocks on factor markets and hence income distribution and thereby poverty. A strong consensus emerged from the survey that TMD's greatest visible contribution has been in providing SAMs and methodologies for compiling them and in providing the standard CGE model, together with contributions to economywide modeling methodology. The questions on the policy influence of CGE modeling elicited a "very influential" response from the majority and the rest said "somewhat influential." So even though it is very difficult to attribute policy reform directly to one or another group of influences, there is a strong feeling that economywide modeling is an effective contributor to the food policy process. On the question of how IFPRI might alter its mix of economywide products without altering the program's aggregate budget, there is extremely strong support for doing more in Africa and on the income distributional and especially poverty impacts of policies, while doing less on global and regional trade issues.

The narratives presented strengthen the impression that IFPRI's economywide modeling efforts have been contributing to IFPRI's priorities. IFPRI's economywide modeling work in Africa is contributing to debates over numerous potentially high-payoff policy reforms, including:

- a more efficient, indirect value-added tax (VAT) system in Malawi and Mozambique,

- a more equitable basic income grant scheme in South Africa (with potential spillovers to Mozambique and Brazil),

- an improved policy for the oilseed complex in Morocco,

- improved national accounts in Tanzania because of the SAM developed there,

- use of the CGE approach in Tunisia to evaluate its prospective free trade agreement (FTA) with the European Union,

- a World Bank loan to prevent contraction of Zambia's economy following the collapse of copper prices,

- a gender-enhanced CGE framework for analyzing agricultural technologies and so on in Mozambique and elsewhere,

- an economywide approach to the analysis of the implications of HIV/AIDS for growth prospects and human capital formation in southern Africa, and

- an improved framework for exploring medium-term budget and employment projections in South Africa.

1. INTRODUCTION

The International Food Policy Research Institute (IFPRI) has been engaged in food policy modeling since its inception in 1975. Prior to 1994, that work was primarily focused on partial equilibrium modeling of food markets. One of the early influential outputs was IFPRI Research Report No. 21 on the costs of OECD agricultural protection to developing countries (Valdés and Zietz 1980), while more recent outputs summarize a joint IFPRI/World Bank study aimed at measuring the extent of and reasons behind developing countries' own distortionary policies, which affect their food and agricultural sectors either directly or indirectly (e.g., Krueger, Schiff, and Valdés 1988, 1991, 1992; Bautista and Valdés 1993).

By the early 1990s, the development of computer power and of modeling skills had substantially lowered the cost of analyzing policies computationally in an economywide framework. In particular, the use of national computable or applied general equilibrium (CGE or AGE) models was blossoming, and regional and global CGE models also were emerging for analyzing preferential and multilateral trade arrangements. In late 1993, IFPRI became part of that trend by appointing Professor Sherman Robinson of the University of California, Berkeley, to head its Trade and Macroeconomics Division (TMD). Robinson was one of the early contributors to the application of CGE models for policy analysis in developing countries.

Why is an economywide approach helpful for analyzing food policies, and what has been the impact of that part of IFPRI's activities over the past decade? This paper (the 21st in a series of studies commissioned by IFPRI to evaluate the impact of its research and related activities) attempts to assess the worth of those activities as part of a wider process aimed at improving the effectiveness of IFPRI's work and documenting for donors the wisdom of investing in it. This assessment is particularly important at this time because those CGE modeling activities were subdivided in April 2003 as part of a reorganization of IFPRI, and a decision regarding how much of that type of modeling will be retained or expanded in the new structure is imminent. It is also important because those modeling activities were not a core part of the IFPRI 2020 Vision for Food, Agriculture, and the Environment and so, unlike IFPRI's partial equilibrium International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) (see Ryan 2003), they have not had their prominence enhanced through that highly publicized and influential IFPRI initiative.

The report begins by laying out the utility of an economywide framework (Section 2), before summarizing the inputs into TMD's economywide modeling and other activities since 1994 (Section 3). It then catalogs the various outputs and tries to measure their outcomes in terms of such things as publication citations and website downloads of papers (Sections 4 and 5). The impact of those products is much more difficult to gauge (the standard attribution problem in assessing methodological and policy research), but two approaches are used in Section 6. One is to draw on responses to a questionnaire sent to a range of stakeholders in developing-country governments, policy think tanks, policy modelers, and other food and trade policy researchers at universities and international donor agencies. The other is to draw on narratives provided by current IFPRI staff and others. The final section summarizes what has been found in this assessment.

2. WHY AN ECONOMYWIDE VIEW OF FOOD POLICY ANALYSIS?[a]

Virtually every developing country has a keen interest in incentives facing food producers or consumers. However, those incentives can be distorted not only by government policies directly affecting the prices of inputs into and outputs of food and agricultural production. Sometimes policies affecting the prices of products that are substitutes or complements to food in production or consumption are even more important. That is, *relative* prices matter. Government intervention in currency markets also can have nontrivial distortionary effects on incentives. Farmers may receive the international price in foreign currency for their produce and yet be harmed by having to convert from foreign to domestic currency at an artificially low exchange rate. Thus, one needs to explore not just the direct but also the various indirect ways in which food- and other trade-related policies, including policies that alter factor or input markets, affect the welfare of people in open-economy developing countries. The benefits of taking an economywide perspective apply both when considering the effects of actual policies at home or abroad and when examining potential policy reforms.

This section considers first the standard single-sector perspective, keeping in mind input as well as output price distortions to producer incentives. It then takes into account the fact that those producer incentives also are affected by distortions to prices of tradable goods or services produced by nonfood sectors, even when those other tradables are not inputs into producing food. The third part adds the further complication that the outputs of some industries are not internationally tradable. In that case, exchange rate distortions can alter the price of those nontradables relative to tradables, thereby indirectly impacting incentives facing farmers and producers of other products. Factor market distortions also often need to be thought of in an economywide framework, bearing in mind that agriculture is the single biggest employer in many developing countries.

Certainly economywide modeling is more demanding of data and econometric parameter estimates than is a simpler partial equilibrium approach to the food sector, so the benefits of this more comprehensive approach cannot be reaped without a more substantial budget. Before drawing out the implications for IFPRI, this section discusses the limitations of the CGE approach when assumptions are made because of missing data or parameter estimates needed for CGE models.

DIRECT EFFECTS OF POLICIES: A SINGLE-SECTOR PERSPECTIVE

Historically, the governments of poor agrarian economies have taxed farmers in one way or another (Krueger, Schiff, and Valdés 1988; Bautista and Valdés 1993; Schiff and Valdés 2002). Sometimes it has been an in-kind tax, such as a proportion of their grain output. In other settings, where a cash crop is being exported, producers often have been required to sell to a statutory marketing authority that pays them only a fraction of the export price. Either way, farmers receive less than the free-market price for their produce. Even in the unlikely event that all of those taxes come back to farm households in the form of

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[a] This section draws on Anderson (2002).

government goods and services that the farmers otherwise would have purchased with that taxed income, the incentive to produce and market farm products has been reduced. Households that are net buyers of food in such countries, however, often get access at least to staples at less than free-market prices.

Governments of such agrarian economies typically return little of the proceeds of those taxes to farm families, especially at early stages of the country's development. Rather, the taxes tend to be used to develop urban infrastructure, pay officials relatively high wages, subsidize urban food consumption, and so on. Until recently it was widely believed that taxing primary producers for such purposes would not reduce output significantly because farm families were poor and/or had no other alternative uses for their time, land, and other resources. Empirical studies during the past half-century, however, have shown that farmers in even the poorest settings are quite price-responsive. When the proceeds from growing a marketable product are reduced, farm households divert at least some of their resources to producing other products and/or to leisure pursuits. Only the very poorest subsistence farmers might be enticed by such taxes to work harder, but even that response may be welfare reducing in that such people then have less recreational time and are likely to live shorter, less healthy lives.

It matters that farm household resources are diverted from producing the taxed good because such diversion means that society's resources are not being used where they are most productive. Likewise, it matters if farmers have to pay more for inputs purchased from nonfarm sectors, for example, because of import taxes on them. They then use less of those inputs relative to other inputs than is optimal (or more, if an input is underpriced, as is often the case for irrigation water, for example).

Not all agricultural producers in developing countries face artificially depressed prices for their products. Indeed, it is not uncommon for import-competing producers of some key food items to enjoy protection from import competition that raises the domestic price of their produce above free-market levels. A TMD-IFPRI/World Bank joint empirical study of 18 developing countries for the decade to the mid-1980s contrasted the treatment of major farm export products with that of key foods that were imported (Krueger, Schiff, and Valdés 1988). It found domestic prices of the latter to average about 20 percent above prices at the countries' borders, whereas those for key agricultural export items were on average 11 percent below international levels. Both types of distortions are harmful to national economic welfare. While the latter ensure that too few resources are devoted to the production of those exportables, an import protection policy encourages too many resources into agriculture's import-competing industries — and harms consumers of those importables also, via higher food prices, unless offsetting consumer price subsidies are applied.

What would be the implications of reforming agricultural policy in the average developing country among those sampled for that IFPRI/World Bank study? Reducing the export restrictions would cause the domestic price of exported farm products to rise by up to one-eighth, helping producers of those exportables but hurting domestic buyers of them (who may be downstream processors). That reform also would encourage producers of import-competing farm products to switch their production to now-higher-priced exportables. If that country's food import restrictions also were reduced, producers of those importables would see their output price decline and consider switching to producing other farm products. This would reinforce the encouragement of exportable production in agriculture, insofar as the resources used in the two different farm subsectors are substitutable. Both types of reforms

improve the efficiency of the sector's resource use by encouraging greater exploitation of the country's agricultural comparative advantage. That is, reforms that boost the *relative* profitability of the industries previously discouraged by the government's trade-restrictive agricultural policies tend to be welfare enhancing.

INDIRECT EFFECTS OF POLICIES: AN INTERSECTORAL PERSPECTIVE

The above effects apply not just within the agricultural sector but also between it and other sectors. That is, farmers can also be discouraged, albeit indirectly, by nonagricultural policy interventions. One source of such discouragement comes from import protection to producers of nonfarm products. In an economy producing just two sets of goods, importables and exportables, a tax on imports is equivalent to a tax of equal size on exports using common resources such as labor and capital. Either of those taxes raises the price of importables *relative* to exportables, and by the same amount, and it is that price ratio that determines the allocation of resources between the agricultural and other sectors (Lerner 1936). More generally, when domestic prices of some industrial and/or service-sector products are raised artificially by restrictions on their importation or other price-support measures, more resources are drawn to those import-competing sectors from other industries in the primary sectors, including exporting ones (Clements and Sjaastad 1984). Industrial tariffs and import quotas have been a major source of indirect discrimination against developing-country agriculture historically, but there is a wide range of other distortionary measures used in service industries as well.

This cause of inefficient resource allocation has crucial implications for policy reform. For example, consider again the average country in the Krueger et al. study and suppose the agricultural sector is a net exporter (which means the country is a net importer of nonfarm products) and that the food-importing subsector uses as many resources/adds the same value as the agricultural export-focused subsector. Within agriculture the restrictions reducing the domestic price of farm exportables by 10 percent and raising the price of food importables by 20 percent would thus boost the overall average price of farm products by close to 10 percent. Taking a single-sector perspective might lead one to believe that removing those agricultural policies and thereby reducing farm prices on average would be national welfare-improving. However, such a conclusion can be drawn only if there were no distortions in the rest of the economy. Were the manufacturers in this economy to be enjoying an average nominal rate of protection from import competition of, say, 25 percent (e.g., due to a uniform 25 percent tariff on imports of industrial products), then, prior to reform and notwithstanding the positive direct assistance to farmers, there would already be too many resources in industrial relative to agricultural activities. In that case, reducing support for farming would be likely to exacerbate that inefficient resource allocation rather than improve it. To ensure a welfare-improving policy reform in this case would require the degree of assistance to manufacturers to be lowered first and then, only when it equals that to farmers, to phase down both simultaneously.[b] Thankfully such reforms have been undertaken in a number of developing countries over the past decade or two, ensuring less anti-agricultural bias in current policies than those before the mid-1980s (Jensen, Robinson, and Tarp 2002).

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[b] In practice, a greater degree of refinement is possible, taking into account not only input price distortions (to capture effective assistance to value added rather than just the nominal boost to the price of output) but also the degree of intersectoral substitutability and/or complementarity in production and consumption — see Corden (1971) and Vousden (1990, ch. 9).

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Where it is currently too difficult politically to lower tariff protection to manufacturers, might a similar national welfare improvement be achievable by raising the level of assistance to agriculture? In theory, maybe, but in practice such a tariff-compensation strategy would be unwise on a number of grounds. First, if rates of assistance to different industries within each of the two sectors are not equal, intrasectoral resource-use inefficiencies remain and could worsen when the average level of agricultural assistance is raised. Second, there are more than just those two sectors in the economy, so similar levels of assistance would need to be provided to fishing, mining, and other primary sectors (not to mention assistance to the service sector) to ensure an overall improvement in the efficiency of national resource use. Third, what if the farm assistance were to be provided via, say, input subsidies? That in fact often happens, even in poor countries (e.g., subsidized fertilizer and water). It turns out that agricultural support via input policies would be less efficient and possibly even counterproductive because it would encourage the use of only a subset of inputs rather than all farm inputs (Warr 1978). And, most damning of all, manufacturers would perceive their situation as deteriorating if support for primary production were increased so that if there had been no change in the political economy forces at work, they would presumably have demanded a return to previous relativities, perhaps by another hike in industrial tariffs. Clearly, tariff compensation to farmers in situations in which assistance to manufacturing exceeds that for agriculture is a far riskier reform strategy for improving the use of national resources than the first-best strategy of reducing industrial assistance programs.

THE ADDITIONAL INDIRECT EFFECT OF DISTORTING EXCHANGE RATES

Unsustainable current account deficits, overvalued official exchange rates, and the like artificially inflate the value of a nation's currency. Such policies encourage the production (and discourage the domestic consumption) of nontradables relative to tradables and thereby provide another source of inefficiency in national resource use — one that is just as much a disincentive to import-competing farmers as to those able to export. Whether overall efficiency of national resource use would rise or fall in such a setting if only a subset of import restrictions and exchange rate distortions were to be removed can only be answered with an empirical economywide model. Even if the most highly protected manufacturing subsectors were to be liberalized first, if the currency remained overvalued there is the possibility that mobile resources would move into the production of more nontradables rather than exportables. Hence, the value of comprehensive reform that simultaneously frees trade in goods, services, and currencies as well as domestic factor markets, and of empirical economywide studies to test whether any proposed reform package would raise welfare.[c]

Where there are such multiple distortions, a reforming country needs to focus simultaneously on restoring macroeconomic balance while reducing trade barriers. The structural-adjustment loan programs of the World Bank and International Monetary Fund (IMF) in the 1980s stimulated the development of economywide models that were able to

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[c] IFPRI's TMD work in the 1980s recognized this need for economywide analysis and adopted the framework in a low-cost way in a number of its studies by estimating Clements and Sjaastad's (1984) "omega" parameter to capture the substitutability in production and consumption between tradables and nontradables. See, for example, the IFPRI research reports in the 1980s on the Philippines (Bautista 1987), Colombia (García García and Montes Llamas 1988), and Nigeria (Oyejide 1986).

examine both the macro and micro policies simultaneously in a consistent framework.[d] That led to better estimates of the degree of overvaluation than the standard purchasing power parity estimates (Devarajan and Robinson 2002).

THE INDIRECT EFFECT OF POLICIES VIA FACTOR MARKETS

Partial equilibrium approaches to food policy analysis can also be misleading in that they ignore the indirect effects on factor markets. Consider the example of Thailand, which for a long time imposed an export tax on food (in its case, rice). It did so partly to raise government revenue, but ostensibly also to lower the domestic price of rice for consumers to make this staple more affordable for poor households that were not surplus rice producers. In the process, that tax lowered the producer price and so lowered the real incomes of those rice farmers who had (or would have had at the free-market price) a surplus to sell. The tax was imposed for decades, even though many such farmers were very poor. More than that, though, a recent empirical study using an economywide CGE model has shown that Thailand's rice export tax also worsened — rather than improved — the incomes of the urban poor in that country. This apparently paradoxical result comes about because the rice export barrier reduced the income-earning prospects of unskilled workers, and to a sufficient extent to more than offset the help that group of workers received directly in terms of the lower consumer price of rice. Those poor workers' incomes were reduced because the trade tax lowered the aggregate demand for and hence wages of unskilled labor (the country's most abundant factor of production), not only on farms but also in nonfarm activities (Warr 2001).

CGE analysis can also be used to demonstrate the importance of policy distortions in factor markets themselves in affecting the poverty consequences of trade reform. An example again provides an easy way to make the point. There has been much concern that the import growth associated with China's recent accession to the World Trade Organization (WTO) would involve reductions in agricultural protection that would reduce incomes of poor farm households in China. Initial empirical studies seemed to support that view. However, CGE modelers are able to show that it is China's restrictions on the migration of farm workers to urban jobs that is responsible for that anti-poor outcome. When accession is modeled with that restriction on labor out-migration removed, some members of farm households are then able to take advantage of the growth in demand for low-skilled workers in nonfarm activities, which could raise the productivity of remaining farmers enough to more than compensate for the lowering of the price of their output — especially if some of their family members who move to nonfarm jobs are able to remit some of their higher earnings back to the farm household (Anderson, Huang, and Ianchovichina 2002).[e]

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[d] Such models are also capable of examining at the same time the tax implications of trade and exchange rate policy reforms, and of changes in tax policies that might be contemplated to ease adjustment or compensate losers. In principle, such models would also be capable of generating an estimate of the change in the marginal cost of taxation (Snow and Warren 1996).

[e] That analysis did not attempt to estimate the social costs or benefits associated with the increased urbanization that would accompany a removal of restraints on rural-to-urban migration, but in principle that is something a CGE model could be used for as well.

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WHAT ABOUT SOCIETY'S "NONECONOMIC" OBJECTIVES?

Trade and other economic policy reforms should not be undertaken without regard for society's "noneconomic" objectives. This is because welfare improvement via trade liberalization cannot be guaranteed if domestic policies are not in place to achieve those social objectives optimally. The **natural environment** is one illustration. Reducing restrictions on exports of logs in the absence of other forest resource policies and institutions is likely to lead to excessive deforestation, just as the reduction in Mongolia's export tax on cashmere encouraged excessive grazing of common pastures. Such overexploitation is in part the result of property rights being poorly defined and/or inadequately policed. Clearly, better resource and environmental policies are required before optimal social welfare can be achieved through trade, exchange rate, and investment policy reform, and the levels of environmental policy intervention need to be adjusted when markets are liberalized to ensure that the welfare loss from any additional environmental damage that accompanies reform is matched with the marginal welfare gains from market expansion. In such cases, not even the sign, let alone the magnitude, of welfare and other effects of policy changes can be determined without an empirical model. With respect to the environment, for example, a change in a product price may reduce pollution side effects associated with domestic production or consumption of that product, but cause even more pollution damage through expanding activities in another product market. Economywide analyses that add environmental features to CGE models are able to better inform society and its policymakers of such prospects than are partial equilibrium studies.

Another illustration has to do with the impact of reforms on **income distribution** and **poverty** (and, partly through that, on **food security**).[f] Partial equilibrium analysis of market reform is incapable of adequately examining the effects on earnings (via factor rewards) when some factors are intersectorally mobile, just as it is incapable of examining the effects on household spending (via changes in relative consumer prices facing different types of households) when there is some degree of substitutability or complementarity in consumption. The earliest CGE analysts saw the potential for improving our understanding in this area (e.g., Adelman and Robinson 1978), and in recent years international donors have sought out such insights as they work with national governments to develop poverty reduction strategies (e.g., Devarajan and Go 2003). That new demand by policymakers is currently stimulating the development of CGE models that incorporate household survey data so as to get a clearer idea of short-run and long-run effects of reform and structural adjustment on different household types, especially those near or below the absolute poverty line.

LIMITATIONS OF CGE MODELING

None of the above discussion is to deny the usefulness of single-sector or single-product studies, which have the great virtue of simplicity and thereby transparency. Nor should the difficulties of doing CGE analysis well be underestimated. Resources need to be devoted to specifying policy measures accurately (e.g., not just expressing them as ad valorem producer, consumer, or trade subsidy or tax equivalents if quantitative restrictions apply); developing social accounting and bilateral trade matrices; deciding on the length of

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[f] These illustrations are but a part of a broader set of concerns about human rights (including workers' rights) that CGE modeling can address.

run under consideration (short, medium or long run) and hence the degree of intrasectoral, intersectoral, and international factor mobility; and estimating econometrically, in a general equilibrium framework, the production, consumption, and trade elasticities and various other parameters in the model for the short, medium, and long run. The extent to which each domestically produced good is internationally tradable, the extent to which tradables imported from one country are substitutes for like products from another country or for those produced domestically, and the extent to which productive factors are sector-specific could be of particular importance. Where insufficient resources are available to address all these matters adequately — which is almost always — the modeler often has to resort to "borrowing" parameter values from other models. Then there is even greater onus on the modeler to validate the model through, for example, backcasting and/or to undertake systematic sensitivity analysis over the likely range of values for uncertain parameters.

There is also the need to explain to readers the reasons behind nonintuitive results, which requires decomposition analysis (drilling down inside the "black box"). Both types of postsimulation analysis (sensitivity and decomposition) take time to do, space to write up, and then perseverance on the part of the reader to digest. And the wider the range of plausible results provided by the sensitivity analysis, the less useful is the output from the practitioner's viewpoint. Hence, it is not surprising that the CGE results most widely cited and used are those that conform with conventional wisdom and/or support the findings of other (e.g., partial equilibrium) analyses (Devarajan and Robinson 2002).

