Macroeconomic Policy Reforms and Agriculture

Towards Equitable Growth in Zimbabwe

Romeo M. Bautista
Marcelle Thomas
Kay Muir-Leresche
Hans Lofgren

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International Food Policy Research Institute
2033 K Street, NW
Washington, DC, 20006-1002 U.S.A.
Telephone +1-202-862-5600
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Foreword

Since early 1996, IFPRI's Trade and Macroeconomics Division has been working with country-based and international collaborators on a multiyear research project entitled Macroeconomic Reforms and Regional Integration in Southern Africa (MERRISA), with funding from Danida and German Agency for Technical Cooperation. The project incorporates two interlinked components: a set of six in-depth country studies on Malawi, Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe, and a study of regional integration possibilities and the impact of global trade reform on the study's subject countries.

This research report presents the findings of the Zimbabwe country study. The authors—Romeo Bautista, Marcelle Thomas, Kay Muir-Leresche, and Hans Lofgren—use historical analysis and economic modeling, focused on agriculture and the rural sector, to investigate the income and equity effects of macroeconomic policy reforms under the Economic Structural Adjustment Program 1991–95 (ESAP) and the Zimbabwe Program for Economic and Social Transformation 1996–2000 (ZIMPREST).

As in many developing countries, agriculture and the rural sector carry significant weight in Zimbabwe's economy. Hence this report emphasizes the links between macroeconomic policies and agricultural performance and, in turn, the influence of agricultural performance on aggregate income and its distribution. In the context of 1990s reform, three relevant aspects of Zimbabwe's macroeconomic policy are given particular attention: the foreign trade regime, public expenditure, and tax policy. In addition, the authors investigate the potential benefits of various land reform scenarios in combination with these structural adjustment reforms.

The failure of increased social investment and support for smallholder agriculture in promoting equitable growth in Zimbabwe during the 1980s largely resulted from the maintenance of pre-independence policies and institutions that involved widespread government regulation and administered resource allocation. Zimbabwe began moving toward more market-oriented policies in 1991 with the adoption of ESAP, which proved successful in substantially reforming the trade and payments regime.

The report highlights the need for policy complementarities in Zimbabwe that can contribute to equitable growth. The simulation results support the conclusion that—had there been effective land reform and restructuring of government expenditure and taxation—the substantial progress in reforming trade and exchange rate policies achieved under ESAP could have helped to promote the twin objectives of overall income growth and equity in Zimbabwe. It is also true, however, that without trade liberalizaton and the abolition of maize price control, success with smallholder farm promotion and land reform to achieve equitable growth would have been limited.

In addition to its policy implications, this report incorporates methodological advances that represent a significant departure from earlier work on Zimbabwe, including explicit focus on agriculture and its dual production technology, examination of income distribution among various rural and urban household groups, and detailed specification of factor markets. The study makes use of a computable general equilibrium (CGE) model built around the structure of a 1991 social accounting matrix for Zimbabwe developed as part of the research. The model provides a policy simulation laboratory in which exogenous policy changes are analyzed for their economywide income and equity effects.

This report should be of interest not only to those concerned with recent economic developments in Zimbabwe but also to those concerned with the broader issues of macroeconomic reform and its ultimate effects. The report's analysis points to possible economic gains through trade liberalization and land market reform. We at IFPRI observe with considerable concern the interaction between structural policy failures and economywide outcomes for countries like Zimbabwe. This study indicates the complexities of institutional and political factors that have long-term effects on the implementation of sustainable adjustment programs.

Joachim von Braun
Director General, IFPRI

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The authors alone accept all responsibility for the ideas expressed in this work and for any errors or omissions.

Summary

Using historical analysis and economic modeling focused on agriculture and the rural sector, this study investigates the income and equity effects of macroeconomic policy reforms in Zimbabwe relating to the Economic Structural Adjustment Program 1991–95 (ESAP) and the Zimbabwe Program for Economic and Social Transformation 1996–2000 (ZIMPREST). The Zimbabwean government adopted these two reform programs in an effort to stabilize the macroeconomy, promote economic growth, and improve equity after a decade of disappointing economic performance.

For a quarter of a century beginning in 1965, when the white-settler regime (then of Southern Rhodesia) made the "unilateral declaration of independence" that prompted international economic sanctions, Zimbabwe followed a development strategy that was heavily interventionist and essentially inward looking. Agricultural market controls and restrictive regulations promoting industrial import-substitution prevailed under the 15-year regime, and continued after independence in 1980 when the new black-majority government assumed power. Post-independence policies significantly expanded social investments and government support for smallholder agriculture, including land purchases for resettlement of smallholder households; however, these increases could not be sustained beyond the first half of the 1980s as a result of growing macroeconomic imbalances and inefficiencies in resource allocation and use. Aiming to reduce government intervention in the economy and allow markets to operate more freely, ESAP emphasized trade and exchange market liberalization, domestic deregulation, and fiscal policy reform. Subsequently, ZIMPREST added land redistribution as "a critical element" in the reform program.