That said, the point remains that a CGE modeling approach has the potential to provide a more comprehensive, consistent, and therefore potentially more accurate analysis than simpler partial equilibrium analysis if the above data and econometric needs can be met. And it should also be kept in mind that compiling those data and providing those econometric estimates are valuable exercises in and of themselves, apart from their contribution to better CGE analysis. Relatively skilled analysts are needed for those tasks, however, as is also true of running the models and drawing out and communicating the results to policymakers. Weaknesses in any of those links in the chain can weaken the potential impact of economywide modeling on the policy process.

IMPLICATIONS FOR REFORM-MINDED PRODUCERS, POLICYMAKERS, TRADE NEGOTIATORS, AND IFPRI

A clear implication from CGE analysis for producers seeking to influence government policy is that their focus should not be confined just to measures directly affecting their industry. The Krueger, Schiff, and Valdés (1988) study suggests that the indirect effect of nonagricultural and macroeconomic policies on farmers' welfare in some cases had, at least up to the 1980s, several times the influence on incentives that the agricultural policies affecting export-oriented farmers had directly. This was also true within a sector, and more so the more that productive factors were substitutable within than between sectors.

An aspect of exporters' lobbying activities involves encouraging the removal of market access impediments abroad. Here again, an economywide perspective is helpful. Consider, for example, the interests of developing countries with a strong comparative advantage in agriculture. They would be likely to benefit directly from the reduction in agricultural protectionism in advanced industrial countries. But they could also benefit from a reduction in manufacturing protection in those same rich countries, albeit indirectly. The

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most obvious example is a reduction in the very high import barriers to textiles, clothing, and footwear. Greater global production and trade in those products would result, with the output expansion concentrated in newly industrializing countries. A direct consequence would be an expanded demand for cotton, wool, and leather inputs, but that is only part of the impact on agrarian developing countries.

More importantly, such reform would speed the industrialization of the more densely populated developing countries, which would attract resources away from those countries' farm sectors. An indirect consequence, therefore, would be an expansion in food import demand by those newly industrializing countries, which would boost exports from more agrarian developing countries. This suggests that there is scope for agrarian and newly industrializing developing countries to mutually benefit from acting collectively to push hard for greater market access for both farm and textile products in advanced economies. In return, those developing countries would be expected to provide more access to their developing-country markets for goods and services exported by advanced economies — another dimension of the intersectoral connectedness of the global economy.

Given IFPRI's mandate to reduce hunger and malnutrition, alleviate poverty, and enhance the natural environment (IFPRI 2003), it is not surprising that for more than two decades IFPRI researchers have been at the forefront of moving analysis of food and agricultural policy issues into an economywide framework. The rest of this report focuses on how well that has been done by IFPRI staff and associates during the past decade.

3. IFPRI'S INPUTS INTO ECONOMYWIDE MODELING

EXPENDITURE

In terms of inputs into economywide modeling, most of IFPRI's effort was in the Trade and Macroeconomics Division (TMD), so we focus attention here on its inputs. The total budget of that division was $0.9 million in 1994, of which less than $0.4 million was from core IFPRI funds. By 2002, the TMD budget had grown to $2.2 million, representing a nominal growth rate of just over 10 percent per year during those nine years. That is somewhat faster than the growth rate of IFPRI as a whole. The share provided from IFPRI's core funds rose from 40 percent in the mid-1990s to 55 percent at the turn of the century, before declining to 31 percent in 2002. That decline is faster than for IFPRI as a whole, suggesting that TMD was able to attract outside funds faster than the rest of IFPRI in recent years, providing a return on the relatively heavy investment from core funding in earlier years. The division's share of IFPRI's total expenditure on direct research and outreach grew from 8.4 percent in 1997 to 12.8 percent by 2002 (Appendix Table A1).

TMD was the smallest of the four research divisions at IFPRI, accounting for a little over 10 percent of IFPRI's research budget and total staff in recent years, and about one-seventh of its research (including visiting) fellow and research assistant staff. The Markets and Structural Studies Division was similarly sized (before absorbing the trade group from TMD in April 2003), while the Environment and Production Technology and Food Consumption and Nutrition Divisions were about twice as large (Appendix Tables A1 and A2).

STAFF

The majority of TMD's funds since 1994 were spent on salaries of regular staff and collaborators.[g] While there was an average of 2.8 research fellows employed per year in addition to the division director, there were a further 2.4 visiting research fellows and 7.8 research analysts or research assistants per year (Appendix Table A3).[h] No fewer than 18 of the 22 research analysts and research assistants (together abbreviated as RAs) employed over the nine years were graduate students completing a Ph.D. dissertation involving economywide modeling, eight of whom had Sherman Robinson formally as an outside dissertation supervisor.[i] Four of those eight stayed on as IFPRI postdoctoral fellows, adding

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[g] For IFPRI as a whole, three-quarters of expenditure is on the aggregate of salaries (including fringe benefits), collaboration/field expenses, and staff travel (respectively made up of 47 percent, 21 percent, and 7 percent on average since 1997 — see IFPRI's annual reports).

[h] The titles of some of the research and administration staff began with the adjective "senior" for some years — see Appendix A, Table A3.

[i] The universities involved are widely dispersed: George Washington University (2), University of Maryland (2), Johns Hopkins University (4), University of Minnesota (1), University of Hohenheim (1), Sorbonne (1), University of Copenhagen (2), Kiel University (1), University of Trondheim (1), Sussex University (1), University of North Carolina (1), University of Toulouse (1), and University of North Carolina (1). One student was a Ph.D. student at the University of Minnesota but was based at Kiel University when he was working with TMD. While all these are U.S. or EU universities, several of the students came from developing countries.

another 1.2 person years of researchers per year. The total annual staffing over those nine years was thus (1.0 + 2.8 + 2.4 + 1.2 =) 7.4 researchers and 7.8 RAs, plus a senior administrative coordinator and a program assistant. (In addition, TMD drew on the usual central administrative staff for services such as auditing, travel, computing, library, publications, etc.). TMD would have required workstations, office space, and equipment for 10 initially and ultimately more than 20 staff.

Not all of those TMD staff were involved in economywide modeling per se during all of the past decade, but the vast majority were and the rest drew frequently on the others' model results for their policy research and analysis. For the purposes of this report, therefore, all TMD inputs and outputs over this period will be examined even though the impact assessment will focus just on economywide modeling.

EXPENDITURE PER RESEARCHER

Expenditure per researcher (including RAs) in TMD averaged $116,000 during 1994–96, then fell to $87,000 by 1999 before rising again to $102,000 by 2002 (not counting services in kind from central administration and outreach divisions). In 1998, it was $96,000, when the expenditure for IFPRI as a whole was $227,000 — but that includes institute-wide outreach activities such as 2020 Vision. Roughly comparable data for 1998 are available in Pardey and Christian (2002, Table 2) for the following institutions: the International Maize and Wheat Improvement Center's (CIMMYT's) economics program ($107,000), Stanford's Food Research Institute ($102,000 in 1995), the Australian Bureau of Agricultural and Resource Economics ($79,000), and the International Rice Research Institute's social science program ($42,000).

An even more pertinent comparator is the Centre of Policy Studies (CoPS) at Monash University in Australia. CoPS, like TMD, is almost entirely focused on CGE modeling and is self-funded through contract teaching to the Economics Department, providing short courses on CGE modeling, and undertaking research and consulting commissioned by government and business in Australia and abroad.[j] In 1997–98, CoPS had virtually the same number of researchers as TMD too, with a budget of just under $90,000 per researcher. By those standards, it would appear that TMD was well funded per researcher, particularly when the Institute's central services are included, but was not out of line with high-quality comparator institutions.[k]

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[j] CoPS and its predecessor centers at Melbourne and La Trobe Universities is one of the most enduring and successful CGE modeling groups in the world. It has been in continuous operation for almost 30 years; its leader, Professor Peter Dixon, together with his colleagues, has been a prolific publisher, including four books for Elsevier's prestigious Contributions to Economic Analysis series (a record); and the policy impact of its CGE modeling, while mainly confined to Australia, is acknowledged even by skeptics to be very considerable (Powell and Snape 1993; Dixon 2001).

[k] Another CGE modeling group of relevance is the GTAP (Global Trade Analysis Project) community, based at Purdue University under the leadership of Tom Hertel (who was inspired to develop this project following a sabbatical at CoPS at Monash University, where he was able to freely obtain the Australian government-developed SALTER model of the global economy as a starter). GTAP has been extraordinarily successful, but it depends on the goodwill of hundreds of volunteer contributors in universities and other research institutions throughout the world, so it is impossible to calculate the inputs into its development.

RANGE OF SKILLS

For a research program involving economywide models to have an impact on conditions in developing countries, it must not only generate new knowledge but also apply this knowledge to real-world policy issues, offer training to developing-country analysts seeking to use such models in their home setting, and help disseminate the findings to policymakers. This requires a team approach so as to get the right mix of skills to cover — as TMD did — the following areas:

- basic research in developing the methodology and software for models that are relevant to the various developing countries in which IFPRI works (appropriate disaggregation, policy specification, technology specification, agent behavior, and structural adjustment dynamics);

- data development involving the compilation of social accounting matrices (SAMs) for each developing country of interest and the updating of those SAMs as needed;

- adaptation and implementation of models for particular research projects, short-term policy missions, or training programs;

- participation in policy advisory activities in developing countries; and

- involvement in capacity-building activities by such means as university subjects, short courses, and on-the-job training through collaborating in joint research, in the preparation of policy briefs, and in the dissemination of policy messages to stakeholders.

CRITICAL MASS

It is clear from the above list that any such research team has to have critical mass. That is, it requires a budget of sufficient aggregate size to attract a mix of staff with technical competence, appropriate policy experience and country knowledge, willingness to spend time in developing countries compiling data for SAMs and specifying behavioral and policy details for the model, and capacity to respond effectively to short-term requests for policy analysis without endangering the ongoing longer-term research program. That means a mix of technically competent senior and junior staff is needed, together with a strong team leader capable of motivating the group to work well as a team. Reaching that critical mass was achievable with the three to five full-time IFPRI fellow positions available to TMD over the past decade, but only through the judicious use of visiting fellows, graduate student research assistants/analysts, and other non-IFPRI collaborators, as noted above. The involvement of graduate students had several advantages: they brought in technical expertise and recent university training at low cost, thereby energizing and boosting morale within the research team; they were excellent in working with collaborators in developing countries, including in teaching short courses/workshops; some of them became TMD postdoctoral fellows, and as such they hit the ground running; and some became collaborators and even customers when they moved on from IFPRI.

4. IFPRI'S ECONOMYWIDE MODELING OUTPUTS

The key outputs from institutions focusing on basic research are publications and the research methodologies presented therein. Applied research institutions may also (or instead) produce data and models, and policy analyses using them. If an institution also has a mandate to strengthen capacity for policy analysis in developing countries, then training programs for researchers working in/for those countries also are appropriate outputs. Since almost all of the economywide modeling at IFPRI was done solely by or jointly with TMD staff, it is TMD outputs that are evaluated here.

PUBLICATIONS

The publication outputs of TMD, like those of IFPRI's other research divisions, range from contributions to books and journals to freely downloadable IFPRI research reports, TMD discussion papers, and outreach items such as policy briefs. In addition, TMD has produced and made publicly available numerous national SAMs, CGE models, and SAM/CGE training manuals. These are listed in Appendix Tables B1 to B9.

Table 1 below, which reports the annual output since 1994 for both TMD and the rest of IFPRI, shows that TMD published somewhat fewer books, journal articles, IFPRI reports, and policy briefs than other divisions, but was 3 percent above average in publishing chapters in books, and 85 percent above the IFPRI average in discussion papers, not to mention its SAMs, CGE models, and training manuals. The 108 TMD discussion papers during 1994–2002 (ignoring those published in 2003 — see Appendix Table B1) also compares favorably with CoPS at Monash University, which produced 68 working papers over the same years (although CoPS also produced myriad reports for commercial clients that have not been made publicly available — see http://www.monash.edu.au/cops). Given that there have been 67 TMD researcher years of input over this period (not counting RAs), these data imply published outputs per TMD researcher of 0.1 IFPRI reports, 0.8 journal articles, 0.5 chapters in books, 1.0 TMD discussion papers, 0.5 policy briefs and such, 0.2 SAMs, and 0.06 CGE models, for a total of 3.2 publications per year.[1]

The averages in Table 1 hide the fact that the pace of TMD publishing has grown rapidly in recent years after a relatively long lead-time (see Appendix B). This is not surprising for a research program focused so heavily on economywide modeling, given the long periods required to build databases and models before the empirical policy analyses can begin to flow. Furthermore, in the case of SAMs and CGE models, the published outputs (13 SAMs and 4 models, all appearing since 2000) are but the tip of an iceberg. Appendix Table B5 cites the discussion papers in which another 35 SAMs created by TMD, while not published are available (23 national ones and 12 multiregional ones). That table also notes that a further 18 SAMs are forthcoming from the recent United Nations Development Programme (UNDP)-funded project aimed at generating models for 18 Latin American countries. Similarly, Appendix Table B7 shows that the number of countries for which

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[1] By comparison, IFPRI's IMPACT modeling efforts produced a total of 10.4 publications per researcher year (excluding conference papers) over the eight years reviewed by Ryan (2003), 70 percent of which were papers in externally refereed books or journals (compared with 35 percent for TMD). The budgetary cost and researcher years of time devoted to IMPACT activities were about one-sixth those of TMD.

models have been developed and reported in TMD discussion papers, even though not publicly available, is now around 35, including the 18 that are forthcoming from the Latin American project. That table also lists nearly a dozen regional (including global) models developed by TMD for various purposes. Given this skewed distribution of outputs over time, one could anticipate that this team would produce far more output per researcher year in its second decade than in its first.

Table 1 — Publications by IFPRI and its TMD, 1994 to March 2003

	Books	IFPRI reports	Journal articles	Chapters in books	Discussion papers	Policy briefs, etc.	SAMs	CGE models & manuals
TMD								
1994	0	1	0	0	0	0	0	0
1995	0	1	1	0	8	0	0	0
1995	0	1	1	0	8	0	0	0
1996	0	0	3	3	7	1	0	0
1997	0	0	3	6	9	4	0	0
1998	0	0	8	6	9	12	0	0
1999	0	0	6	5	17	4	0	0
2000	0	1	16	5	14	5	4	2
2001	0	2	10	2	19	3	0	1
2002	0	3	10	4	25	6	9	1
TOTAL	**0**	**8**	**57**	**31**	**108**	**35**	**13**	**4**
Annual average	**0.0**	**0.9**	**6.3**	**3.4**	**12.0**	**3.9**	**1.4**	**0.4**
Rest of IFPRI								
1994	2	5	43	11	15	22	–	–
1995	1	4	27	3	24	31	–	–
1996	2	2	49	14	32	16	–	–
1997	3	4	55	12	53	12	–	–
1998	5	8	58	20	37	17	–	–
1999	3	10	47	21	63	28	–	–
2000	10	8	56	30	40	38	–	–
2001	10	12	95	33	43	53	–	–
2002	8	7	70	33	42	40	–	–
Annual average divided by 6ᵃ	**0.8**	**1.1**	**9.3**	**3.3**	**6.5**	**4.8**	**–**	**–**

Source: TMD and (for the IFPRI totals) Pardey and Christian (2002) and updated data provided by Marc Cohen for 2001 and 2002.

[a] The average number of researchers in TMD was one-seventh of the total in IFPRI over this period, so dividing the "Rest of IFPRI" annual average by 6 makes it comparable with the annual average for TMD.

The geographic distribution of the national models is fairly widespread among the poorer developing countries. In addition to 18 for Latin America, there are 9 for Africa and 5

for Asia (plus at least one SAM for Vietnam). Asia is clearly underrepresented in this set, but that may be justified by the greater proportion of other institutions' models of Asia.[m]

Just over one-third of the 108 TMD discussion papers during 1994–2002 have been subsequently published in books or journals: 20 percent in journals and 15 percent as chapters in books. This aggregate of 35 percent is lower than the IFPRI average of 56 percent over the 1994–2001 period, and probably lower than in universities. But a low average is understandable for an economywide modeling group that uses the series also to disseminate its SAMs (and bearing in mind that numerous other TMD articles bypassed the discussion paper stage, see below).

Of the 108 discussion papers produced by the end of 2002, TMD staff identified exactly two-thirds as using an economywide model for the major part of their analysis or documenting economywide databases (especially SAMs) and methods for their estimation. Another one-eighth draw directly on insights from economywide work or use such models for a minor part of their analysis, leaving just over one-fifth that are not closely related to economywide modeling. Likewise, most of the division's contributions to the IFPRI research report series have been based on CGE modeling (five out of seven, see Appendix Table B2).

As for external publications, TMD staff published no books until this year (when a volume edited by Hans Lofgren appeared). This compares, for example, with four authored books published through reputable commercial publishers by the CoPS group at Monash University over the same period.

More than twice as many articles by TMD staff were published in journals and as chapters in books than indicated by the list of TMD discussion papers subsequently published in such outlets. This is an unusual practice: given the long delays in getting to-be-published papers from the accepted stage to the printed stage, it is normal to put such papers in a working/discussion paper series and preferably on a website for free downloading, pending their final publication, so as to maximize the speed of dissemination of the material in them.

Not surprisingly for applied policy analyses, TMD staff tended to publish not in first-ranked theory journals but rather in such reputable field journals as the *American Journal of Agricultural Economics, Journal of Comparative Economics, Journal of Economic Perspectives, Journal of Environmental Economics and Management,* and the *Review of Development Economics* (see Appendix Table B3). Book chapters appeared in a wide range of volumes, mostly with a developing-country policy focus and often following a conference on the topic.

The level of publication per TMD researcher has been high in part because of the extent of co-authorship between TMD and non-TMD staff. Most of those co-authors are non-IFPRI staff. Of the 111 TMD discussion papers released to date, 50 are jointly authored by non-TMD staff, and only five of those (Nos. 11, 73, 76, 87, and 108) involve authors employed elsewhere in IFPRI.[n] Of those 50, about one-fifth of the non-TMD co-authors are

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[m] For example, each of the Northeast Asian and several of the Southeast and South Asian countries have research groups with CGE models of their national economy.

[n] Number 76, on evaluating the PROGRESA program in Mexico, was an especially important example of useful collaboration between divisions, in that case with IFPRI's Food Consumption and Nutrition Division (FCND).

from developing country institutions, with most of the rest from U.S. institutions; about half are at universities, one-third are in policy research institutes, and the remaining one-sixth are equally split between national and international bureaucracies.

The relatively high level of TMD co-authorship with non-IFPRI researchers demonstrates a high degree of leverage of IFPRI funds. However, in so far as TMD was above the IFPRI average in terms of its share of outside co-authors, then the indicator "publications per TMD researcher" as used here overstates the degree of these researchers' productivity since it does not fractionalize each author's contribution according to the number of co-authors.

OTHER OUTPUTS

IFPRI's economywide outputs involved more than just publications. Other outputs of note are its training programs in economywide modeling and its contribution to new methods for compiling SAMs and undertaking economywide modeling. TMD training programs have been held in a wide range of locations in Africa, Asia, Latin America, and the Middle East. More than a dozen examples over the past three years are listed in Appendix Table B8. The courses ranged in duration from four days to four weeks, each involving more than 20 participants on average. Participants came from a mix of ministries, planning commissions, central banks, national statistical agencies, policy research institutes, think tanks, and universities. Some of the courses focused more on CGE modeling methodology, others more on applied policy analysis. And some were geared to a single country while others involved regional groupings of up to a dozen countries.

With regard to IFPRI's contributions to new methods for compiling SAMs and undertaking economywide modeling, the list is substantial. Staff members say these activities involved only a small portion of their time, which makes this by-product of their core applied research all the more impressive. As examples, Table B9 summarizes some of these outputs that were generated over the past five years. The first listed is in maximum entropy econometrics. Given the problem of acquiring data in developing countries, there is a premium on finding estimation techniques that can efficiently use available information without making strong assumptions about missing data. IFPRI staff have developed a very flexible approach using cross-entropy methods that is now being used extensively in estimating both SAMs and CGE model parameters. Seven TMD discussion papers (two of which have since appeared in journals) report these developments.

A second area of methodological development, again stimulated by the needs of developing-country clients, is in microsimulation modeling. Compared with conventional CGE models, these can take the analysis of income distribution one step further. Drawing on household survey data, econometrics is used to provide behavioral detail so as to allow analysis of the effects of policy reform or other shocks on the entire distribution of households rather than on just one or several representative households. This is particularly useful for focusing on the impact of shocks on inequality and the incidence of poverty. IFPRI staff have posted on the World Bank website a paper that extends the standard CGE model so it can draw on additional information about representative households to compute relatively easily a range of poverty and inequality indexes.

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A third area is dynamic CGE modeling. This includes both recursive and intertemporal optimization approaches. More than a dozen published papers are listed in Appendix Table B9 as contributing to this field. Also listed are papers contributing to multiregional modeling both within and between countries (with the most recent examples providing a specific treatment of geographic space) and to modeling the global economy with imperfect competition, which is crucial for analyzing services trade liberalization.

Yet another set of contributions to methodological development relates to the numerous novel applications of CGE models for analyzing critical policy issues for developing countries. One example is gender analysis. By including men and women as separate factors of production, and household work and leisure as additional activities, extra insights are possible: in addition to providing gender-disaggregated welfare impacts of shocks, the inclusion of gender in the structure of the economy being modeled allows for different behavioral responses by men versus women — something that is of significance in many developing-country settings. Another example is health economics. IFPRI economywide work in this area has included analyses of the effect of environmental policies on health improvements and their feedback effects on the economy of Thailand, and the effect in Africa of HIV/AIDS on growth prospects and human capital accumulation.