Agriculture and the rural sector are of considerable importance to the Zimbabwean economy. This study therefore underscores the links between macroeconomic policies and agricultural performance, along with agriculture's influence on aggregate income and its distribution. In the context of the reform process of the 1990s, three relevant aspects of Zimbabwe's macroeconomic policy environment are emphasized: the foreign trade regime, public expenditure, and tax policy. In the quantitative assessment of the impact of policy changes, the measures of aggregate income used are GDP at factor cost and total household disposable income in real terms. The equity effect is represented by the relative income changes for the five household groups distinguished in the study, highlighting, in particular, the income gains or losses for smallholder farm households, which account for a large majority of the country's poor.

Zimbabwe's agriculture sector is extremely dualistic, consisting of a densely populated (mostly communal) smallholder sector and a modern, large-scale commercial (LSC) sector. The LSC sector occupies about one-third of the country's total land area and has a disproportionately large share of the high-potential agricultural land. LSC farms are highly mechanized

and show very high crop yields in the small proportion of arable area actually cultivated. By contrast, lower yields characterize the smallholder farms in which a much higher proportion of the farm area is cropped. These salient features of Zimbabwean agriculture reflect historical land allocation, stringent restrictions on farm subdivision, and the absence of agricultural land tax.

The 1991 Zimbabwe social accounting matrix (SAM) constructed in this study has an agricultural focus (15 of the 27 sectors are agricultural) and incorporates the important distinction between smallholder and LSC sectors in the representation of production technologies and in household classification. Conventional multiplier analysis using the Zimbabwe SAM confirms the hypothesis that exogenous income increases produce stronger linkage effects in lower-income households and in agricultural production (relative to nonagricultural production). Within the agriculture sector, larger GDP multipliers (income effects) are associated with smallholder farms relative to LSC farms, suggesting that productivity increases in Zimbabwe's smallholder agriculture do not depend on a tradeoff between income growth and equity.

Income and equity implications for alternative growth paths emphasizing various agricultural subsectors, are quantitatively examined based on the calculated SAM multipliers for the relevant activity and commodity accounts. The "smallholder road to development," focusing on smallholder production, is associated with the largest GDP multiplier (2.23), indicating that each Zimbabwe dollar of additional value-added generated in smallholder farms leads to an increase of Z$1.23 in income elsewhere in the domestic economy (in 1991 prices). Agricultural growth based on food crops—in which the contribution of smallholders is much greater than that of LSC farms—yields the next largest multiplier (1.90), exceeding the (weighted) average agricultural multiplier (1.71). Lower GDP multipliers characterize the two agricultural growth paths emphasizing traditional and nontraditional export crop production, in which LSC farms predominate. Notably, the multiplier for light manufacturing, a potentially important source of needed employment generation in Zimbabwe, is calculated to be 1.44, which is lower than any of the agricultural multipliers with the exception of nontraditional export crop production. These results support the theory favored by advocates of agriculture-based development that rising agricultural incomes, especially from small-farm production, are strongly correlated with overall economic growth.

Agricultural growth emphasizing smallholder production also appears to have the most favorable equity impact. Smallholder households understandably receive the largest income increment. The low-income urban household group is also shown to greatly benefit, presumably related to the more labor-intensive nature of smallholder household demand. The remaining three household groups experience smaller income gains.

This study also makes use of a computable general equilibrium (CGE) model for Zimbabwe that, unlike the SAM framework, allows for relative price effects arising from changes in sectoral supply conditions. It is built around the structure of the benchmark SAM, and has some distinctive features that represent a significant departure from earlier work on Zimbabwe, including an explicit focus on agriculture, emphasis on income distribution among various rural and urban household groups, and a detailed specification of factor markets. The model provides a policy simulation laboratory in which exogenous policy changes are analyzed for their economywide income and equity effects.

One important result of the CGE model simulations shows that trade policy reform alone—that is, dismantling import and foreign exchange controls and reducing import taxes to a low uniform rate—increases GDP, agricultural production, and aggregate disposable household income. In addition, foreign trade expands markedly (by about a quarter of the base year value). These aggregate effects are even larger when trade liberalization is accompanied

by price decontrol in the maize market. In either case, however, the equity impact is unfavorable because the heavily export-oriented LSC farms benefit far more than smallholder farms from a liberalized trade regime. Moreover, a substantial loss in import tax revenue results, making this policy option unappealing given the significant existing 1991 fiscal deficit.

The model simulation that incorporates increased income taxes on enterprises and the two affluent household groups—measures aimed at counteracting the decline in import tax revenue from trade liberalization and reduced government consumption expenditure—markedly lowers the income gains for the two household groups paying the higher taxes (as well as for households in the aggregate). GDP and other household income effects, however, change little.