RANGE OF POLICY ISSUES ANALYZED AND COUNTRIES AND PRODUCTS COVERED

Finally, the discussion on outputs should mention the wide range both of food-related policy issues and of countries and commodities that have been analyzed by IFPRI's economywide modelers over the past decade. In addition to standard macroeconomic and national, regional, and global trade policy issues and the items mentioned above (poverty/income inequality, gender, health), the issue coverage has included land, water, forestry, and other natural and agricultural resource issues, climate change and other environmental issues, technology shocks including new biotechnologies, nonfood sector shocks that impact the food sector, collapsing agricultural prices, financial crises, fiscal policies, labor policies, and, of course, food pricing policies themselves. By their nature, economywide models involve all product and factor markets, so in principle any product or industry could be the focus of attention. The vast majority of the attention of TMD staff has been directly or indirectly focused on issues of relevance to the food sector, however.

As for country coverage, more than 40 nations are involved individually in TMD publications in addition to the numerous multicountry regional and global studies. All this is consistent with IFPRI's priorities as laid out in its latest strategic plan (IFPRI 2003), namely:

- to provide policy solutions that reduce hunger and malnutrition,

- to address the major emerging issues affecting food security, and

- to focus on issues that produce results applicable to many countries and that help the greatest number of people in deepest need (i.e., to efficiently provide international public goods).

This coverage of countries and regions by IFPRI modelers is in stark contrast to most other CGE modeling groups, which often have a single focus. Examples are CoPS at Monash University (focusing almost entirely on national modeling of the Australian economy,

although with occasional technical assistance to other countries' modelers); the GTAP community, with its home base at Purdue University (almost all users draw on one core global model and database); and the Michigan Model of World Production and Trade, based at the University of Michigan (again using just one core model and database).

5. UPTAKE OF IFPRI'S ECONOMYWIDE MODELING OUTPUTS

The first step toward research outputs having an impact is for them to be sought by others. Indicators of that in the case of publications include website downloads of discussion papers; requests for data sources and models; requests to present results at seminars, conferences, and workshops; and journal citations. In the case of training programs it might be information on the career development of participants following their attendance at a training session.

WEBSITE DOWNLOADS

Data are available on downloads from http://www.ifpri.org for the period January 2002 to March 2003. In those 15 months, the number of downloads of TMD discussion papers exceeded a staggering 105,000. One paper was extraordinarily popular, with 22,400 downloads: No. 75, which was the first version of the standard CGE model (by Lofgren, Harris, and Robinson, April 2001) prior to its publication in early 2003 as No. 5 in IFPRI's Microcomputer Series of papers. But of the 108 discussion papers produced by the end of 2002, a further 26 had more than 1,000 downloads, and virtually all enjoyed several hundred, making the average number 980 (or 65 per month). The most popular were the modeling papers, which comprised 67 percent of the total: their average download was 1,162, or 863 excluding No. 75. Next most popular were the 11 percent of papers drawing on insights from economywide models or using such models for a minor part of the paper, with an average of 708 downloads. The nonmodeling papers (the remaining 22 percent) averaged 558 downloads.

That rate of downloads for this rather narrow research field compares very favorably with the rate of 220 per month during 2000–01 for the eight most popular publications from IFPRI's 2020 Vision Initiative (Ryan 2003, Table 3), since TMD's rate during the 15 months to March 2003 for its top eight discussion papers was 313 per month.

Downloads of the much lengthier IFPRI research reports by TMD staff also were numerous, even though the last two came out only at the end of 2002:

No. 115	2,131	(wheat policy in Egypt)
No. 117	7,170	(structural adjustment in Tanzania)
No. 119	858	(Egyptian food subsidies)
No. 126	1,406	(development in Mozambique)
No. 128	361	(policy reforms in Zimbabwe)

Part of the output from model-based analyses has been used in TMD-written essays included in IFPRI annual reports. In 1998, for example, the essay title was "Globalization, Trade Reform, and Developing Countries," while in 2000 the title was "Biotechnology, Trade, and Hunger." Those essays have proved popular, attracting website downloads in the 15 months to March 2003 of 1,196 and 1,914 copies, respectively, in addition to being read as part of the many hard copies of those annual reports that have been distributed.

Downloads do not, of course, tell us how much these papers are read, or how influential they have been, and IFPRI has not collected information on who is downloading its publications. Nonetheless, the sheer volume of downloads is impressive by any standards.

CITATIONS IN JOURNAL ARTICLES

Comprehensive citation data have not been compiled for this study, but one set has become available from the ISI Social Science Citation Index, which records the number of times a researcher's work is cited in the covered journals each year. It shows that the eight TMD researchers on the staff in March 2003 had been cited on average 16 times over the period 1995 to 2001, or 2.3 times per year. Sherman Robinson was responsible for 43 percent of those (a rate of 8 cites per year) and Channing Arndt for 23 percent of them.

REQUESTS FOR SOCIAL ACCOUNTING MATRICES

Only 13 of the SAMs produced by TMD have been made publicly available so far, some from mid-2000 but the majority from mid-2002. By the end of March 2003 there had been 1,041 requests for them (Appendix Table B4). That is an average of more than six per month per SAM (taking into account each one's release date), with none involving less than three requests per month. The majority of those requests (600) have come from a wide array of developing countries. While another 208 are from the United States, and 83 from the United Kingdom, many of those may well have been from students from developing countries who are studying in the United States or United Kingdom (or from their supervisors). Indeed, 57 percent of requests were from universities, as shown in Appendix Figure C1.

Of the unreleased SAMs, information has been provided about them in pertinent TMD discussion papers, as noted in Appendix Table B5. Those papers have been almost as popular in terms of downloads as the other discussion papers, averaging 793 downloads compared with the 980 average for the entire DP series as reported above.

REQUESTS FOR CGE MODELS AND TRAINING EXERCISES

Publicly released CGE models have been distributed in hard-copy form as well as via diskette and e-mail for some years,[o] but records were not kept prior to the publication of the standard CGE model in Discussion Paper No. 75. In addition to its more than 22,000 downloads over the past 24 months, many copies have been distributed in its newly published form (hard copy and CD-ROM) as No. 5 in IFPRI's Microcomputer Series of papers (354 in the first two months alone). As for unreleased CGE models, information has been provided about them in pertinent TMD discussion papers, as noted in Appendix Table B7. Those papers have also been quite popular in terms of downloads, averaging 757 downloads (again compared with the 980 average for the entire DP series).

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[o] For example, TMD gave the United States International Trade Commission (USITC) the source code for a CGE model in 1994, which the USITC made good use of but then kept for its own use rather than making it freely available.

Accompanying the standard model are two other papers in the Microcomputer Series of papers (No. 4a and 4b) that provide exercises in CGE modeling using GAMS and a key to their answers. These have been used in numerous training programs since their release in 2000 and have been distributed in hard copy and CD-ROM (almost 300 copies) as well as via e-mail and the website. The number of downloads in the 15 months to March 2003 amounted to 2,513 and 1,815, respectively.

REQUESTS TO PRESENT RESULTS AT OUTREACH WORKSHOPS/ CONFERENCES

IFPRI's economywide modeling staff have been increasingly active in taking part in seminars, workshops, and conferences, largely by invitation. In the first half of the decade under consideration, the average number of presentations per year was just over 30 (5.1 per researcher), but it rose to more than 60 at the turn of the century (6.3 per researcher) and more than 80 in the two most recent years (8.9 per researcher). The majority of those presentations were in developing countries, but a significant number were at meetings in OECD countries, including ones focused on economywide methodological developments (see the long lists in the annual TMD Internal Program Review, compiled in December each year).

REQUESTS TO EMPLOY IFPRI CGE MODELING EXPERTISE IN OTHER INSTITUTIONS' SHORT-TERM PROJECTS

Appendix Table C1 provides a sample list of numerous projects by other institutions (such as the World Bank) that have sought and used TMD expertise in economywide modeling and analysis. There is clearly a strong demand for these services, so an issue for IFPRI is to decide how much of its modelers' time should be spent on those activities as compared with IFPRI-initiated efforts to more directly influence policies of importance to food and nutrition security in developing countries. Making an ex ante judgment about that is, of course, even more difficult than assessing its worth ex post. That activity with other institutions also adds to the difficulty of assessing the impact of IFPRI's modeling in any particular setting, since there needs to be a sharing of the credit with those other institutions.

TRANSFERS OF IFPRI MODELS AND DATA SETS TO STUDENTS AND OTHER RESEARCHERS WORKING ON DEVELOPING COUNTRIES

Numerous requests have been met to transfer IFPRI's economywide models and data sets to students and other researchers who are undertaking their own studies of particular developing countries. The sample list of such transfers provided in Appendix Table C2 shows that a wide range of developing countries have been the focus of those requests.

USE OF IFPRI'S ECONOMYWIDE MATERIAL IN UNIVERSITY COURSES

A sample list of university courses in economywide modeling that have adopted papers written by IFPRI staff as part of their required reading is provided in Appendix Table C3. This list was obtained by a very quick Internet search and so greatly underestimates the likely extent to which such usage is being made of IFPRI's CGE modeling outputs.

Nonetheless, it is a further illustration of the state-of-the-art contribution to basic research provided by IFPRI's work program in this area.

USE OF IFPRI'S SAMS BY OTHER MODELERS

Apart from their use by the governments of the countries for which they have been developed, IFPRI's SAMs have been used by other economywide modelers. Perhaps the most important example of such uptake is by the GTAP Center at Purdue University. The SAMs compiled for the various southern African nations have been incorporated in the latest version of the GTAP model's database, enabling considerably more country disaggregation of sub-Saharan Africa in the standard GTAP model. With the recent development by IFPRI of new SAMs for 18 Latin American countries, a similar disaggregation of that region in GTAP would be possible if sufficient resources are made available to transfer them to the GTAP template. This is a fine example of the international public good contribution by IFPRI to this field, because it is only as those SAMs become available that the GTAP global database can be disaggregated to provide for more countries. Moreover, the higher the quality of those SAMs, the more the GTAP model will be used by researchers working on those newly added countries for their own analysis of trade policy issues. The multiplier effect of this contribution is very difficult to gauge, but judging by the impact the addition of the southern African countries has had, it is very substantial. And for international trade policy analysis for a country involved in regional or global reform initiatives, having access to a global model enables far more precision in estimating those reforms' impacts on separately included countries than is possible with access to just a national model.

6. IMPACT OF IFPRI'S ECONOMYWIDE MODELING

The next step, in drawing inferences from the above outcomes about the impact of TMD economywide modeling research in providing policy solutions to reduce hunger and malnutrition and boost food security in developing countries, is necessarily a heroic one. It is difficult enough to assess the impact of a tightly confined individual project, such as the three-year IFPRI one on rice policy in Vietnam (Ryan 2002), and more so for a modeling exercise of global scope, as with IFPRI's partial equilibrium IMPACT model (Ryan 2003). But in the present case of economywide general equilibrium modeling, the complexity of impact assessment is even greater because many individual countries as well as multicountry regions are involved, as are all goods and services and all factors of production. And because this is a relatively new field of applied research, substantial methodological and data investments have been required up front in order to make economywide models relevant for the various types of developing countries under study.

What is already clear from the previous sections of this report is that IFPRI's economywide modelers have made very substantial contributions in terms of basic methodologies for compiling SAMs and building models, and in providing the standard CGE model and SAMs for a large number of countries — international public goods that are enabling non-IFPRI researchers to have an impact on the well-being of poor people. That impact, while too diffuse to quantify, is nonetheless clearly recognized by peers, as reported in the previous section on uptake of IFPRI's outputs in this area.

How much further is it possible to go? A formal assessment, of the type outlined in Schimmelpfennig and Norton (2003), is not possible in this case. Instead, two less-formal approaches are used to provide some idea of the impact of IFPRI's economywide research. The first is to report on the results from a survey, conducted by the author, of views of modeling peers and the policy community; the second is to report on a sample of narratives provided by current and former IFPRI staff, and collaborators.

SURVEY RESULTS

To gauge outsiders' views of IFPRI's contributions in this area, a questionnaire with an accompanying letter was handed or e-mailed to 72 people drawn from national governments and think tanks (20), international agencies (16), university-based researchers (20), and participants in the 2003 WTO Trade Policy Training Course for Anglophone African officials at the University of Nairobi (16). The questionnaire and the list of recipients are shown in Appendixes D and E. The author interviewed some of the recipients personally, including during a field trip to eastern and southern Africa in April 2003.[p]

The number of returned forms was 43 (61 percent). However, of the WTO course participants, a significant proportion were unfamiliar with IFPRI and a smaller number with

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[p] A field trip to meet with a wide range of senior people in the policy and research communities in China was also planned for early May but had to be cancelled because of the travel bans following the outbreak of the severe acute respiratory syndrome (SARS) virus. Other fieldwork was not possible in the time available. A wider group could have been mailed the questionnaire, but the response rate would have been very low for those with less familiarity with IFPRI and its research.

CGE modeling, and so they were unable to answer many of the more specific questions. Even so, the majority of them said in answer to question 1 that economywide modeling was "very important," and most of the rest said it was "important" for analyzing food policy issues. In answer to question 8, the majority rated the following advantages of economywide modeling as "extremely valuable," and most of the remainder rated them as "moderately useful": CGE models are transparent, provide factor market effects, and expose effects on the food sector of nonfood policies. In terms of the approach's disadvantages, the only one of the 14 prompts to be checked by more than four respondents was that such models are too complicated for colleagues to use (the view of 7 of the 16 WTO course respondents).

Turning to the other respondents, it makes more sense to express numbers of answers as a percentage of those expressing a view, since not all responded to every question. In the case of the first question, 79 percent said that economywide modeling was "very important," and all but one of the rest said it was "important" for analyzing food policy issues. The spread of answers to questions 2 and 3, on the value of the CGE approach to food policy analysis taken by non-IFPRI and IFPRI analysts, respectively, was identical: 59 percent rated both groups' publications "extremely valuable" and the remaining 41 percent rated them "moderately useful."

Of IFPRI's various modeling products, the SAMs and national CGE models, and the methodologies supporting both, were all rated either extremely valuable (more than 60 percent) or moderately useful by all but one respondent. There was, however, somewhat less familiarity with or enthusiasm for IFPRI's multiregional modeling.

About 70 percent of respondents were only "somewhat" aware of IFPRI's nonmodeling trade policy research outputs, and another one-eighth were "not at all" aware. Even though there was a disproportionately high representation of modelers in the sample, this was surprising, especially as the question referred to the Institute as a whole, not just TMD. The response suggests that IFPRI may need to strengthen its reputation in nonmodeling work to maintain impact if it downsizes its modeling activities under the new structure of the organization.

The numbers of answers to the question about the advantages of an economywide modeling approach to food policy analysis are as follows:

	extremely valuable	moderately useful	not very useful
Transparent	[6]	[5]	[2]
Tests one's own intuition	[10]	[7]	[0]
Provides factor market effects	[12]	[4]	[1]
Forces analysts to expose their assumptions	[9]	[6]	[2]
Exposes effects of nonfood policies	[13]	[3]	[0]
Shows effects on other sectors	[10]	[5]	[1]
Can potentially show effects of policy on:			
Food and nutrition security	[6]	[10]	[1]
Household income distribution	[11]	[4]	[1]
Poverty alleviation	[7]	[6]	[1]
Resource use	[5]	[8]	[1]
Natural environment	[5]	[5]	[4]

Most respondents believed economywide models are useful for all the above reasons, although least so for examining effects on the natural environment. The strongest agreement related to the usefulness of these models in showing effects on factor markets and household income distribution, and in exposing the effects of nonfood policies on the food sector. Other advantages mentioned included the macro (including fiscal) effects, and the fact that such models force analysts to be consistent in their assumptions.

The answers to the question about the disadvantages of an economywide modeling approach to food policy analysis came out as a mirror image of the responses about advantages, with only a few respondents (numbers in brackets) checking the following boxes:

Too intensive in the use of our staff's time	[4]
Too complicated for our staff to use	[5]
Not enough extra insights compared with sector-specific analysis	[1]
Does not focus on the important short-run adjustment issues	[4]
Underlying data are too out of date	[3]
Cannot trust the underlying elasticities	[3]
Cannot trust the underlying protection estimates	[3]
Takes too long to respond to policymakers' needs	[2]
Too difficult to communicate results to stakeholders	[6]
Is not easily able to show effects of policy on:	
Food and nutrition security	[1]
Household income distribution	[1]
Poverty alleviation	[2]
Resource use	[1]
Natural environment	[4]

Evidently, the main disadvantages of using CGE models are seen as their time intensity, their complexity, and the difficulty in communicating their results, although the number of respondents with those views is quite small (only four to six).

In answer to question 10, the majority of respondents found IFPRI's CGE modeling publications helpful in their own research, half as many found them helpful in a policy context, and slightly fewer found them helpful in their teaching (but note that relatively few academics were in the sample). No respondents indicated that they found IFPRI's CGE modeling publications helpful in their strategic planning and priority setting, in contrast to publications drawing on the IMPACT model's results (as reported in Ryan 2003). That is understandable, given that the IMPACT work has focused heavily on providing projections, whereas TMD's modeling has not. In that context, question 13 asked to what extent IFPRI should focus its economywide modeling on providing global economic projections, as a supplement to IFPRI's IMPACT projections and potentially in competition with GTAP and other modeling groups. This elicited a wide range of answers. A few said it would be excellent, but more felt it would not be a good use of IFPRI's resources. And while some felt it would be better to pool resources to get one consensus set of projections, some others thought competition in such projections is healthy. The most expansive response pointed to the potential for IFPRI to join forces with others (e.g., the GTAP community) and for each organization to specialize in various inputs into the projection exercise. In that case, IFPRI

presumably could specialize in such things as land, water, population, and agricultural technology projections, to which both the IMPACT and TMD staff could contribute.

On the question of how influential IFPRI's economywide model-based research has been in the policy process (question 11), only 13 felt they knew enough to respond. Of those, four believed the research had been "very" influential in their institution or country. Question 12 then asked about the influence of non-IFPRI CGE modeling. Half the respondents to that question answered "very influential" and the other half "somewhat influential." That is certainly consistent with the view that such modeling is "extremely important" and the strong endorsement elicited by question 1.

Question 14 asked: ***Within its current budget***, how should IFPRI alter its economywide modeling product mix to enhance its impact on well-being in developing countries? The numbers of affirmative responses to each statement are shown in brackets:

	Do more	Continue as is	Do less
Make models and databases freely available on website	[7]	[6]	[0]
Collaborate with researchers in developing countries	[8]	[4]	[0]
Provide CGE training/capacity building	[5]	[5]	[1]
Offer simpler ("back-of-the-envelope") models to assist intuition	[8]	[1]	[3]
Offer more-complex dynamic models	[4]	[3]	[3]
Organize seminars/conferences to disseminate findings	[6]	[5]	[2]
Write up CGE results in nontechnical policy papers and briefs	[9]	[3]	[0]
Collaborate with national policymakers in preparing policy positions	[6]	[4]	[2]
Participate in World Bank, etc., short-term missions	[1]	[4]	[6]
Supervise Ph.D. theses, including via internships at IFPRI	[0]	[5]	[2]
Appoint in-country IFPRI economywide analysts	[3]	[3]	[4]
Update its models' protection/taxation estimates	[4]	[3]	[3]
Update its models' social accounting matrices	[2]	[5]	[1]
Estimate its models' elasticity parameters	[4]	[5]	[1]
Validate and do sensitivity analysis with its models	[5]	[5]	[0]
Focus on:			
Global trade (WTO) issues	[2]	[7]	[3]
Regional trade issues	[2]	[5]	[3]
National trade issues in:			
Africa	[8]	[4]	[0]
Asia	[4]	[4]	[1]
Latin America	[5]	[4]	[0]
Transition economies	[2]	[3]	[2]
Effects on income distribution and especially poverty	[7]	[3]	[0]
Effects on natural resources and the environment	[4]	[4]	[2]

Several clear messages can be drawn from these answers. Not surprisingly, there was very strong support for making more SAMs and models freely available on the IFPRI website. There was also very strong support for capacity strengthening, including collaborating more with developing-country researchers and policy advisors, providing more

back-of-the-envelope model results to assist intuition and communication of full-blown modeling results, writing up more results in nontechnical policy papers/briefs, and presenting them in outreach seminars/conferences.

In terms of geographic coverage, there was extremely strong support for doing more in Africa, while doing less on global (and to a lesser extent regional) trade issues. And more work on income distribution and especially poverty also received extremely strong support. The current emphases on engaging Ph.D. students and producing SAMs were considered about right, but perhaps a little more emphasis should be given to model validation and to parameter and protection rate estimation. The areas that respondents on average felt should remain unchanged or even be de-emphasized included dynamic modeling, participation in World Bank short-term projects/missions, and the placement of modeling staff in-country.

Less than half the respondents felt they could answer question 15, on the extent to which IFPRI has made a positive impact in various areas of economywide modeling. But a strong consensus emerged that IFPRI's strongest impacts have been in providing the standard CGE model, SAMs, and methodologies for compiling them. Nearly as many also mentioned IFPRI's contributions to an economywide modeling methodology. A somewhat smaller number mentioned IFPRI's impact on CGE training, while only two mentioned its direct impact on trade policy reforms.

NARRATIVES

Stories about the impacts of IFPRI's economywide modeling research on poverty alleviation and food and nutrition security via the policy reform process are worth examining because there need be only one significant impact every now and again to make the overall investment in an applied policy research program worthwhile from a global welfare viewpoint. In the case of IFPRI's research on rice policy in Vietnam, for example, the estimated benefit/cost ratio is between 56 and 114, depending on the conservativeness of the assumptions one adopts (Ryan 2002). In the case of IFPRI's economywide modeling, the aggregate investment over the past nine years has been a little less than $15 million in nominal terms (Appendix Table A1). That order of magnitude needs to be kept in mind when considering the following examples.

China

Two recent IFPRI papers have already had a significant impact in China. The first, one of the earliest to focus on the regional impact within China of its WTO accession, was presented at a conference in China in November 2001, just after the country finalized its agreement to join the WTO (TMD Discussion Paper No. 87, forthcoming as Diao, Fan, and Zhang 2003). TV and newspaper media covered the story, and Per Pinstrup-Andersen, then IFPRI's director general, had the opportunity to relay the findings during a postseminar meeting with Chinese President Jiang Zemin. Drawing also on earlier research papers from IFPRI's Environment and Production Technology Division (Fan, Hazell, and Thorat 2000; Fan, Fang, and Zhang 2001), 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.

The second recent China paper of note is EPTD Discussion Paper No. 53 (forthcoming as Fan, Robinson, and Zhang 2003), which combines sectoral econometric estimations with economywide 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, IFPRI has been involved in recent years in compiling SAMs and constructing CGE models for 18 countries in Latin America (listed in Appendix Tables B5 and B7). Each has a microsimulation 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 will be published as a book. Meanwhile, numerous training sessions/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 requests from international institutions and others 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, respectively; and 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 IFPRI's standard CGE model to estimate the impact of trade liberalization and growth on poverty and income distribution in Brazil. IFPRI Visiting Research Fellow Sam Morley has gone to a number of workshops and missions with Enrique Ganuza, the UNDP economist in charge of this project, where members of the CGE project gave extensive policy advice to senior government leaders, including the president of Costa Rica. IFPRI and UNDP economists also offered strategies to reduce poverty faster in Costa Rica, and with Jose Molinas they 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 IFPRI 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.

At present the static models are not very useful for examining growth issues, so work is under way on a dynamic version of the model that will shed more light on those central

policy issues. Meanwhile, the models are useful 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 are 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. IFPRI's model results suggest that this view is wrong. Trade liberalization by itself reduces poverty and has little effect on inequality. They also suggest that capital inflows are positive, even if there is an exchange rate appreciation — something not widely believed in Latin America. Actual history is different both because it takes time to get to the favorable long-run results and because there were other negative shocks happening at the time of the liberalization process.

Another IFPRI project has focused on the impact of different globalization scenarios on the agricultural sectors of four countries in Latin America (Argentina, Chile, Colombia, and Costa Rica). It was conducted in collaboration with the Inter-American Institute for Cooperation on Agriculture (IICA) 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 suggest 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.

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 by IFPRI, Bunda College, the Reserve Bank of Malawi, and the National Economic Council 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 IFPRI's 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

In collaboration with Purdue University, IFPRI has catalyzed oilseed policy change in Morocco. Under a 1999 USAID partnership grant, IFPRI/Purdue University developed a detailed policy proposal for reform of the oilseed complex. The proposal dealt with trade, production, processing, marketing, and consumer demand, using an economywide CGE model. In October 2000, the government of Morocco adopted this policy proposal, with very few modifications. Since that success, IFPRI Research Fellow Xinshen Diao has been working with Professor Terry Roe of the University of Minnesota on 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, IFPRI Research Analyst James Thurlow, together with Dirk van Seventer from 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 by Thurlow 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 TMD Discussion Paper No. 101 in October 2002, jointly with FCND) 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 IFPRI approach because Brazil is currently 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 by Thurlow as he completes his Ph.D. thesis on the impact of trade liberalization on South Africa, and by another student at the University of Pretoria who is analyzing the impact of varying the VAT system (with the help of Professor Karen Thierfelder, a long-term IFPRI collaborator).

Meanwhile, the South African Treasury in 2003 decided to adopt an IFPRI CGE model, and Thurlow 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, IFPRI has been collaborating with the National Bureau of Statistics (NBS) in Dar es 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 and run by IFPRI staff 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.

Collaborators have responded positively to IFPRI's guidance and have themselves identified areas where their quantitative skills and data management processes require further attention. This work, which has fed into the current re-basing of their national accounts, is expected to lead to new collaborative work between IFPRI and the United Kingdom's Department for International Development (DfID). 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 Danish donors have been very pleased with progress to date, as have the directors general of the relevant Tanzanian authorities who attended the workshops.

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 IFPRI 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 (mostly using the joint IEQ-IFPRI

model) of issues related to Tunisia's FTA with the EU (fiscal effects, impact on food and agricultural trade), wage policy, the dismantling of the Multi-fibre 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 asked IFPRI to undertake 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 report was included as the main component of the Bank's assessment of the future of copper mining in the country. Following the report's findings, representatives from the Bank have notified TMD that funds were given to Zambia to prevent the predicted collapse of production in the country from taking place. TMD was been asked 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 will form part of the World Bank's current Country Economic Memorandum for Zambia, but the model development and experience gained from this task can be a direct input into IFPRI's future analysis of food issues in that economy.

Multicountry 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) asked TMD to help with an FAO project entitled "World Tobacco Demand and Supply by 2015: Policy Options and Adjustments." As an important component of the project, TMD 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, 3–4 December 2001. As with the analysis of copper in Zambia, this multicountry work is potentially useful for analyzing food issues in these countries where tobacco is an important cash-crop alternative to the production of food.

Multicountry Analysis: Gender Issues

IFPRI Research Analyst Marzia Fontana's project on gender analysis using CGE models (partly with Adrian Wood of Sussex, and supplemented by IFPRI Visiting Research Fellow Channing Arndt's work) 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 has 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

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before signing them (see the NGO's website at http://www.womensedge.org). Meanwhile, the European Union invited Fontana 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 after their meeting on this issue in Brussels last November; they expressed interest in encouraging more CGE modeling work on the gender impact of trade. She has 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. This led to a new collaborative project between IFPRI and ISST that has just started.

Multicountry Analysis: HIV/AIDS Issues

Since early 2000, Arndt has been active in evaluating the economic impacts of the HIV/AIDS epidemic. Published work to date, focusing on South Africa, has been widely disseminated, including via the South African media. IFPRI reports were cited (without attribution) 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, 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 is ongoing in Mozambique and Tanzania. A study by Arndt on the implications of HIV/AIDS for growth prospects and human capital accumulation for Mozambique 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.

Multicountry Analysis: Use of IFPRI's 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's standard CGE model as the starting point in a multicountry project that is aimed at engendering economic policy analysis in Africa, in particular 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 IFPRI's standard CGE model in a multicountry 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). As part of the project, Löfgren was invited to attend a two-day technical workshop held in Rome in June 2003.

Multicountry Analysis: Agriculture-Related Trade Issues

Analyzing multilateral and regional trade policies continues to be the predominant use of IFPRI's CGE models, which have also formed the backbone of the models used by some other agencies. One example is the adoption in 1994 of a TMD 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). Diao provided a major contribution to that report via her model development and analysis, the welfare results of which have been cited by U.S. Presidents Clinton and George W. Bush and by many U.S. government officials. IFPRI 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. And as is clear from the list of reports and book chapters in Appendix Table B3, IFPRI work has been a significant input into workshops and conferences of many international organizations that focus on agricultural trade policy issues (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
- Organisation for Economic Co-operation and Development
- World Bank
- World Meteorological Organization

CONCLUSION

Did IFPRI reach the policymaker through this research program? Were research outputs used directly in policy discussions that led to reforms? Did implementation of those reforms change the lives of poor people for the better? Neither the above narratives nor the survey findings are able to provide convincing evidence of policy changes instituted as a direct consequence of IFPRI's economywide research alone, let alone of improvements in the well-being of poor people. The difficulty of going further in attribution will always be present for this type of research. Even so, what this section has demonstrated is that (a) there is a strong belief even by the less-informed survey respondents that this type of research is "extremely valuable" for food policy analysis, despite its complexity; and (b) there are numerous examples in Africa, Asia, and Latin America where outputs from this research program have been directly used in policy debates on big issues of direct significance to poor people in those regions. Furthermore, the exposure of developing-country food policy analysts and advisors to economywide thinking and analysis, through their collaboration with IFPRI staff, is having an important ongoing, if indirect and less visible, impact on policymaking in poor countries.

7. SUMMARY OF FINDINGS AND LESSONS LEARNED

TMD, where almost all of IFPRI's economywide modeling has been undertaken to date, accounted for one-tenth of IFPRI's 2002 budget and total staff, and about one-seventh of IFPRI research staff. The division had been growing faster than the rest of IFPRI over the past nine years, thanks to an expansion of outside-funded and commissioned research (which meant it drew only 31 percent of its budget from core IFPRI funds by 2002). Its expenditure since 1994 amounted to about $15 million in nominal terms before the division was closed in April 2003, and over that period it employed an average annual staff of 7.4 senior researchers, 7.8 RAs, and 2.0 administrative assistants. The budget per researcher, at just over $100,000 per year on average, was comparable with other benchmark groups. How well has that money and time been spent, what legacies have the division's economywide modeling efforts left, and what lessons can be drawn from this study concerning impact assessment?

TMD has been a prolific generator of economywide modeling outputs by both internal and external standards. Its publications per researcher are close to or exceed the average for IFPRI except for books and journal articles, and are well above the average in the case of discussion papers. In addition, it has produced and made publicly available numerous SAMs and economywide models, plus methodologies associated with both. These modeling outputs are state-of-the-art, with some pushing the knowledge frontier. TMD has also engaged in substantial capacity strengthening via training workshops in a wide range of locations in Africa, Asia, Latin America, and the Middle East. The output rate has been high partly because of the considerable extent of co-authorship between TMD and either non-IFPRI staff or graduate student RAs. And the range of policy issues analyzed and countries and products covered by IFPRI's economywide modelers has been extraordinarily wide for such a small group of core staff.

The uptake of those economywide modeling outputs has been equally impressive. Website downloads of TMD discussion papers over the 15 months to March 2003 exceeded a staggering 105,000, or an average of 980 per paper for the 108 papers published between 1994 and 2002, or 65 per paper per month. The rate for the eight most popular ones, 313 downloads per month, compares favorably with a rate of 220 per month during 2000–01 for the eight most popular publications from IFPRI's 2020 Vision Initiative, especially given the high promotional expenditure on the latter and its widespread audience relative to that for the narrower field of economywide modeling. True, one discussion paper was extraordinarily popular, with 22,400 downloads (No. 75, which was the first version of the standard CGE model by Löfgren, Harris, and Robinson, released in April 2001 prior to its more formal publication in late 2002 in IFPRI's Microcomputer Series), but a further 26 had more than 1,000 downloads each and virtually all 108 enjoyed several hundred downloads.

Despite their greater degree of technicality, the most popular discussion papers were the modeling papers, which comprised 67 percent of the total: their average monthly download was 74, or 58 excluding No. 75. Next most popular were the 11 percent of papers drawing on insights from economywide models or using such models for a minor part of the paper, with an average of 47 downloads. The nonmodeling papers (the remaining 22 percent) averaged 37 downloads per month. This high degree of uptake would not have been possible had TMD's modeling work not been highly regarded by the economics profession. Further evidence of that reputation is provided by the many copies of the Microcomputer Series of

papers on the standard CGE model (more than 150 per month) and the training exercise manuals that have been requested over the past two years, and the hundreds of requests per year to generate and share SAMs, discuss methodological developments, present model results, take part in short-term policy missions, supervise Ph.D. students, and conduct training courses throughout the world. That scholarly contribution has strengthened the professional reputation of IFPRI, providing a local public good to other divisions in the Institute.

How much impact this economywide modeling program has had is notoriously difficult to gauge. The standard attribution problem in assessing any methodological and policy research impact is made all the more difficult in this case because this particular research program (a) covered the full spectrum from basic to applied research and its dissemination, plus major data compilation, engagement in short-term missions, and provision of training programs; (b) covered all developing-country regions as well as multilateral and regional trade policy issues; and (c) covered all products and factors of production so as to ensure that the food sector's interactions with other sectors was fully taken into account. The chosen way around this impact assessment problem was to survey a range of stakeholders and to draw on narratives provided by IFPRI staff.

The survey revealed that a majority of even the least-informed respondents believe that economywide modeling offers an extremely valuable contribution to food policy analysis, notwithstanding its complexity and the associated difficulty of communicating its results. Its main advantages are seen as quantifying the effects of nonfood policies on the food sector, and of structural or policy shocks on factor markets and hence income distribution and thereby poverty. In the eyes of the more-informed participants, IFPRI and non-IFPRI economywide modeling publications are seen as equally valuable, with the majority rating them as "extremely valuable." The same uniform level of support was evident when respondents were asked to rate separately IFPRI's SAMs, national models, and the methodologies supporting both. However, there was less familiarity with or enthusiasm for TMD's multiregional modeling, and much less awareness of IFPRI's nonmodeling trade policy research outputs. Nor was there much enthusiasm for IFPRI's economywide modelers getting involved in projections work, except perhaps as specialized contributors (maybe with the IMPACT team) to a collaborative effort involving the GTAP modeling community and, as part of that, hopefully the *Global Economic Prospects* team at the World Bank (which to date has not been willing to make its projections publicly available).

A strong consensus emerged from the survey that TMD's greatest visible contribution has been in providing SAMs and the methodologies for compiling them and in providing the standard CGE model, together with contributions to economywide modeling methodology. The questions on the policy influence of CGE modeling elicited a "very influential" response from the majority, and the rest said "somewhat influential." So even though it is very difficult to attribute policy reform directly to one or another group of influences, there is a strong feeling that economywide modeling, including by IFPRI, is an effective contributor to the food policy process.

On the question of how IFPRI might alter its mix of economywide products without altering the program's aggregate budget, several clear messages came out. Not surprisingly, there is very strong support for international public goods such as making more SAMs and models freely available on the IFPRI website, collaborating more with developing-country researchers and policy advisors, providing more back-of-the-envelope model results to assist intuition and communication of full-blown modeling results, and more writing up of results in

nontechnical policy papers/briefs and presenting them in outreach seminars/conferences. In terms of geographic coverage, there is extremely strong support for doing more in Africa, while doing less on global and to a lesser extent regional trade issues to which other groups, including the GTAP community, are now contributing significantly. More work on income distribution and especially poverty also received extremely strong support, certainly stronger than work on environmental effects (although poverty alleviation would itself contribute to greater care of the natural environment). The current emphases on engaging Ph.D. students and producing SAMs were considered about right, but perhaps a little more emphasis should be given to model validation and to parameter and protection rate estimation. An area that respondents on average felt should remain unchanged or even be de-emphasized was participation in World Bank and other short-term projects/missions.

The narratives presented in the previous section not only are consistent with many of the above findings, but also strengthen the impression that IFPRI's economywide modeling efforts have been contributing to fulfilling IFPRI's priorities as laid out in its latest strategic plan, namely, to provide policy solutions that reduce hunger and malnutrition, to address the major emerging issues affecting food security, and to focus on issues that produce results applicable to many countries and that help the greatest number of people in deepest need (thereby efficiently providing international public goods).

The narratives begin with a report of a paper on the likely consequences of China's WTO accession for hinterland farmers, with policy conclusions that drew heavily on other IFPRI papers from EPTD. When first presented in late 2001, the report led to widespread media coverage and to IFPRI's director general being able to discuss the results with the president of China. If, as a consequence, the Chinese government were to boost human capital investments in the western provinces to compensate those poor farm families likely to gain least or even lose from WTO accession, the benefits to the world of that alone would be many times IFPRI's entire investment over the past nine years in economywide modeling of $15 million (equal to less than half a cent per Chinese farmer per year).

A high payoff can be expected also from the recent UNDP-funded project involving modeling 18 Latin American economies, not least because of the large number of prominent participants in this project who are now well placed in their respective countries to use the models they helped develop to analyze policy options. Further, trade liberalization is among those options and is being considered more favorably than before because of recent IFPRI modeling results. Specifically, the results from modeling the trade liberalizations that took place between 1985 and 1995 in virtually every country in the region provide a better understanding of both trade liberalization and capital account shocks. Current and capital account liberalization has been blamed for a failure of the region to reduce either poverty or inequality, but IFPRI's model results suggest that trade liberalization by itself reduced poverty and had little effect on inequality.

Finally, IFPRI's economywide modeling work in Africa is contributing to debates over potentially high-payoff policy reforms there. These include encouraging the adoption of:

- a more efficient indirect (VAT) tax system in Malawi and Mozambique,

- a more equitable basic income grant scheme in South Africa (with potential spillovers to Mozambique and Brazil),

- an improved policy for the oilseed complex in Morocco,

- improved national accounts in Tanzania because of the SAM developed there,

- use of the CGE approach in Tunisia to evaluate its prospective FTA with the EU,

- a World Bank loan to prevent contraction of Zambia's economy following the collapse of copper prices,

- a gender-enhanced CGE framework for analyzing agricultural technologies and so on in Mozambique and elsewhere,

- an economywide approach to the analysis of the implications of HIV/AIDS for growth prospects and human capital formation in southern Africa, and

- an improved framework for exploring medium-term budget and employment projections in South Africa.

In all these cases, it probably was important that IFPRI modelers were part of the Consultative Group on International Agricultural Research system with a clear mandate to work in and on developing economies for the betterment of poor people, as distinct from being part of a national government of a developed country, or a rich-country club such as the OECD, or a think tank with a narrower mission, or even a university (as with many of the GTAP modelers).

This report is not the place to draw implications for IFPRI resource allocation, since that is something that has to be done in a whole-of-institution strategic planning framework. But some lessons on impact assessment itself are offered by way of conclusion. First, surveying various groups for views on the impact of the research is a very open-ended exercise. It is difficult to ensure enough useful representative responses without investing a great deal of time and travel funds to do face-to-face interviews. Second, and not unrelated, narratives by participants ideally should be corroborated by others, but that too requires considerable time and travel funds (even if undertaken while doing the survey), and the narratives would need to be collected before the survey work began. Third, citations would add to the evidence of impact. Academic citations would be evidence of the extent of contribution to basic research, but more important for impact assessment would be citations by policymakers in the mass media, in parliamentary speeches, and the like. If researchers kept files of such material they would be in a better position to convince assessors of their impact on policy. And fourth, benefit/cost analysis of the type that is possible for a single project (e.g., the analysis of IFPRI's rice policy research in Vietnam by Ryan [2002]) is simply not feasible for a large and diverse program of research projects such as the one being assessed here.

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APPENDICES

A. Trade and Macroeconomic Division (TMD) inputs, 1994 to 2002

B. Outputs from IFPRI's economywide modeling, 1994 to March 2003

C. Outcomes from IFPRI's economywide modeling, 1994 to March 2003

D. Questionnaire sent to peer researchers and users of economywide modeling

E. List of recipients of the questionnaire

APPENDIX A

TRADE AND MACROECONOMIC DIVISION
(TMD) INPUTS, 1994–2002

Table A1 — Annual budget, TMD and IFPRI in total, 1994 to 2002

Table A2 — Staff numbers, TMD and other IFPRI research divisions, 31 December 2000

Table A3 — Staff members, 1994 to 2002
    (a)   Research Fellows
    (b)   Research Analysts, Research Assistants, and Postdoctoral Fellows
    (c)   Administrative Coordinators and Program Assistants

Table A1 — Annual budget, TMD and IFPRI in total, 1994 to 2002 (nominal US$, thousands)

| | TMD | | | IFPRI | | | | TMD as |
Year	Core	Total	Core as percent of total	Core	Direct research/ outreach	Total	Core as percent of total	percent of all IFPRI's direct research exp.
1994	388	901	43					
1995	436	1,253	35					
1996	484	1,343	36					
1997	586	1,361	43	9,626	16,282	18,434	52	8.4
1998	826	1,530	54	9,615	16,314	20,275	47	9.4
1999	906	1,652	55	9,571	17,258	21,214	45	9.6
2000	987	1,783	55	9,432	18,233	22,702	42	9.8
2001	711	1,955	36	8,756	19,533	23,102	38	10.0
2002	676	2,162	31	8,251	16,961	23,456	35	12.8

Table A2 — Staff number, TMD and other IFPRI research divisions, 31 December 2000

	Research fellows	Visiting research fellow	Postdoctoral fellows	Research Analysts/ Assistants	Administrative Staff	All researchers	All staff
	(1)	(2)	(3)			(1+2+3)	
TMD	4	2	3	4	2	9	15
MSSD	6	0	2	2	3	8	13
EPTD	12	3	5	10	6	20	36
FCND	12	3	5	10	6	20	36
Subtotal	34	8	15	26	17	57	100
Central					51		51
Total	**34**	**8**	**15**	**26**	**68**	**57**	**151**

Table A3 — Staff members, 1994 to 2002

Division director	Research fellows	Visiting research fellows	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total person years
						(a) Research Fellows						
Sherman Robinson			X	X	X	X	X	X	X	X	X	9
	Romeo Bautista		X	X	X	X	X	X	to Senior Research Fellow			7
	Dean DeRosa		X	X								2
	Yair Mundlak		X									1
	Hans Löfgren			X	X	X	X	X	X	to Senior Research Fellow	X	8
	Eugenio Díaz-Bonilla							X	X	to Senior Research Fellow	X	4
	Xinshen Diao								X	X	X	3
		Eugenio Díaz-Bonilla		X	X	X	X	to Research Fellow				4
		Antonio Gomez-Merlano					X	X				2
		Samuel Morley					X	to Visiting Senior Research Fellow	X	X	X	4
		Lucio Reca		X	X	X	X	X	to Visiting Senior Research Fellow	X	X	8
		Susan Schadler					X	X				2
		Karen Thierfelder									X	1
		Channing Arndt									X	1
Total (9)	**Total (25)**	**Total (22)**	**4**	**6**	**5**	**5**	**7**	**8**	**7**	**6**	**8**	**56**

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Table A3 — Staff members, 1994 to 2002

Research Analysts	Visiting Research Analysts	Research Assistants	Postdoctoral Fellows	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total person years
(b) Research Analysts, Research Assistants, and Postdoctoral Fellows													
		Andrea Cattaneo		X	X	to Senior Res. Asst.	X	to Res. Analyst	X	X			7
	Jennifer Chung-I Li									X	X	X	3
Carolina Diaz-Bonilla											X	X	2
		Moataz El-Said				to Senior Res. Asst.	X	X	X	X	X	X	7
		Marzia Fontana							X		X	X	3
Clemen Gehlhar				X	X								2
Rebecca Harris							X	X	X				3
	Henning Jensen										X		1
	Ahmed Kamaly									X	X	X	3
	Stephanie Levy										X	X	2
	Christen Lungren											X	1
	Natasha Mukherjee			X	X								2
	Chantal Nielsen								X	X			2
	Valeria Piñeiro					X	to Senior Res. Asst.	to Res. Analyst	X	X	X	X	7
	Anne-S. Robilliard							X	X				2
		Monica Scatasta			X	to Senior Res. Asst.	X						3
	Hildegunn Stokke										X		1

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Table A3 — Staff members, 1994 to 2002

Research Analysts	Visiting Research Analysts	Research Assistants	Postdoctoral Fellows	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total person years
(b) Research Analysts, Research Assistants, and Postdoctoral Fellows													
	Nu Nu San[a]							X	X				2
	Dongsheng Sun											X	1
Marcelle Thomas				X	X	X	X	X	X	X	X	X	9
James Thurlow												X	1
Peter Wobst							X	X	X				3
		Yukitsugu Yanoma								X	X	to Senior Res. Asst.	3
			Rebecca Harris							X	X		2
			Natasha Mukherjee			X	X	X	X				4
			Anne-S. Robilliard							X	X		2
			Peter Wobst							X	X	X	3
Total (28)	**Total (22)**	**Total (20)**	**Total (11)**	**4**	**5**	**6**	**8**	**9**	**11**	**11**	**14**	**13**	**81**

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[a] Visiting consultant.

Table A3 — Staff members, 1994 to 2002

Administrative Coordinator	Program Assistant	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total person years
(c) Administrative Coordinators and Program Assistants											
Susan Frost		X	X								2
Maria Cohan			X	X	X	X	X	to Sr. Admin. Coord.	X	X	8
	Abe Fafchamps					X					1
	Florence Meria						X	X	X	X	4

APPENDIX B

OUTPUTS FROM IFPRI'S ECONOMYWIDE MODELING, 1994 TO MARCH 2003

Table B1:   IFPRI's TMD discussion papers

Table B2:   IFPRI research reports from TMD

Table B3:   IFPRI's external publications by TMD staff
(a) Edited books
(b) Journal articles
(c) Chapters in books
(d) Other external publications

Table B4:   IFPRI's publicly released social accounting matrices, and copies requested

Table B5:   IFPRI's unreleased social accounting matrices

Table B6:   IFPRI's publicly released economywide models and training manuals

Table B7:   IFPRI's unreleased economywide models

Table B8:   IFPRI's training programs in economywide modeling

Table B9:   IFPRI's contributions to methods for compiling SAMS and undertaking economywide modeling
(a) Entropy
(b) Microsimulation and poverty/inequality analysis
(c) Dynamic CGE models
(d) Multiregional models
(e) CGE models with nonseparable households
(f) Imperfect competition in a global CGE model
(g) Gender analysis
(h) Health analysis

TABLE B1 — IFPRI'S TMD DISCUSSION PAPERS[a]

1. "Land, water, and agriculture in Egypt: The economywide impact of policy reform," by **Sherman Robinson and **Clemen Gehlhar** (January 1995). Published as: Robinson, S., and C. G. Gehlhar. 1996. "Impacts of macroeconomic and trade policies on a market-oriented agriculture." In *Egypt's agriculture in a reform era*, ed. L. B. Fletcher, pp. 271–293. Ames: Iowa State University Press.

2. "Price competitiveness and variability in Egyptian cotton: Effects of sectoral and economywide policies," by **Romeo M. Bautista and **Clemen Gehlhar** (January 1995). Published as: Bautista, R. M., and C. G. Gehlhar. 1996. "Price competitiveness and variability in Egyptian cotton: Effects of sectoral and economywide policies." *Journal of African Economies* 5 (1): 21–51.

3. "International trade, regional integration, and food security in the Middle East," by **Dean A. DeRosa** (January 1995).

4. "The green revolution in a macroeconomic perspective: The Philippine case," by **Romeo M. Bautista (May 1995). Published as: Bautista, R. M. 1997. "Income and equity effects of the green revolution in the Philippines: A macroeconomic perspective." *Journal of International Development* 9 (2): 151–168.

5. "Macro and micro effects of subsidy cuts: A short-run CGE analysis for Egypt," by **Hans Löfgren (May 1995). Published as: Löfgren, H. 1997. "Macro and micro effects of subsidy cuts: A short-run CGE analysis for Egypt." *Middle East Business and Economic Review* 7 (2): 18–39. Reprinted in R. Dahel and I. Sirageldin, eds., *Research in Human Capital and Development*, vol. 11B. Greenwich: JAI Press.

6. "On the production economics of cattle," by **Yair Mundlak**, He Huang, and Edgardo Favaro (May 1995).

7. "The cost of managing with less: Cutting water subsidies and supplies in Egypt's agriculture," by **Hans Löfgren** (July 1995, revised April 1996). Published as: Löfgren, H. 1996. "The cost of managing with less: Cutting water subsidies and supplies in Egypt's agriculture." In *Research in Middle East economics*, vol. 1, ed. K. Pfeifer, pp. 83–107. Greenwich: JAI Press.

8. "The impact of the Mexican crisis on trade, agriculture, and migration," by **Sherman Robinson, Mary Burfisher, and Karen Thierfelder (September 1995).

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[a] The ** refers to papers using an economywide model for the major part of their analysis and papers documenting economywide databases (especially SAMs) and methods for their estimation, while the * refers to papers drawing on insights from TMD economywide papers or using economywide models for a nonmajor part of their analysis. Names underlined were TMD researchers at the time of publication.

*9.   "The trade-wage debate in a model with nontraded goods: Making room for labor economists in trade theory," by **Sherman Robinson** and Karen Thierfelder (revised March 1996).

10.   "Macroeconomic adjustment and agricultural performance in Southern Africa: A quantitative overview," by **Romeo M. Bautista** (February 1996).

11.   "Tiger or turtle? Exploring alternative futures for Egypt to 2020," by **Hans Löfgren, **Sherman Robinson**, and David Nygaard (August 1996). Published as: Löfgren, H., S. Robinson, and D. Nygaard. 1998. "Tiger or turtle? Exploring alternative futures for Egypt to 2020." In *Opening doors to the world: A new trade agenda for the Middle East*, ed. R. Safadi, pp. 167–197. Cairo: American University in Cairo Press and International Development Research Centre, in association with the Economic Research Forum for the Arab Countries, Iran, and Turkey.

12.   "Water and land in South Africa: Economywide impacts of reform — A case study for the Olifants River," by **Natasha Mukherjee (July 1996).

13.   "Agriculture and the new industrial tevolution in Asia," by **Romeo M. Bautista** and **Dean A. DeRosa** (September 1996). Published as: Bautista, R. M., and D. A. DeRosa. 1998. "Agriculture and the new industrial revolution in Asia." In *The new industrial revolution in Asian economies*, eds. R. Hooley and Z. A. Mahani. Greenwich: JAI Press.

14.   "Income and equity effects of crop productivity growth under alternative foreign trade regimes: A CGE analysis for the Philippines," by **Romeo M. Bautista and **Sherman Robinson** (September 1996). Published as: Bautista, R. M., and S. Robinson. 1997. "Income and equity effects of crop productivity growth under alternative foreign trade regimes: A CGE analysis for the Philippines." *Asian Journal of Agricultural Economics* 2 (2): 177–194; and as: Bautista, R. M., and M. Thomas. 1997. "Income effects of alternative trade policy adjustments on Philippine rural households: A general equilibrium analysis." In *Food security, diversification, and resource management: Refocusing the role of agriculture?*, eds. G. Peters and J. von Braun. Brookfield, VT: Ashgate.

15.   "Southern Africa: Economic structure, trade, and regional integration," by **Natasha Mukherjee and **Sherman Robinson** (October 1996). Published as: Mukherjee, N., and S. Robinson. 1997. "Economic structure, trade, and regional integration in Southern Africa." In *Achieving food security in Southern Africa: New challenges, new opportunities*, ed. L. Haddad, pp. 60–98. Washington, DC: International Food Policy Research Institute.

16.   "The 1990's global grain situation and its impact on the food security of selected developing countries," by Mark Friedberg and **Marcelle Thomas** (February 1997).

17.   "Rural development in Morocco: Alternative scenarios to the year 2000," by **Hans Löfgren, Rachid Doukkali, Hassan Serghini, and **Sherman Robinson** (February 1997). Published as: Löfgren, H., R. Doukkali, H. Serghini, and S. Robinson.

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18.   "Evaluating the effects of domestic policies and external factors on the price competitiveness of Indonesian crops: Cassava, soybean, corn, and sugarcane," by **Romeo M. Bautista**, **Nu Nu San**, Dewa Swastika, Sjaiful Bachri, and Hermanto (June 1997). Published as: Bautista, R. M., and N. N. San. 1998. "Modeling the price competitiveness of Indonesian crops." *Journal of Asian Economics* 9 (3): 425–443.

19.   "Rice price policies in Indonesia: A computable general equilibrium (CGE) analysis," by **Sherman Robinson, **Moataz El-Said**, **Nu Nu San**, Achmad Suryana, Hermanto, Dewa Swastika, and Sjaiful Bahri (June 1997). Published as: Robinson, S., M. El-Said, and N. N. San. 1998. "Rice policy, trade, and exchange rate changes in Indonesia: A general equilibrium analysis." *Journal of Asian Economics* 9 (3): 393–423.

20.   "The mixed-complementarity approach to specifying agricultural supply in computable general equilibrium models," by **Hans Löfgren and **Sherman Robinson** (August 1997). Published as: Löfgren, H., and S. Robinson. 1999. "The mixed-complementarity approach to specifying agricultural supply in computable general equilibrium models." In *Food security, diversification, and resource management: Refocusing the role of agriculture?*, eds. G. H. Peters and J. von Braun, pp. 367–378. Brookfield, VT: Ashgate.

21.   "Estimating a social accounting matrix using entropy difference methods," by **Sherman Robinson and **Moataz El-Said** (September 1997).

22.   "Income effects of alternative trade policy adjustments on Philippine rural households: A general equilibrium analysis," by **Romeo M. Bautista and **Marcelle Thomas** (October 1997). Published as: Bautista, R. M., and M. Thomas. 1997. "Income effects of alternative trade policy adjustments on Philippine rural households: A general equilibrium analysis." In *Food security, diversification, and resource management: Refocusing the role of agriculture?*, eds. G. H. Peters and J. von Braun, pp. 473–481. Brookfield, VT: Ashgate.

23.   "South American wheat markets and MERCOSUR," by **Eugenio Díaz-Bonilla** (November 1997). Published as: Díaz-Bonilla, E. 2000. "South American wheat markets and MERCOSUR." In *The economics of world wheat markets: Implications for the Northern Rockies and Great Plains*, eds. J. Antle and V. Smith, pp. 313-350. New York: CABI.

24.   "Changes in Latin American agricultural markets," by **Lucio Reca** and **Eugenio Díaz-Bonilla** (November 1997). Published as: Reca, L., and E. Díaz-Bonilla.

2002. "Changes in Latin American agricultural markets." In *Achieving agricultural development through agricultural trade*. E-Book: <http://www.agritrade.org/ DW%20Book/DW%20Cover.htm>. Washington, D.C.: International Policy Council.

*25.   "Policy bias and agriculture: Partial and general equilibrium measures," by **Romeo M. Bautista**, **Sherman Robinson**, Finn Tarp, and **Peter Wobst** (May 1998). Published as: Bautista, R. M., S. Robinson, F. Tarp, and P. Wobst. 2001. "Policy bias and agriculture: Partial and general equilibrium measures." *Review of Development Economics* 5 (1): 89–104.

26.   "Estimating income mobility in Colombia using maximum entropy econometrics," by **Samuel Morley**, **Sherman Robinson**, and **Rebecca Harris** (revised February 1999).

27.   "Rice policy, trade, and exchange rate changes in Indonesia: A general equilibrium analysis," by **Sherman Robinson, **Moataz El-Said**, and **Nu Nu San** (June 1998). Published as: Robinson, S., M. El-Said, and N. N. San. 1998. "Rice policy, trade, and exchange rate changes in Indonesia: A general equilibrium analysis." *Journal of Asian Economics* 9 (3): 393–424.

28.   "Social accounting matrices for Mozambique — 1994 and 1995," by Channing Arndt, Antonio Cruz, Henning Tarp Jensen, **Sherman Robinson, and Finn Tarp (July 1998).

29.   "Agriculture and macroeconomic reforms in Zimbabwe: A political economy perspective," by Kay Muir-Leresche (August 1998).

30.   "A 1992 social accounting matrix (SAM) for Tanzania," by **Peter Wobst (August 1998).

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32.   "Does trade liberalization enhance income growth and equity in Zimbabwe? The role of complementary polices," by **Romeo M. Bautista, **Hans Löfgren**, and **Marcelle Thomas** (September 1998).

33.   "Estimating a social accounting matrix using cross entropy methods," by **Sherman Robinson, **Andrea Cattaneo**, and **Moataz El-Said** (October 1998). Published as: Robinson, S., A. Cattaneo, and M. El-Said. 2001. "Updating and estimating a social accounting matrix using cross entropy methods," *Economics Systems Research* 13 (1): 47-64.

*34.   "Trade liberalization and regional integration: The search for large numbers," by **Sherman Robinson** and Karen Thierfelder (January 1999). Published as: Robinson, S., and K. Thierfelder. 2002. "Trade liberalisation and regional

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36. "A 1991 social accounting matrix (SAM) for Zimbabwe," by **Marcelle Thomas and **Romeo M. Bautista** (January 1999).

37. "To trade or not to trade: Non-separable farm household models in partial and general equilibrium," by **Hans Löfgren and **Sherman Robinson** (January 1999). Published as: Löfgren, H., and S. Robinson. 1999. "To trade or not to trade: Non-separable farm household models in partial and general equilibrium." *American Journal of Agricultural Economics* 81 (3): 663–670.

38. "Trade reform and the poor in Morocco: A rural-urban general equilibrium analysis of reduced protection," by **Hans Löfgren (January 1999). Published as: Löfgren, H. 2000. "Trade reform and the poor in Morocco: A rural-urban general equilibrium analysis of reduced protection." In *Earnings inequality, unemployment, and poverty in the Middle East and North Africa*, eds. W. Shahin and G. Dibeh, pp. 51–77. Westport, CT: Greenwood Press.

39. "A note on taxes, prices, wages, and welfare in general equilibrium models," by **Sherman Robinson and Karen Thierfelder (January 1999).

40. "Parameter estimation for a computable general equilibrium model: A maximum entropy approach," by Channing Arndt, **Sherman Robinson, and Finn Tarp (February 1999). Published as: Arndt, C., S. Robinson, and F. Tarp. 2002. "Parameter estimation for a computable general equilibrium model: A maximum entropy approach." *Economic Modeling* 19: 375–398.

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42. "Alternative industrial development paths for Indonesia: SAM and CGE analysis," by **Romeo M. Bautista, **Sherman Robinson**, and **Moataz El-Said** (May 1999). Published as: Bautista, R. M., S. Robinson, and M. El-Said. 2001. "Alternative industrial development paths for Indonesia: SAM and CGE analysis." In *Restructuring Asian economics for the new millennium*, vol. 9B, eds. J. Behrman, M. Dutta, S. L. Husted, P. Sumalee, C. Suthiphand, and P. Wiboonchutikula, pp. 773–790. Amsterdam: North-Holland.

43. "Marketing margins and agricultural technology in Mozambique," by Channing Arndt, Henning Tarp Jensen, **Sherman Robinson, and Finn Tarp (July 1999). Published as: Arndt, C., H. Tarp Jensen, S. Robinson, and F. Tarp. 2000. "Marketing margins and agricultural technology in Mozambique." *Journal of Development Studies* 37 (1): 121–137.

44. "The distributional impact of macroeconomic shocks in Mexico: Threshold effects in a multi-region CGE model," by **Rebecca Lee Harris (July 1999).

45. "Economic growth and poverty reduction in Indochina: Lessons from East Asia," by **Romeo M. Bautista** (September 1999).

*46. "After the negotiations: Assessing the impact of free trade agreements in Southern Africa," by Jeffrey D. Lewis, **Sherman Robinson**, and Karen Thierfelder (September 1999).

*47. "Impediments to agricultural growth in Zambia," by Rainer Wichern, Ulrich Hausner, and Dennis K. Chiwele (September 1999).

48. "A general equilibrium analysis of alternative scenarios for food subsidy reform in Egypt," by **Hans Löfgren and **Moataz El-Said** (September 1999). Published as: Löfgren, H., and M. El-Said. 2001. "Food subsidies in Egypt: Reform options, distribution, and welfare." *Food Policy* 26: 65–83.

**49. "A 1995 social accounting matrix for Zambia," by Ulrich Hausner (September 1999).

*50. "Reconciling household surveys and national accounts data using a cross entropy estimation method," by **Anne-Sophie Robilliard** and **Sherman Robinson** (November 1999).

51. "Agriculture-based development: A SAM perspective on central Vietnam," by **Romeo M. Bautista (January 2000).

52. "Structural adjustment, agriculture, and deforestation in the Sumatra regional economy," by **Nu Nu San, **Hans Löfgren**, and **Sherman Robinson** (March 2000).

53. "Empirical models, rules, and optimization: Turning positive economics on its head," by **Andrea Cattaneo** and **Sherman Robinson** (April 2000).

*54. "Small countries and the case for regionalism vs. multilateralism," by Mary E. Burfisher, **Sherman Robinson**, and Karen Thierfelder (May 2000). Published as: Burfisher, M., S. Robinson, and K. Thierfelder. 2002. "Developing countries and the gains from regionalism: Links between trade and farm policy reforms in Mexico." *American Journal of Agricultural Economics* 84 (3): 736–748.

55. "Genetic engineering and trade: Panacea or dilemma for developing countries?" by **Chantal Pohl Nielsen, **Sherman Robinson**, and Karen Thierfelder (May 2000). Published as: Nielsen, C. P., S. Robinson, and K. Thierfelder. 2001.

"Genetic engineering and trade: Panacea or dilemma for developing countries?" *World Development* 29 (8): 1307–1324.

56. "An international, multi-region general equilibrium model of agricultural trade liberalization in the South Mediterranean NICs, Turkey, and the European Union," by Ali Bayar, **Xinshen Diao, and A. Erinc Yeldan (May 2000). Published as: Diao, X., and A. E. Yeldan. 2001. "An international, multi-region general equilibrium model of agricultural trade liberalization in the South Mediterranean NICs, Turkey, and the European Union." In *Regionalism in Europe: Geometries and strategies after 2000*, eds. J. von Hagen and M. Widgren, pp. 195–220. Dordrecht, The Netherlands: Kluwer.

57. "Macroeconomic and agricultural reforms in Zimbabwe: Policy complementarities toward equitable growth," by **Romeo M. Bautista and **Marcelle Thomas** (June 2000).

58. "Updating and estimating a social accounting matrix using cross entropy methods," by **Sherman Robinson, **Andrea Cattaneo**, and **Moataz El-Said** (August 2000). Published as: Robinson, S., A. Cattaneo, and M. El-Said. 2001. "Updating and estimating a social accounting matrix using cross entropy methods." *Economic Systems Research* 13 (1): 47–64.

59. "Food security and trade negotiations in the World Trade Organization: A cluster analysis of country groups," by **Eugenio Díaz-Bonilla**, **Marcelle Thomas**, **Andrea Cattaneo**, and **Sherman Robinson** (November 2000).

60. "Why the poor care about partial versus general equilibrium effects, Part 1: Methodology and country case," by **Peter Wobst (November 2000). Published as: Wobst, P. 2000. "Why the poor care about partial versus general equilibrium effects." In *Proceedings Deutscher Tropentag 2000 — International Agricultural Research: A Contribution to Crisis Prevention.* Stuttgart, Germany: University of Hohenheim (CD-ROM).

*61. "Growth, distribution, and poverty in Madagascar: Learning from a microsimulation model in a general equilibrium framework," by Denis Cogneau and **Anne-Sophie Robilliard** (November 2000).

62. "Farmland holdings, crop planting structure, and input usage: An analysis of China's agricultural census," by **Xinshen Diao**, Yi Zhang, and Agapi Somwaru (November 2000).

63. "Rural labor migration, characteristics, and employment patterns: A study based on China's agricultural census," by Francis Tuan, Agapi Somwaru, and **Xinshen Diao** (November 2000). Published as: Gale, F., A. Somwaru, and X. Diao. 2002. "Agricultural labor: Where are the jobs?" In *China's food and agriculture: Issues for the 21st century.* ERS Agricultural Information Bulletin No. 775, pp. 44–46. Washington, DC: U.S. Department of Agriculture.

64. "GAMS code for estimating a social accounting matrix (SAM) using cross entropy (CE) methods," by **Sherman Robinson and **Moataz El-Said** (December 2000).

65. "A computable general equilibrium analysis of Mexico's agricultural policy reforms," by **Rebecca Lee Harris (January 2001).

66. "Distribution and growth in Latin America in an era of structural reform," by **Samuel A. Morley** (January 2001).

67. "What has happened to growth in Latin America?" by **Samuel A. Morley** (January 2001).

68. "China's WTO accession: Conflicts with domestic agricultural policies and institutions," by Hunter Colby, **Xinshen Diao**, and Francis Tuan (January 2001). Published as: Colby, H., X. Diao, and F. Tuan. 2001. "China's WTO accession: Conflicts with domestic agricultural policies and institutions." *Estey Center Journal of International Law and Trade Policy* 2 (1): 190–210.

69. "A 1998 social accounting matrix for Malawi," by Osten Chulu and **Peter Wobst (February 2001).

70. "A CGE model for Malawi: Technical documentation," by **Hans Löfgren (February 2001).

71. "External shocks and domestic poverty alleviation: Simulations with a CGE model of Malawi," by **Hans Löfgren, Osten Chulu, Osky Sichinga, Franklin Simtowe, Hardwick Tchale, Ralph Tseka, and **Peter Wobst** (February 2001).

72. "Less poverty in Egypt? Explorations of alternative pasts with lessons for the future," by **Hans Löfgren (February 2001).

73. "Macro policies and the food sector in Bangladesh: A general equilibrium analysis," by **Marzia Fontana, **Peter Wobst**, and **Paul Dorosh** (February 2001).

74. "A 1993–94 social accounting matrix with gender features for Bangladesh," by **Marzia Fontana and **Peter Wobst** (April 2001).

75. "A standard computable general equilibrium (CGE) model," by **Hans Löfgren, **Rebecca Lee Harris**, and **Sherman Robinson**, with assistance from **Marcelle Thomas** and **Moataz El-Said** (April 2001). Published as: Löfgren, H., R. L. Harris, and S. Robinson, with assistance from M. Thomas and M. El-Said. 2002. "A standard computable general equilibrium (CGE) model in GAMS." IFPRI Microcomputer Series No. 5. Washington, DC: International Food Policy Research Institute.

76. "A regional general equilibrium analysis of the welfare impact of cash transfers: An analysis of Progresa in Mexico," by **David P. Coady and **Rebecca Lee Harris** (June 2001).

77. "Genetically modified foods, trade, and developing countries," by **Chantal Pohl Nielsen, Karen Thierfelder, and **Sherman Robinson** (August 2001).

78. "The impact of alternative development strategies on growth and distribution: Simulations with a dynamic model for Egypt," by **Moataz El-Said, **Hans Löfgren**, and **Sherman Robinson** (September 2001).

79. "Impact of MFA phase-out on the world economy: An intertemporal, global general equilibrium analysis," by **Xinshen Diao and Agapi Somwaru (October 2001). Published as: Diao, X., and A. Somwaru. 2002. "A global perspective on liberalizing world textile and apparel trade." *Nordic Journal of Political Economy* 28 (2): 127–145.

*80. "Free trade agreements and the SADC economies," by Jeffrey D. Lewis, **Sherman Robinson**, and Karen Thierfelder (November 2001).

81. "WTO, agriculture, and developing countries: A survey of issues," by **Eugenio Díaz-Bonilla**, **Sherman Robinson**, **Marcelle Thomas**, and **Yukitsugu Yanoma** (January 2002).

82. "On boxes, contents, and users: Food security and the WTO negotiations," by **Eugenio Díaz-Bonilla**, **Marcelle Thomas**, and **Sherman Robinson** (November 2001, revised July 2002). Published as: Díaz-Bonilla, E., M. Thomas, and S. Robinson. 2003. "Trade, food security, and WTO negotiations: Some reflections on boxes and their contents." In *Agricultural trade and poverty: Making policy analysis count*. OECD Proceedings, pp. 59–103. Paris: OECD.

83. "Economy-wide effects of El Niño/Southern Oscillation (ENSO) in Mexico and the role of improved forecasting and technological change," by **Rebecca Lee Harris and **Sherman Robinson** (November 2001).

84. "Land reform in Zimbabwe: Farm-level effects and cost-benefit analysis," by **Anne-Sophie Robilliard**, Crispen Sukume, **Yukitsugu Yanoma**, and **Hans Löfgren** (December 2001, revised May 2002).

*85. "Developing-country interest in agricultural reforms under the World Trade Organization," by **Xinshen Diao**, Terry Roe, and Agapi Somwaru (January 2002). Published as: Diao, X., T. Roe, and A. Somwaru. 2002. "Developing-country interest in agricultural reforms under the World Trade Organization." *American Journal of Agricultural Economics* 84 (3): 782–790.

**86. "Social accounting matrices for Vietnam 1996 and 1997," by Chantal Pohl Nielsen (January 2002).

87. "How China's WTO accession affects rural economy in the less developed regions: A multi-region, general equilibrium analysis," by **Xinshen Diao, Shenggen Fan, and Xiaobo Zhang (January 2002). Forthcoming in the *Journal of Comparative Economics*.

88. "HIV/AIDS and macroeconomic prospects for Mozambique: An initial assessment," by **Channing Arndt (January 2002).

89. "International spillovers, productivity growth, and openness in Thailand: An intertemporal general equilibrium analysis," by **Xinshen Diao, Jorn Rattso, and Hildegunn Ekroll Stokke (February 2002).

90. "Scenarios for trade integration in the Americas," by **Xinshen Diao, **Eugenio Díaz-Bonilla**, and **Sherman Robinson** (February 2002).

91. "Assessing impacts of declines in the world price of tobacco on China, Malawi, Turkey, and Zimbabwe," by **Xinshen Diao, **Sherman Robinson**, **Marcelle Thomas**, and **Peter Wobst** (March 2002).

92. "The impact of domestic and global trade liberalization on five Southern African countries," by **Peter Wobst (March 2002).

93. "An analysis of the skilled-unskilled wage gap using a general equilibrium trade model," by **Karen Thierfelder and **Sherman Robinson** (May 2002).

94. "That was then but this is now: Multifunctionality in industry and agriculture," by **Eugenio Díaz-Bonilla** and Jonathan Tin (May 2002).

95. "A 1998 social accounting matrix (SAM) for Thailand," by **Jennifer Chung-I Li (July 2002).

96. "Trade and the skilled-unskilled wage gap in a model with differentiated goods," by **Karen Thierfelder and **Sherman Robinson** (August 2002).

97. "Estimation of a regionalized Mexican social accounting matrix: Using entropy techniques to reconcile disparate data sources," by **Rebecca Lee Harris (August 2002).

*98. "The influence of computable general equilibrium models on policy," by Shantayanan Devarajan and **Sherman Robinson** (August 2002).

99. "Macro and micro effects of recent and potential shocks to copper mining in Zambia," by **Hans Löfgren, **Sherman Robinson**, and **James Thurlow** (August 2002).

100. "A standard computable general equilibrium model for South Africa," by **James Thurlow and Dirk Ernst van Seventer (September 2002).

101. "Can South Africa afford to become Africa's first welfare state?" by **James Thurlow (September 2002).

102. "HIV/AIDS and labor markets in Tanzania," by **Channing Arndt and **Peter Wobst** (October 2002).

103. "Economy-wide benefits from establishing water user-right markets in a spatially heterogeneous agricultural economy," by **Xinshen Diao**, Terry Roe, and Rachid Doukkali (October 2002).

104. "Do direct payments have intertemporal effects on U.S. agriculture?" by Terry Roe, Agapi Somwaru, and **Xinshen Diao** (October 2002).

105. "General equilibrium measures of agricultural policy bias in fifteen developing countries," by Henning Tarp Jensen, **Sherman Robinson**, and Finn Tarp (October 2002).

*106. "Trade in genetically modified food: A survey of empirical studies," by Chantal Pohl Nielsen, **Sherman Robinson**, and **Karen Thierfelder** (November 2002).

107. "Opportunities and challenges in agriculture and garments: A general equilibrium analysis of the Bangladesh economy," by **Channing Arndt**, Paul Dorosh, **Marzia Fontana**, and Sajjad Zohir, with **Moataz El-Said** and **Christen Lungren** (November 2002).

108. "Globalizing health benefits for developing countries," by **Eugenio Díaz-Bonilla**, Julie Babinard, Per Pinstrup-Andersen, and **Marcelle Thomas** (December 2002). Published as: Díaz-Bonilla, E., J. Babinard, P. Pinstrup-Andersen, and M. Thomas. 2002. "Globalization and health: Opportunities and risks for the poor in the developing countries." *Nord-Süd aktuell* 16 (3): 417–425.

109. "U.S. agricultural policy: The 2002 Farm Bill and WTO Doha Round proposal," by David Orden (February 2003).

110. "Modeling the effects of trade on women, at work and at home: A comparative perspective," by **Marzia Fontana** (February 2003).

*111. "Food security, poverty, and economic policy in the Middle East and North Africa," by **Hans Löfgren** and Alan Richards (February 2003). Published as: Löfgren, H., and A. Richards. 2003. "Food security, poverty, and economic policy in the Middle East and North Africa." In *Food, agriculture, and economic policy in the Middle East and North Africa*, ed. H. Löfgren, pp. 1-31. New York: JAI/Elsevier.

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*115. *Wheat policy reform in Egypt: Adjustment of local markets and options for future reforms*, by Mylène Kherallah, **Hans Löfgren**, Peter Gruhn, and Meyra Reeder (2000).

117. *Structural adjustment and intersectoral shifts in Tanzania: A computable general equilibrium analysis*, by **Peter Wobst (2001).

*119. *The Egyptian food subsidy system: Structure, performance, and options for reform,* by Akhter U. Ahmed, Howarth E. Bouis, Tamar Gutner, and **Hans Löfgren** (2001).

126. *Facing the development challenge in Mozambique: An economywide perspective*, by Finn Tarp, **Channing Arndt, Henning Tarp Jensen, **Sherman Robinson**, and Rasmus Heltberg (2002).

128. *Macroeconomic policy reforms and agriculture: Towards equitable growth in Zimbabwe*, by **Romeo M. Bautista, **Marcelle Thomas**, Kay Muir-Leresche, and **Hans Löfgren (**2002).

129. *Balancing agricultural development and deforestation in the Brazilian Amazon*, by **Andrea Cattaneo (2002).

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[b] The ** refers to reports using an economywide model for the major part of their analysis and documenting economywide databases (esp. SAMs) and methods for their estimation, while the * refers to reports drawing on insights from TMD economywide papers or using economywide models for a nonmajor part of their analysis. Names underlined were TMD researchers at the time of publication.

TABLE B3 — IFPRI'S EXTERNAL PUBLICATIONS
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*Löfgren, H., ed. 2003. *Food, agriculture, and economic policy in the Middle East and North Africa*. New York: JAI/Elsevier.

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Table B4 — IFPRI's publicly released social accounting matrices, and copies requested since 2000

Social Accounting Matrix	Date placed on web	Copies requested by December 2003
Bangladesh, 1993–94	4/1/2002	190
Brazil, 1995-1996 – Aggregated	3/17/2003	63
Brazil, 1995-1996-Dissagregated	3/17/2003	65
Egypt, 1997 – Aggregated	7/1/2002	137
Egypt, 1997 – Disaggregated	7/1/2002	145
Indonesia, 1995	4/01/2003	58
Malawi, 1998	5/1/2002	153
Mexico, 1996	11/18/2002	115
Morocco, 1994	7/1/2002	75
Mozambique, 1994–95	7/28/2000	150
South Africa, 1993, 1998 and 1999	10/1/2002	158
Tanzania, 1992	5/1/2000	186
Tanzania, 1998-2001	04/28/2003	82
Thailand, 1998	7/1/2002	116
Vietnam, 1997	4/1/2002	166
Zambia, 1995	7/28/2000	178
Zimbabwe, 1991	5/1/2000	163
TOTAL number requested		**2,200**

Table B5 — IFPRI's unreleased social accounting matrices

Country	Authors	SAM Year	TMD Discussion Paper No.
Egypt	Robinson and Gelhar	1987	1
	Löfgren	1991–92	5
	Löfgren, Robinson, and Nygard	1989–90	11
	Löfgren	1979	72
Bangladesh	Arndt *et al*	1999-2000	107
	Fontana *et al*	1993-1994	73
Indonesia	Robinson *et al.*	1990	19
	Robinson, El-Said, and San	1990	27
(Sumatra)	San, Löfgren, and Robinson	1990	52
Madagascar	Robilliard and Robinson	1995	50
	Cogneau and Robilliard	1995	61
Mexico	Robinson, Burfisher, and Thierfelder	USDA SAM	8
Morocco	Diao, Roe, and Doukkali	1998	103
Mozambique	Arndt	1997	88
Philippines	Bautista	1979	4
	Bautista and Robinson	1979	14
	Bautista and Thomas	1979	22
South Africa (Transvaal)	Mukherjee	1995	12
Tanzania	Bautista, Robinson, Tarp, and Wobst	1990	25
	Arndt and Wobst	1998	102
Thailand	Diao, Rattso, and Stokke	1989	89
	Li	1998	95
Tunisia	Löfgren	1996	Donor Report**
Uganda	Dorosh, El-Said and Lofgren	1998	Not published
U.S.A.	Thierfelder and Robinson	1982	96
Zambia	Evans and Thurlow	2001	Not published
Zimbabwe	Levy, Lofgren and Thurlow	1997	Not published
UNDP Project in Latin America:			
Argentina	C. Díaz-Bonilla,* E. Díaz-Bonilla, Piñeiro, and Robinson	1993/1997	
Bolivia	Jimenez and Piñeiro*	1996	
Brazil	Carneiro	1996	
Chile	Contreras, Ramos, Montero, and Piñeiro*	1996	
Colombia	Sanchez and Hernandez Diaz	1998	
Costa Rica	Sauma and Sanchez	1998	
Cuba	Ferriol, Hernandez Montero, and Hoang	1999	
Ecuador	Vos and Leon	1993	
El Salvador	Acevedo and Piñeiro*	1999	
Honduras	Cuesta, Sanchez, and Piñeiro*	1997	
Jamaica	King and Piñeiro*	2000	
Mexico	Morley and C. Díaz-Bonilla	1996	
Paraguay	Molinas and Piñeiro	1998	
Peru	Segura Vasi and Garcia	1994	

Table B5 — IFPRI's unreleased social accounting matrices

Country	Authors	SAM Year	TMD Discussion Paper No.
Dominican Republic	Aristy and Piñeiro*	1991	
Uruguay	Laenz and Perera	1995	
Venezuela	Ortega	1996	

* Not an author, but helped construct the model.
** Used in a Donor Report, not in TMD discussion paper

Table B6 — IFPRI's publicly released economywide models and training manuals

The Standard CGE Model

> **Löfgren, H.**, **R. L. Harris**, and **S. Robinson**, with the assistance of M. El-Said and M. Thomas. 2002. *A standard computable general equilibrium (CGE) model in GAMS.* Microcomputers in Policy Research No. 5. Washington, DC: International Food Policy Research Institute. (Document distributed via website and in hard copy, and GAMS code distributed via website and on CD-ROM, which also includes demo version of the GAMS software, inside the back cover of each hard copy. Formerly released as TMD Discussion Paper No. 75; also distributed via website and in hard copy, and GAMS code distributed via website.)

> Prior to the development of the standard CGE model, a country-level model was widely distributed in hard copy, and via diskette and e-mail (for the GAMS code). The model is documented in two places:

> Devarajan, S., J. D. Lewis, and **S. Robinson**. 1994. "From stylized to applied models: Building multisector CGE models for policy analysis." In *Getting the model right: The general equilibrium approach to adjustment policy*, Chapter 3. Unpublished book manuscript.

> **Robinson, S.**, A. Yúnez-Naurde, R. Hinojosa-Ojeda, J. D. Lewis, and S. Devarajan. 1999. "From stylized to applied models: Building multisector CGE models for policy analysis." *North American Journal of Economics and Finance* 20: 5–38.

Training Exercises

> **Löfgren, H.** 2000. *Exercises in general equilibrium modeling using GAMS.* Microcomputers in Policy Research No. 4A. Washington, DC: International Food Policy Research Institute. (Document distributed via website and in hard copy, and GAMS code distributed via website and on diskette inside back cover of hard copy; hard copy also includes CD-ROM with demo version of the GAMS software.)

> **Löfgren, H.** 2000. *Key to exercises in general equilibrium modeling using GAMS.* Microcomputers in Policy Research No. 4B. Washington, DC: International Food Policy Research Institute. (Document distributed via website and in hard copy, and GAMS code distributed via website and on diskette inside back cover of hard copy; hard copy also includes CD-ROM with demo version of the GAMS software.)

Table B7 — IFPRI's unreleased economywide models

Single Country	Authorship	TMD Discussion Paper No.
Bangladesh	Fontana *et al.*	73
	Robinson *et al.*	107
Egypt	Löfgren	1
	Löfgren	5
	Löfgren *et al.*	11
	Löfgren *et al.*	48
	Löfgren	72
	El-Said *et al.*	78
Indonesia	Robinson *et al.*	19
	Robinson *et al.*	27
	Bautista *et al.*	42
(Sumatra)	San *et al.*	52
Madagascar	Cogneau *et al.*	61
Malawi	Löfgren *et al.*	71
Mexico	Robinson *et al.*	8
	Harris	44
	Burfisher *et al.*	54
	Harris	65
	Coady *et al.*	76
	Harris *et al.*	83
Morocco	Löfgren *et al.*	17
	Löfgren	38
	Arndt *et al.*	40
	Löfgren *et al.*	41
	Diao *et al.*	103
Mozambique	Arndt *et al.*	43
	Arndt	88
Philippines	Bautista	4
	Bautista *et al.*	14
	Bautista *et al.*	22
South Africa	Mukherjee	12
	Thurlow *et al.*	100
	Thurlow	101
Tanzania	Bautista *et al.*	25
	Wobst	60
	Arndt *et al.*	102
Thailand	Diao *et al.*	89
U.S.A.	Theirfelder *et al.*	96
Zambia	Löfgren	99
Zimbabwe	Bautista *et al.*	32
	Bautista *et al*	57
Stylized developing country	Löfgren *et al.*	35
	Löfgren *et al.*	37
8-country region	Lewis *et al.*	46
7-country multiregion	Nielsen *et al.*	55
Multiregion	Bayar *et al.*	56
Global	Nielsen *et al.*	77
	Diao *et al.*	79
	Diao *et al.*	90
14 linked country/region	Lewis *et al.*	80
China multiregion	Diao *et al.*	87
China, Malawi, Turkey, and Zimbabwe	Diao *et al.*	91

Table B7 — IFPRI's unreleased economywide models

Single Country	Authorship	TMD Discussion Paper No.
Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe	Wobst *et al.*	92
	Tarp *et al*.	105

UNDP Project in Latin America

Argentina	E. Díaz-Bonilla *et al.*	
Bolivia	Jimenez *et al.*	
Brazil	Carneiro	
Chile	Contreras *et al.*	
Colombia	Sanchez *et al*.	
Costa Rica	Sauma *et al.*	
Cuba	Ferriol *et al.*	
Ecuador	Vos *et al*.	
El Salvador	Acevedo *et al.*	
Honduras	Cuesta *et al.*	
Jamaica	King *et al*.	
Mexico	Morley *et al.*	
Paraguay	Molinas *et al*.	
Peru	Segura Vasi *et al.*	
Dominican Republic	Aristy *et al.*	
Uruguay	Laenz *et al.*	
Venezuela	Ortega	

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003

Title:	"Collaborative Research and Capacity Strengthening for Multisector Policy Analysis in Malawi and Southern Africa," a joint project with Bunda College of Agriculture
Place:	Bunda College of Agriculture, University of Malawi, Lilongwe
Dates:	▪ November 8–26, 1999, and March 13–31, 2000 ▪ March 13–31, 2000
Length/time:	▪ Two three-week courses ▪ Three weeks
Number of participants:	▪ 17 (Malawi 9, Mozambique 2, Swaziland 1, Tanzania 2, Zambia 2, Zimbabwe 1) ▪ 18 (Malawi 9, Mozambique 1, Tanzania 4, Zimbabwe 2, Uganda 1, The Netherlands 1)
Participants' affiliations:	▪ *Malawi*: Bunda College, Reserve Bank of Malawi, National Economic Council, USAID, Ministry of Finance. *Mozambique*: Ministry of Finance and Planning. *Swaziland*: Central Bank of Swaziland. *Tanzania*: Bank of Tanzania, Economic and Social Research Foundation. *Zambia*: Ministry of Finance and Economic Development, Department of Civil Engineering. *Zimbabwe*: World Conservation Union. ▪ *Malawi*: Bunda College, National Statistical Office, National Economic Council, Reserve Bank of Malawi. *Mozambique*: Ministry of Agriculture and Fisheries. *Tanzania*: Bank of Tanzania, Customs and Excise Department, University of Dar es Salaam, National Bureau of Statistics. *Zimbabwe*: University of Zimbabwe. *The Netherlands*: Food and Agriculture Organization of the United Nations.
Types of training materials:	Löfgren, Hans. 2000. *Exercises in General Equilibrium Modeling Using GAMS*. Microcomputers in Policy Research No. 4A/B. Washington, DC: International Food Policy Research Institute; package of reading material on CGE models and SAMs prepared for course.

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	"Computable General Equilibrium Modeling and the Use of GAMS Software," for use in the research project entitled "Modeling the Future of Indonesian Agriculture"
Place:	CASER, Bogor
Dates:	May 19–31, 1996, and August 1997
Length/time:	Two weeks each
Number of participants:	Unrecorded
Participants' affiliations:	CASER and others from Ministry of Agriculture
Types of training materials:	

Title:	TIPS/UCT/IFPRI Winter School on I-O and SAM-Based Models and Masters in Economics Course on CGE Modeling
Place:	University of Cape Town
Dates:	July 9–August 3, 2001
Length/time:	Four weeks
Number of participants:	23
Participants' affiliations:	Trade and Investment South African Agency; Department of Trade and Industry of South Africa; Statistics South Africa; University of Pretoria; Rand Afrikaans University, Department of Economics; University of Kwazulu Natal, Department of Economics, Trade, and Industrial Policy Strategies; University of Cape Town; Development Policy Research Unit at the University of Cape Town; Applied Fiscal Research Centre (South Africa); Central Statistics Office of Zimbabwe; University of Dar es Salaam (Tanzania); Ministry of Agriculture and Rural Development of Mozambique; Bangladesh Institute of Development Studies.
Types of training materials:	Löfgren, Hans. 2000. *Exercises in General Equilibrium Modeling Using GAMS*. Microcomputers in Policy Research No. 4A/B. Washington, DC: International Food Policy Research Institute; package of reading material on CGE models and SAMs prepared for course.

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	Computable General Equilibrium Models for Trade and Macroeconomic Analysis
Place:	San José, Costa Rica
Dates:	February 19–23, 2001
Length/time:	5 days
Number of participants:	25
Participants' affiliations:	Inter-American Institute for Cooperation on Agriculture (San José, Costa Rica), Inter-American Institute for Cooperation on Agriculture (Bogotá, Colombia), Inter-American Institute for Cooperation on Agriculture (Buenos Aires, Argentina), Universidad de Costa Rica (San José, Costa Rica), The Tropical Agronomic Centre for Research and Education (Costa Rica), Costa Rican government (San José, Costa Rica)
Types of training materials:	Löfgren, Hans. 2000. *Exercises in General Equilibrium Modeling Using GAMS*. Microcomputers in Policy Research No. 4A/B. Washington, DC: International Food Policy Research Institute; package of reading material on CGE models and SAMs prepared for course

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	Export-Led Economic Strategies: Effects on Poverty, Inequality, and Growth in Latin America and the Caribbean
Place:	▪ Montelimar, Nicaragua ▪ Santo Domingo, Dominican Republic ▪ Buenos Aires, Argentina
Dates:	▪ July 24–28, 2002 ▪ February 25–28, 2002 ▪ January 22–25, 2003
Length/time:	▪ 5 days ▪ 4 days ▪ 4 days
Number of participants:	▪ 45 ▪ 30 ▪ 35
Participants' affiliations:	Unidad de Análisis de Políticas Sociales y Economicas (La Paz, Bolivia), Instituto de Pesquisa Econômica Aplicada (Rio de Janeiro, Brazil), Economic Commission for Latin America and the Caribbean of the United Nations (Bogotá, Colombia), Instituto Nacional de Investigaciones Económicas (Cuba), Universidad Católica de Chile (Santiago, Chile), Fundación Economía y Desarrollo (Santo Domingo, Dominican Republic), Fundacion Salvadoreña para el Desarrollo Economico y Social (San Salvador, El Salvador), United Nations Development Programme (Ciudad de Guatemala, Guatemala), United Nations Development Programme (Tegucigalpa, Honduras), Department of Economics, University of the West Indies-Mona (Kingston, Jamaica), Grupo de Analisis para el Desarrollo (Lima, Peru), Institute of Social Studies (The Hague, the Netherlands), Sistema Integrado de Indicadores Sociales del Ecuador (Quito, Ecuador), Centro de Investigaciones Económicas (Montevideo, Uruguay), Department of Economics, University of Maryland (College Park, MD, U.S.A.), Economic Commission for Latin America and the Caribbean of the United Nations (Santiago, Chile), United Nations Development Programme (New York, U.S.A).
Types of training materials:	Löfgren, Hans. 2000. *Exercises in General Equilibrium Modeling Using GAMS*. Microcomputers in Policy Research No. 4A/B. Washington, DC: International Food Policy Research Institute; Robinson, Sherman, et al. "Standard CGE Model." Discussion Paper No. 75. Washington, DC: International Food Policy Research Institute; package of reading material on CGE models and SAMs prepared for course.

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	Argentine CGE Model
Place:	Buenos Aires, Argentina
Dates:	▪ December 17–20, 2002 ▪ (2) January 27–30, 2003
Length/time:	Four days
Number of participants:	▪ Four ▪ Two
Participants' affiliations:	Argentine Secretariat of Agriculture (SAGPyA)
Types of training materials:	Löfgren, Hans, et al. 2001. "A Standard Computable General Equilibrium (CGE) Model in GAMS." TMD Discussion Paper No. 75. Washington, DC: International Food Policy Research Institute.

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	- Analytical Tools for Economywide Policy Analysis with Applications to WTO Issues in Bangladesh - Follow-up training workshop
Place:	Dhaka, Bangladesh
Dates:	- March 16–April 4, 2002 - September 10–17, 2002
Length/time:	- Three-week course - Seven days
Number of participants:	24 12
Participants' affiliations:	- Jahangirnagar University (Savar, Dhaka); Rajshahi University (Rajshahi); Shahjalal University of Science and Technology (Sylhet); Islamic University (Kushtia); Bangabandhu Sheikh Mujibur Rahman Agricultural University (Gazipur); Center for Policy Dialogue (Bangladesh); Proshika; Bangladesh Bank; Bangladesh Bureau of Statistics, Implementation Monitoring, and Evaluation Division at the Ministry of Planning (Bangladesh); Ministry of Industries; SEID; Planning Commission; General Economics Division at the Ministry of Planning; Bangladesh Agricultural Research Council; Bangladesh Rice Research Institute; Bangladesh Institute of Development Studies; Sustainable Development Networking Programme (Bangladesh). - Various institutions, including Jahangirnagar University, Savar (Dhaka), Rajshahi University (Rajshahi), Bangabandhu Sheikh Mujibur Rahman Agricultural University (Gazipur), Center for Policy Dialogue (Bangladesh), Proshika, Bangladesh Bank, Bangladesh Bureau of Statistics, Bangladesh Institute of Development Studies.
Types of training materials:	Löfgren, Hans. 2000. *Exercises in General Equilibrium Modeling Using GAMS*. Microcomputers in Policy Research No. 4A/B. Washington, DC: International Food Policy Research Institute; package of reading material on CGE models and SAMs prepared for course.

Table B8 — IFPRI's training programs in economywide modeling, November 1999 to January 2003 (continuation)

Title:	Introduction to General Equilibrium Modeling for Policy Analysis
Place:	Kuwait Institute for Scientific Research (KISR) Kuwait City, Kuwait
Dates:	January 13–15, 2003
Length/time:	Three days
Number of participants:	20
Participants' affiliations:	Kuwait Institute for Scientific Research (KISR) Ministry of Planning
Types of training materials:	Publicly available: ■ McCarl, B. A. 2000. "Using GAMSIDE." <http://www.agrinet.tamu.edu/mccarl>. ■ Rosenthal, R. E. 1998. "A GAMS Tutorial." In *GAMS: A User's Guide*, eds. A. Brooke, D. Kendrick, A. Meeraus, and R. Raman, pp. 5–28. Washington, DC: GAMS Development Corporation (included in CD). ■ Sadoulet, E., and A. de Janvry. 1995. "Input-Output Tables, Social Accounting Matrices, and Multipliers." In *Quantitative Development Policy Analysis*, pp. 273–288. Baltimore: Johns Hopkins University Press. ■ Reinert, K. A., and D. W. Roland-Holst. 1997. "Social Accounting Matrices." In *Applied Methods for Trade Policy Analysis: A Handbook*, eds. J. F. François and K. A. Reinert, pp. 94–121. New York: Cambridge University Press. ■ Robinson, S. 1989. "Multisectoral Models." In *Handbook of Development Economics*, vol. 2, eds. H. Chenery and T. N. Srinivasan, pp. 885–947. Amsterdam: Elsevier Science. Not publicly available: ■ Robinson, S. 2000. "123 Model Slide Presentation," IFPRI (PowerPoint Slides). ■ Robinson, S. 2001. "Policy Models: Design, Implementation, and Use," IFPRI (PowerPoint Slides). ■ Robinson, S. 2003. "Social Accounting Matrices, National Accounts, and the Circular Flow of Income," IFPRI (PowerPoint Slides).

Table B9 — IFPRI's contributions to methods for compiling SAMs and undertaking economywide modeling since the late 1990s

(A) ENTROPY

Drawing on information theory, IFPRI staff has extended recent work on maximum entropy econometrics to develop estimation techniques that efficiently use the information available but do not need to make any assumptions about information that is missing. The approach is very flexible, and IFPRI staff has applied it extensively to estimating both SAMs (for a large number of countries) and CGE model parameters.

Arndt, C., **S. Robinson**, and F. Tarp. 1999. "Parameter estimation for a computable general equilibrium model: A maximum entropy approach." TMD Discussion Paper No. 40. Washington, DC: International Food Policy Research Institute. Now in *Economic Modeling* 19 (3, 2002): 375–398.

Cattaneo, A., and **S. Robinson**. 2000. "Empirical models, rules, and optimization: Turning positive economics on its head." TMD Discussion Paper No. 53. Washington, DC: International Food Policy Research Institute.

Harris, R.L. 2002. "Estimation of a regionalized Mexican social accounting matrix: Using entropy techniques to reconcile disparate data sources." TMD Discussion Paper No. 97. Washington, DC: International Food Policy Research Institute.

Morley, S., **S. Robinson**, and **R.L. Harris**. 1998. "Estimating income mobility in Colombia using maximum entropy econometrics." TMD Discussion Paper No. 26. Washington, DC: International Food Policy Research Institute.

Robilliard, A.-S., and **S. Robinson**. 1999. "Reconciling household surveys and national accounts data using a cross entropy estimation method." TMD Discussion Paper No. 50. Washington, DC: International Food Policy Research Institute.

Robinson, S., **A. Cattaneo**, and **M. El-Said**. 2000. "Updating and estimating a social accounting matrix using cross entropy methods." TMD Discussion Paper No. 58. Washington, DC: International Food Policy Research Institute. Now in *Economic Systems Research* 13 (1, 2001): 47–64.

Robinson, S., and **M. El-Said**. 2000. "GAMS code for estimating a social accounting matrix (SAM) using cross entropy (CE) methods." TMD Discussion Paper No. 64. Washington, DC: International Food Policy Research Institute.

(B) MICROSIMULATION AND POVERTY/INEQUALITY ANALYSIS

This method takes the analysis of income distribution one step further than conventional CGE models. It links a national-level CGE model to a microsimulation model based on household survey data. The household module is usually estimated with econometric techniques. Its units correspond to individual observations in a survey. The goal is to construct a model that makes the best possible use of microeconomic information derived from household data in order to capture the importance of heterogeneity across

households. Various approaches may be followed within this methodology. The household module can be integrated with the CGE model, permitting full interaction between the two levels of analysis. Alternatively, under a sequential approach, the CGE model supplies a separate microsimulation module with data on employment, wages, and consumer prices. The articles listed below are examples of the latter approach. The main advantage of the CGE-microsimulation approach is that it incorporates more behavioral detail than other approaches and allows analysis of economic policies on the entire distribution of households rather than a set of representative households.

> Coady, D., and **R. L. Harris**. 2001. "A regional general equilibrium analysis of the welfare impact of cash transfers: An analysis of Progresa in Mexico." TMD Discussion Paper No. 76. Washington, DC: International Food Policy Research Institute.

> Cogneau, D., and **A.-S. Robilliard**. 2000. "Growth, distribution, and poverty in Madagascar: Learning from a microsimulation model in a general equilibrium framework." TMD Discussion Paper No. 61. Washington, DC: International Food Policy Research Institute.

> **Robilliard, A.-S.**, F. Bourguignon, and **S. Robinson**. 2001. "Crisis and income distribution: A macro-micro model for Indonesia." International Food Policy Research Institute, Washington, DC (Mimeo).

As part of this work, TMD has developed a household module for extending the standard CGE model. This module uses additional information about representative households to compute poverty and inequality indices such as the three measures of the Foster, Greer, and Thorbecke family, the Gini coefficient, the Theil entropy index, and the Atkinson index.

> **Löfgren, H.**, **S. Robinson**, and **M. El-Said**. 2002. "Poverty and inequality analysis in a general equilibrium framework: The representative household approach." International Food Policy Research Institute, Washington, DC (Mimeo.). Posted on World Bank website (http://wb.forumone.com/poverty/psia/tools.htm) as part of the "Toolkit for Evaluating the Poverty and Distributional Impact of Economic Policies."

(C) DYNAMIC CGE MODELS

Unlike static CGE models, dynamic CGE models explicitly incorporate time. IFPRI has developed and applied several dynamic CGE models. They fall into two major categories: recursive and intertemporally optimal. Dynamic-recursive models are solved one period at a time with an interperiod module that updates selected parameters (typically total factor productivity and stocks of factors and population) on the basis of exogenous trends or decisions in earlier periods. Agents do not explicitly consider future outcomes (for example, prices and incomes). For examples, see Löfgren et al. (1998, 2002).

Intertemporally optimal dynamic models are models in which producers and consumers make decisions that are optimal over time, explicitly considering future prices, and the equilibrium is a set of prices that clear markets at every point in time. The papers by Diao and co-authors that are listed below describe a wide range of applications of

intertemporal dynamic models. Some of these papers focus on endogenous growth and some on multicountry modeling.

As an intermediate case, Löfgren and Robinson (2003) have developed an intertemporal model that is an extension of the static standard model. It is solved simultaneously for all time periods. The government is permitted to make intertemporally optimal decisions while other agents make myopic decisions. It includes links between, on the one hand, factor productivity and, on the other hand, foreign trade and government spending in different functional areas. As a special case, the model can be formulated in a manner that makes it equivalent to a dynamic-recursive model, although it has the advantage of being more efficient from a solver perspective (a single-pass multiperiod solution takes less time than solving a model repeatedly for single periods).

Diao, X., W. Li, and E. Yeldan. 2000. "How the Asian crisis affected the world economy: A general equilibrium perspective." *Economic Quarterly* 86 (2): 35–59.

Diao, X., W. Li, and E. Yelden. 2002. "On the differential impact of the Asian crisis on the world economy: A general equilibrium perspective." *Pacific Economic Review* 7 (3): 519–543.

Diao, X., J. Rattso, and H. Stokke. 2002. "International spillovers, productivity growth, and openness in Thailand: An intertemporal CGE model analysis." Under revision for publication in *Journal of Development Economics*.

Diao, X., J. Rattso, and H. Stokke. 2002. "Learning by exporting and productivity-investment interaction: An intertemporal general equilibrium analysis of the growth process in Thailand." EUI Working Paper ECO No. 2002/25. Badia Fiesolana, San Domenico, Italy: European University Institute, Department of Economics.

Diao, X., and T. Roe. 2000. "How the financial crisis affected world agriculture: A general equilibrium perspective." *American Journal of Agricultural Economics* 82 (3): 688–694.

Diao, X., T. Roe, and A. Somwaru. 2002. "Developing-country interests in agricultural reforms under the World Trade Organization." *American Journal of Agricultural Economics* 84 (3): 782–790.

Diao, X., and A. Somwaru. 2000. "An inquiry on general equilibrium effects of MERCOSUR: An intertemporal world model." *Journal of Policy Modeling* 22 (5): 557–588.

Diao, X., and A. Somwaru. 2001. "A dynamic evaluation of the effects of a free trade area of the Americas: An intertemporal, global general equilibrium model." *Journal of Regional Integration* 16 (1): 21–47.

Diao, X., and A. Somwaru. 2002. "A global perspective of liberalizing world textile and apparel trade." *Nordic Journal of Political Economy* 28 (2): 127–146.

Diao, X., A. Somwaru, and T. Roe. 2001. "A global analysis of agricultural reform in WTO member countries." In *Agricultural policy reform in the WTO: The road*

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ahead. Agricultural Economic Report No. 802. Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Diao, X., and E. Yelden. 2001. "Turkey's strategic trade policy alternatives in a world of multi-polar trade blocs: Lessons from an intertemporal, multi-region general equilibrium model." In *Regionalism in Europe: Geometries and strategies after 2000*, eds. J. V. Hagen and M. Widgren, pp. 195–220. Dordrecht, The Netherlands: Kluwer.

Löfgren, H., **M. El-Said**, and **S. Robinson**. 2002. "Trade liberalization and the poor: A dynamic rural-urban general equilibrium analysis of Morocco." In *Towards Arab and Euro-Med regional integration*, eds. S. Dessus, R. Safadi, and J. Devlin, pp. 129–146. Paris: OECD.

Löfgren, H., and **S. Robinson**. Forthcoming. "Public spending, growth, and poverty alleviation." In *Sub-Saharan Africa: Simulations with an archetype general equilibrium model*.

Löfgren, H., **S. Robinson**, and D. Nygaard. 1998. "Tiger or turtle? Exploring alternative futures for Egypt to 2020." In *Opening doors to the world: A new trade agenda for the Middle East*, ed. R. Safadi, pp. 167–197. Cairo: American University in Cairo Press and International Development Research Centre, in association with the Economic Research Forum, Cairo.

Somwaru, A., and **X. Diao**. 2002. "Scenario analysis using a global dynamic applied general equilibrium model." In *Papers and proceedings of the 12th Federal Forecasters Conference 2002*, pp. 163-170. Washington, DC: Department of Veteran Affairs.

(D) MULTIREGIONAL MODELS

The spatial dimension of economic policy is important. IFPRI has developed two types of multiregional models, with and without an explicit treatment of geographical space.

The models that do not treat space explicitly are less data-intensive and have been widely applied in IFPRI work, both in multicountry (including global) models and in multiregional country-level models. For examples, see papers by Diao and co-authors.

Spatial-network models, which treat space explicitly, are currently at an experimental stage. For an example, see Löfgren and Robinson (2002).

Diao, X., S. Fan, and X. Zhang. Forthcoming. "China's WTO accession: Impacts on regional agricultural income — A multi-region general equilibrium analysis." *Journal of Comparative Economics*.

Diao, X., and T. Roe. 2000. "The win-win effect of joint water market and trade reform on interest groups in irrigated agriculture in Morocco." In *The political economy of water pricing implementation*, ed. A. Dinar, pp. 141–165. New York: Oxford University Press.

Diao, X., and T. Roe. Forthcoming. "Can a water market avert the 'double whammy' of trade reform and lead to a 'win-win' outcome?" *Journal of Environmental Economics and Management*.

Diao, X., T. Roe, and R. Doukkali. 2002. "Economy-wide benefits from establishing water user-right markets in a spatially heterogeneous agricultural economy." TMD Discussion Paper No. 103. Washington, DC: International Food Policy Research Institute.

Löfgren, H., and **S. Robinson**. 2002. "Spatial networks in multi-region computable general equilibrium models." *Regional Science and Urban Economics* 32 (2): 651–671.

Roe, T., and **X. Diao**. 2000. "Water, externality, and strategic interdependence: A general equilibrium analysis." *Journal of International Development* 12 (2): 149–167.

(E) CGE MODELS WITH NONSEPARABLE HOUSEHOLDS

Empirical evidence and microeconomic theory suggest that, in many settings, farm household production and consumption decisions are "nonseparable." Nonseparability may have important policy implications, including lack of response or threshold effects when incentives change. This work extends the literature in two ways. First, it develops a nonseparable farm household model with transaction costs and endogenous choice of market "regime" (surplus, self-sufficiency, or deficit) for commodities and factors that are both demanded and supplied by the household. Second, it embeds this household model in an economywide computable general equilibrium model that is formulated as a mixed-complementarity problem.

Löfgren, H., and **S. Robinson**. 1999. "To trade or not to trade: Non-separable farm household models in partial and general equilibrium." *American Journal of Agricultural Economics* 81 (3): 663–670.

(F) IMPERFECT COMPETITION IN A GLOBAL CGE MODEL

Drawing on imperfect competition theory, IFPRI staff has extended work on imperfect competition modeling to develop a world CGE model with imperfect competition. The model has been applied to analyze the service sector's liberalization under APEC.

Benjamin, N., and **X. Diao**. 2000. "Liberalizing services trade in APEC: A general equilibrium analysis with imperfect competition." *Pacific Economic Review* 5 (1): 49–75.

(G) GENDER ANALYSIS

Women and men experience economic change differently because of their different access to and control over resources, and their different roles in the household and the market economy. It is often important to learn about the gender-disaggregated welfare impacts of policies. In addition, the introduction of gender in CGE models may also be needed to understand the impact of policies on other (nongender) indicators (since those responses are

conditioned by the gender structure of the economy). In a series of papers by Fontana and co-authors, a standard CGE model has been adapted to include women and men as separate factors of production, and social reproduction (or household work) and leisure as sectors in addition to standard market sectors.

Fontana, M. 2001. "Modeling the effects of trade on women: A closer look at Bangladesh." IDS Working Paper No. 139. Brighton, U.K.: Institute of Development Studies.

Fontana, M. 2002. "Modeling the effects of trade on women: The case of Zambia." IDS Working Paper No. 155. Brighton, U.K.: Institute of Development Studies.

Fontana, M. 2003. "Modeling the effects of trade on women, at work and at home: A comparative perspective." TMD Discussion Paper No. 110. Washington, DC: International Food Policy Research Institute.

Fontana, M., and A. Wood. 2000. "Modeling the effects of trade on women, at work and at home." *World Development* 28 (7): 1173–1190.

(H) HEALTH ANALYSIS

IFPRI macro modeling work in this area has included analyses of the effects in Africa of HIV/AIDS on growth prospects and human capital accumulation. Examples of presentations by Channing Arndt are:

"HIV/AIDS and human capital accumulation: Evidence from Tanzania and policy implications for Mozambique." Presented to Macroeconomics Directorate, Ministry of Planning and Finance, Mozambique, October 2002.

"HIV/AIDS and educational attainment in Tanzania." UNAIDS Reference Group on Economics. Bangkok, Thailand, September 2002.

"HIV/AIDS, human capital, and economic growth prospects for Mozambique." Presented to the Conference on HIV/AIDS in the Lusophone Countries, Lisbon, April 2002; The World Bank, Washington, DC, March 2002.

IFPRI work in the health area has also included analyses of the effect of environmental policies on health improvements and their feedback effects on the economy of Thailand. In 2000, the Trade and Commodities Division of FAO asked IFPRI's modeling staff to help with an FAO project, "World Tobacco Demand and Supply by 2015: Policy Options and Adjustments." As an important component of the project, TMD 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, Kobe, Japan, December 3–4, 2001.

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APPENDIX C

OUTCOMES FROM IFPRI'S ECONOMYWIDE MODELING, 1994 TO MARCH 2003

Table C1 — Sample of other institutions' short-term projects involving IFPRI's economywide modeling expertise

- A Japanese government-funded project, administered through the World Bank, to provide training and capacity building in CGE models to the Center for Agricultural and Socioeconomic Research (CASER) of the Ministry of Agriculture in Indonesia

- A World Bank mission to Morocco to review the country's rural development strategy

- A World Bank-funded project to provide training and capacity building in CGE models for a government research institute in Tunisia

- A joint project with (and funded by) the Institute for International Economics (IIE) in Washington, DC, to study the economic impact of potential integration of North and South Korea

- A joint project with (and funded by) the IIE to study the impact of famine in North Korea

- A joint project with (and funded by) the IIE to study the impact of the Asian financial crises on trade (exports and imports) and current account balances in countries across the world, including developing countries

- A study using SAM multipliers to support a World Bank mission to Tanzania

- A study to support a World Bank Country Economic Memorandum mission to Zambia

- A World Bank-funded study to assess the potential impact of land reform in Zimbabwe

- A World Bank study, using trust-fund resources, of the impact of the Asian financial crisis on income distribution and poverty in Indonesia, employing both a CGE model and a microsimulation model based on household survey data

- A project, funded by the Inter-American Development Bank (IDB) and Inter-American Institute of Cooperation in Agriculture (IICA), to provide a report on the state of agriculture in Venezuela and to provide technical assistance to the Ministry of Agriculture, including through training in CGE methodology

- A study of Mexico as part of an IDB project to analyze the potential impact of improved climate forecasting on Mexico and countries in Central America

- Various short-term projects jointly with, and funded by, the Economic Research Service, U.S. Department of Agriculture (ERS/USDA), to study the impact of agricultural policy reform in the OECD countries on the world economy, including developing countries

- ERS/USDA projects to study regional trade agreements, including NAFTA and the proposed FTAA
- ERS/USDA projects on the impact of China joining the WTO
- A World Bank project, using trust-fund resources, to train Indonesian researchers in the use of CGE models and microsimulation models, including transferring the IFPRI models
- A series of short-term projects funded by the government of Argentina to build capacity in, and transfer CGE models to, various government agencies, including economic units in the Secretariat of Agriculture and the Ministry of Foreign Affairs
- A World Bank-funded project to contribute to a manual on "tools" to support work on PRSPs in developing countries
- A World Bank project to study the role of water in Morocco
- A study of the impact of the Aswan High Dam in Egypt as part of a World Bank project to evaluate investment in dams in developing countries
- A study of Uganda as part of IFPRI work to support USAID's Initiative to End Hunger in Africa

Table C2 — Sample of transfers of IFPRI's CGE models and data sets to students and other researchers working on developing countries

- A researcher from Beacon Hill Institute asked Diao to provide him with the global CGE model code and paper.

- A researcher from the United Nations' Asia and Pacific Center for Transfer of Technology, an institution of ESCAP, asked for the endogenous growth CGE model.

- TMD's global CGE model and simulation analysis is the backbone of the USDA/ERS publication *Agricultural Policy and Reform in the WTO: The Road Ahead,* for which Diao developed the model and provided analysis, and whose welfare results have been cited by Presidents Clinton and Bush and by many U.S. government officials.

- Jennifer C. Li assisted a Thai doctoral student at the Economics Department of the University of Kansas to apply a static CGE model for Thailand.

- Jennifer C. Li assisted a Taiwanese doctoral student at the Economics Department of the University of North Carolina to apply a static CGE model for Taiwan.

- Carolina Díaz-Bonilla assisted a researcher from the trade unit of the World Bank who is working on the poverty chapter of a trade integration study, to create and run a small CGE-type household model to simulate the impact of price shocks (and later of various potential trade reforms) on households and on poverty, in October-November 2002.

- Hans Lofgren has provided technical support related to SAMs and IFPRI's standard CGE model to students, faculty, and researchers (with institutional affiliation in parentheses) working on the following countries:

  - Brazil (graduate student at Ohio State University)
  - Cuba (researcher at Instituto Nacional de Investigaciones Economicas, Havana)
  - Estonia and Lithuania (undergraduate student at Harvard University)
  - Ethiopia (undergraduate student at the University of South Florida)
  - Ghana (graduate student at Humboldt University of Berlin)
  - Jamaica (faculty at the University of the West Indies)
  - Japan (Mitsubishi Research Institute, Japan)
  - Korea (faculty at Chungbuk National University, Cheongju, Korea)
  - Lesotho (graduate student at American University, Washington, DC)
  - Mali (graduate student at Wageningen University, the Netherlands)
  - Morocco (two graduate students at Ohio State University)
  - Portugal (faculty at Technical University of Lisbon)
  - South Africa (graduate student at the University of Natal, Durban, and a researcher at the Chief Directorate of Agriculture, Western Cape)
  - Thailand (graduate student at the University of Kansas)
  - Turkey (graduate student at George Mason University)
  - Vietnam (graduate student at the University of Hohenheim, Germany)
  - Zimbabwe (graduate student at Ohio State University)
  - Various developing countries (faculty at Cornell University, a researcher at New York University, faculty at Yokohama National University in Japan)

Table C3 — Sample of IFPRI's CGE modeling material in university courses

A simple Internet search found the following illustrative examples of the use of IFPRI's CGE models:

- The Ohio State University — Economics 902: Computable General Equilibrium Analysis

  Löfgren, H. 2000. *Exercises in CGE modeling using GAMS.* Washington, DC: IFPRI.
  http://www-agecon.ag.ohio-state.edu/class/AEDE902/Kraybill/Syllabus902_2002.htm

- Texas A&M University — AGEC 685: Directed Study

  Löfgren, H., et al. 2001. *A standard computable general equilibrium (CGE) model in GAMS.* Washington, DC: IFPRI.
  http://ageco.tamu.edu/faculty/mccarl/685/agec685syllabus.pdf

- University of Cape Town — Following two courses in computable general equilibrium, students are now able to take a more specialized course on modeling techniques that is based on one provided by TMD at Cape Town in mid-2001. University of Cape Town's website provides a course description at the following address:

  http://www.commerce.uct.ac.za/economics/programs/postgrad/specialisation/msstrpol/seminars.htm

- University of Copenhagen — SAM and CGE Models for Development Analysis (Ph.D. course)

  Devarajan, S., J. D. Lewis, and S. Robinson. 1994. "Getting the model right: The general equilibrium approach to adjustment policy." Draft manuscript.
  http://www.econ.ku.dk/courses/courses/2-12-june-1998.htm

- Tulane University — Economics 756: International Trade, II

  Devarajan, S., D. Go, J. Lewis, S. Robinson, and P. Sinko. 1996. "Simple general equilibrium modeling." In *Applied methods for trade policy analysis: A handbook*, eds. J. Francois and K. Reinert, pp. 156-188. Cambridge: Cambridge University Press.
  http://www.tulane.edu/~dnelson/COURSES/GTrade/syl75602.htm

- Bilkent University — Econ 562: Topics in Microeconomics: Modeling General Equilibrium

  (1) Devarajan, S., J. D. Lewis, and S. Robinson. 1994. "Getting the model right: The general equilibrium approach to adjustment policy." Draft manuscript.

(2) Diao, X., et al. — 6 mimeographs and discussion papers.
http://www.bilkent.edu.tr/~yeldane/Ec562syl.html

- University of Minnesota — PA 8811: Strategic Issues in International Economic Policies

  Diao, X. 1997. "Using a dynamic applied general equilibrium model for policy analysis: Illustration with a study on NAFTA in its third year." Washington, DC: IFPRI.
  http://www.hhh.umn.edu/academics/syllabi/2003/pa8811.pdf

Figure C1 — Requests for IFPRI's publicly released social accounting matrices, by type of requestor, to April 2003
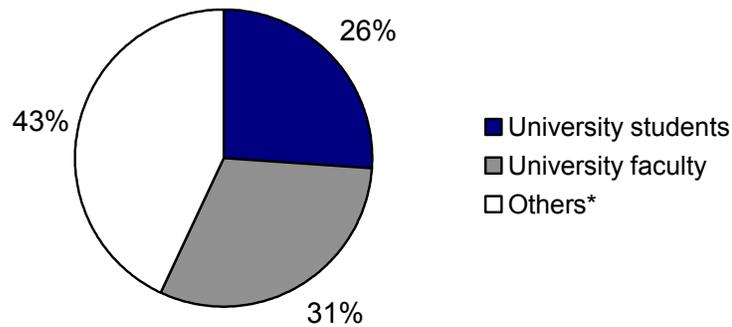
*The "others" category is largely made up of researchers at nonprofit organizations but also includes workers in government and private companies.

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APPENDIX D

QUESTIONNAIRE SENT TO PEER RESEARCHERS AND USERS OF ECONOMYWIDE MODELING

IMPACT OF IFPRI'S ECONOMYWIDE MODELING RESEARCH

The International Food Policy Research Institute (IFPRI), which is based in Washington, DC, systematically reviews the impact of its major research programs (see Impact Assessment papers at http://www.ifpri.org). I was asked to report on the impact of IFPRI's economywide modeling research and outreach (particularly its computable general equilibrium or CGE modeling), a program that has been led by Sherman Robinson since his appointment in 1993 as director of IFPRI's Trade and Macroeconomics Division. The program could be impacting directly through influencing policies in individual developing countries or regional or multilateral trading arrangements, or indirectly through the provision of international public goods such as data sets, models, research methodologies, and training programs that together enhance the policy research capability of developing countries.

The recent reorganization of IFPRI has eliminated TMD, dividing its work program and staff between two divisions (a new Development Strategy and Governance Division [DSGD] and the Markets, Trade, and Institutions Division [MTID]). The single-country modeling capacity is now in DSGD and the multi-country trade models are in MTID. Since decisions will be made soon regarding how much of TMD's work with economywide models will be retained in the new structure, this impact evaluation study is very timely.

Your response to the following questions would be greatly appreciated, especially if it could be returned to me via fax or email by **18 May 2003**.

Kym Anderson, Executive Director
Centre for International Economic Studies
University of Adelaide
Adelaide SA 5005 AUSTRALIA
Phone (+61 8) 8303 4712
Fax (+61 8) 8223 1460
kym.anderson@adelaide.edu.au

1. ***How important*** do you think it is to use an economywide approach (as distinct from a commodity- or sector-specific approach) to analyzing food policy issues?

	not important			very important
	1	2	3	4

2. If you have read or consulted any publications that analyze food policy issues using a national, regional or global CGE modeling approach, please rate ***non-IFPRI examples*** as:

extremely valuable [ ]   moderately useful [ ]   not very useful [ ]

3.   If you have read or consulted any of ***IFPRI's publications*** where CGE models or databases have been used, please rate them (relative to non-IFPRI comparators) as:
        extremely valuable [ ]   moderately useful [ ]   not very useful [ ]

4.   If you have made use of any of the following ***inputs*** into IFPRI's CGE modeling research and publications, please tick and add details (e.g., which country? used to what extent/for what purpose?)

Social Accounting Matrices (SAMs)   [ ]
National CGE models   [ ]
Multiregional CGE models   [ ]
Methodologies for compiling SAMs   [ ]
Methodologies for CGE modeling   [ ]

5.   In cases where you have made use of any of the following ***inputs*** into IFPRI's CGE modeling, please rate them as:

	extremely valuable	moderately useful	not very useful
Social Accounting Matrices (SAMs)	[ ]	[ ]	[ ]
National CGE models	[ ]	[ ]	[ ]
Multiregional CGE models	[ ]	[ ]	[ ]
Methodologies for compiling SAMs	[ ]	[ ]	[ ]
Methodologies for CGE modeling	[ ]	[ ]	[ ]

6.   If you are aware of or have been involved in any ***IFPRI outreach workshops/ seminars/conferences*** involving economywide modeling, please give examples and rate them as:
        extremely valuable [ ]   moderately useful [ ]   not very useful [ ]

7.   How aware are you of ***IFPRI's other (i.e., non-modeling) trade policy research*** output?
                not at all [ ]   somewhat [ ]   very familiar [ ]

        If aware with those non-modeling products, please give examples and rate them as:
        extremely valuable [ ]   moderately useful [ ]   not very useful [ ]

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8.   What do you see as the main *advantages* of an economywide modeling approach to food policy analysis in developing countries?

	extremely valuable	moderately useful	not very useful
Transparent	[ ]	[ ]	[ ]
Tests one's own intuition	[ ]	[ ]	[ ]
Provides factor market effects	[ ]	[ ]	[ ]
Forces analysts to expose their assumptions	[ ]	[ ]	[ ]
Exposes effects of non-food policies	[ ]	[ ]	[ ]
Shows effects on other sectors	[ ]	[ ]	[ ]
Can potentially show effects of policy on:			
Food and nutrition security	[ ]	[ ]	[ ]
Household income distribution	[ ]	[ ]	[ ]
Poverty alleviation	[ ]	[ ]	[ ]
Resource use	[ ]	[ ]	[ ]
Natural environment	[ ]	[ ]	[ ]
Other (please specify)	[ ]	[ ]	[ ]

9.   What do you see as the main *disadvantages* of an economywide modeling approach to food policy analysis in developing countries?

Too intensive in the use of our staff's time	[ ]
Too complicated for our staff to use	[ ]
Not enough extra insights compared with sector-specific analysis	[ ]
Doesn't focus on the important short-run adjustment issues	[ ]
Underlying data are too out of date	[ ]
Can't trust the underlying elasticities	[ ]
Can't trust the underlying protection estimates	[ ]
Takes too long to respond to policymakers' needs	[ ]
Too difficult to communicate results to stakeholders	[ ]
Isn't easily able to show effects of policy on:	
Food and nutrition security	[ ]
Household income distribution	[ ]
Poverty alleviation	[ ]
Resource use	[ ]
Natural environment	[ ]
Other (please specify)	[ ]

10.   If you have used information/ideas from IFPRI publications that use CGE modeling, please indicate in what context:
   (a) in a *policy context*?   yes [   ]   no [   ]

   (b) in your *research*?   yes [   ]   no [   ]

   (c) in your *teaching*? If yes, please specify what courses at what institutions and in what years.
          yes [   ]   no [   ]

   (d) in your *strategic planning and priority assessment*?
        yes [   ]   no [   ]

11.   Please indicate how *influential* IFPRI economywide modeling research has been in the policy process in your institution or country in:

	Very	Somewhat	None
Encouraging an intersectoral, economywide perspective	[ ]	[ ]	[ ]
Educating developing country economists/policy advisors	[ ]	[ ]	[ ]
Speeding up the policy reform process	[ ]	[ ]	[ ]
Reinforcing existing policies	[ ]	[ ]	[ ]
Preventing worse policies being adopted	[ ]	[ ]	[ ]
Dispelling myths/discrediting flawed analyses	[ ]	[ ]	[ ]
Offering novel policy options/insights	[ ]	[ ]	[ ]
Other (please specify)	[ ]	[ ]	[ ]

12.   What other *(that is, non-IFPRI)* CGE modeling, if any, have you used for policy formulation/reform, and how influential has that modeling research been?
    very influential [   ] somewhat influential [   ] no influence [   ]

   What are the (a) strengths and (b) weaknesses of those non-IFPRI modeling products compared with IFPRI's?

13.   To what extent should IFPRI's economywide modeling be focusing on providing global projections (as a supplement to IFPRI's sectoral IMPACT modeling and in competition with GTAP and other economywide global modeling)?

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14.   ***Within its current budget***, how should IFPRI alter its economywide modeling products mix to enhance its impact on well-being in developing countries?

	Do more	Continue as is	Do less
Make models and databases freely available on website	[ ]	[ ]	[ ]
Collaborate with researchers in developing countries	[ ]	[ ]	[ ]
Provide CGE training/capacity building	[ ]	[ ]	[ ]
Offer simpler ("back-of-the-envelope") models to assist intuition	[ ]	[ ]	[ ]
Offer more-complex dynamic models	[ ]	[ ]	[ ]
Organize seminars/conferences to disseminate findings	[ ]	[ ]	[ ]
Write up CGE results in non-technical policy papers and briefs	[ ]	[ ]	[ ]
Collaborate with national policymakers in preparing policy positions	[ ]	[ ]	[ ]
Participate in World Bank, etc. short-term missions	[ ]	[ ]	[ ]
Supervise Ph.D. theses including via internships at IFPRI	[ ]	[ ]	[ ]
Appoint in-country IFPRI economywide analysts	[ ]	[ ]	[ ]
Update its models' protection/taxation estimates	[ ]	[ ]	[ ]
Update its models' social accounting matrices	[ ]	[ ]	[ ]
Estimate its models' elasticity parameters	[ ]	[ ]	[ ]
Validate and do sensitivity analysis with its models	[ ]	[ ]	[ ]
Focus on:			
Global trade (WTO) issues	[ ]	[ ]	[ ]
Regional trade issues	[ ]	[ ]	[ ]
National trade issues in:			
Africa	[ ]	[ ]	[ ]
Asia	[ ]	[ ]	[ ]
Latin America	[ ]	[ ]	[ ]
Transition economies	[ ]	[ ]	[ ]
Effects on income distribution and esp. poverty	[ ]	[ ]	[ ]
Effects on natural resources and the environment	[ ]	[ ]	[ ]

15.   If you are familiar with IFPRI's overall trade and macroeconomic research division's program, please rate the extent to which it has made positive impacts on:

	No impact		Huge impact		Don't know
Global trade reform via WTO	1	2	3	4	0
Regional trade agreements	1	2	3	4	0
National unilateral policy reform	1	2	3	4	0
Adoption of economywide perspective on food policy	1	2	3	4	0
Compilation of national SAMs (including for GTAP model)	1	2	3	4	0
Provision of a generic national economywide model	1	2	3	4	0
Provision of a global economywide model	1	2	3	4	0
Provision of estimates of rates of protection	1	2	3	4	0
Training of developing country economywide modelers	1	2	3	4	0
Training of developing country trainers of such modeling	1	2	3	4	0
Economywide modeling methodology	1	2	3	4	0
Methodology for compiling SAMs	1	2	3	4	0

16.   Do you have any other comments regarding IFPRI's economywide modeling that might help in the impact assessment?

Your name:
Your position:
Your responsibilities:
Organization and address:
Telephone:
E-mail:
Date:

Thank you very much for taking the time to complete this survey.

APPENDIX E

LIST OF RECIPIENTS OF THE QUESTIONNAIRE

* indicates a response was received

INTERNATIONAL AGENCIES

Binswanger, Hans (World Bank)
Ganuza, Enrique (UNDP)*
Hoekman, Bernard (World Bank)*
Laird, Sam (UNCTAD)*
Lewis, Jeffrey (World Bank)
Low, Patrick (WTO)*
Morris, Michael (CIMMYT)
Petit, Michel (World Bank)
Pingali, Prahbu (FAO)
Schiff, Maurice (World Bank)
Subramanian, Arvind (IMF)
Tangermann, Stefan (OECD)*
Tarr, David (World Bank)*
Thomson, Robert (IPC)
Valdes, Alberto (World Bank)
Watson, Andrew (Ford Foundation, China)*

NATIONAL GOVERNMENT AGENCIES AND POLICY THINK TANKS

Burfisher, Mary (ERS/USDA, U.S.A.)*
Cassim, Rashad (Trade and Industrial Policy Studies, South Africa)
Cheong, Inkyo (Korea International Policy Research Institute, Korea)
Erwidodo (CASER, Indonesia)
Franson, Soren (FOI, Denmark)*
Huang, Jikun (Center for Chinese Agricultural Policies, China)
Huong, Pham Lan (Central Institute for Economic Management, Vietnam)
Katuruza, Angelica (Ministry of Industry and International Trade, Zimbabwe)*
Kelagama, K.S.G. (Institute of Policy Studies, Sri Lanka)
Kibua, T. (Institute for Policy Analysis and Research, Kenya)*
Mwaikambo, W. (Ministry of Agriculture and Food Security, Tanzania)*
Ndlela, D.B. (Zimconsult, Zimbabwe)*
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