Adding two land reform alternatives to the above scenario results in markedly different income and equity effect outcomes. The first land reform policy involves government and donor purchase of 50 percent of large-scale farms and restricts the subdivision of the remaining 50 percent. The second reform alternative—which the model shows to be much more effective—actively encourages free subdivision and sale of lands. Given effective land reform and restructuring of government expenditure and taxation, the simulation results support the conclusion that the substantial progress in reforming trade and exchange rate policies achieved under ESAP could have helped promote the twin objectives of overall income growth and equity. It is also true, however, that without trade liberalization and the abolition of maize price control, the government would have had only limited success in achieving equitable growth in Zimbabwe through smallholder farm promotion and land reform.

The simulation results affirm the importance of identifying complementary policy combinations that can synergistically contribute to equitable growth. It is insufficient to investigate the effects of trade liberalization (or any policy reform measure) in isolation; the corresponding effects of simultaneous changes to other policies must be incorporated.

CHAPTER 1

Introduction

As in most low-income developing countries, agriculture and the rural sector dominate Zimbabwe's economy. With around three-quarters of Zimbabwe's population living in rural areas, agriculture accounts for about 70 percent of total employment and for 40–45 percent of the country's export products. It is also the source of principal raw materials for 60 percent of manufacturing production in Zimbabwe. The strikingly low agricultural share of gross domestic product (GDP), at around 16 percent, reflects low farmer incomes particularly in the semi-arid, low-productivity communal and resettlement areas. Hence, unsurprisingly, rural areas account for the overwhelming majority of Zimbabwe's poor at 88 percent in 1991, for example—markedly higher than in urban populations at 31 versus 10 percent (World Bank 1995a).

Development economists and practitioners generally agree that sustained economic growth in heavily agricultural countries is unlikely to occur without prior or concurrent development of agriculture. The positive association between agricultural growth and overall economic growth among developing countries is empirically established in development economics (Timmer 1988). Further, persuasive arguments indicate—historically and through counterfactual model simulations—that agricultural development is a significant determinant of growth in other sectors of the economy for a number of countries.[1] An important general finding is that the "consumption linkage" effect of induced increases in rural income is the more potent intersectoral influence compared with the "production linkages" of agricultural growth; the potential for rural consumption demand to create and sustain a mass market for domestic products has been increasingly recognized, particularly in terms of labor-intensive manufactured goods and services.

The extent to which nonagricultural growth is influenced by expanding agricultural output differs significantly by country. Thus, the correlation between per capita agricultural and nonagricultural growth rates, based on 1960–86 data, has been found to be stronger in Asia than in Latin America and Sub-Saharan Africa (Mellor 1995, 2–4). Moreover, there are significant variations in the relationship between agricultural and nonagricultural growth among developing countries within each of the three regional categories. This would seem to indicate that other influences on nonagricultural growth were at work, presumably including domestic policies and external developments during the period.

The role of agriculture in economic development is not confined to its contribution to the growth of the national economy. Where poverty is a substantially rural phenomenon—

[1]Among others, see Mellor (1976) on India, Adelman (1984) on Korea, Adelman and Taylor (1990) on Mexico, and Mao and Schive (1995) on Taiwan.

seemingly the case in most low-income countries—accelerated growth of agricultural production can also lead to significant reductions in poverty and income inequality. A critical determinant of this outcome is the structure of agricultural growth and its linkages to the rest of the economy. Broadly based agricultural growth is associated with strong labor-intensive linkages on the consumption side, enhancing the employment and income multiplier effects that cut across rural and urban sectors. By contrast, if the rural income gains from agricultural growth are concentrated in the more affluent households, the pattern and growth of rural household expenditures will favor capital-intensive products and imported goods rather than labor-intensive, locally produced goods and services, thereby weakening the impetus toward rapid and equitable overall growth of the national economy.[2]

It is well known that governments in developing countries intervene heavily in agricultural markets (Schultz 1978), which in part reflects the importance of agriculture and the perceived need to shield it from market forces (including external market forces). What may seem surprising is that government policies have tended to penalize agricultural producers, particularly with respect to price incentives and public investment, as shown in the findings of several studies on the experiences of developing countries until the mid-1980s.[3] Such policy bias has had significant adverse effects on agricultural performance, in turn contributing heavily to unsatisfactory national income growth and macroeconomic instability—factors that characterized many developing countries over the past few decades. In several Sub-Saharan African countries during the putative crisis period of 1979–84, agricultural growth was negative, per capita income declined, and macroeconomic imbalances worsened (Mosley and Weeks 1993).

To be sure, the external economic environment deteriorated markedly for many developing countries during the first half of the 1980s, resulting from recessionary conditions, declining world commodity prices, and a sharp rise in international interest rates. Even so, inappropriate domestic policies have also been recognized as a major culprit in preventing the necessary adjustment to the external shocks. This has led to the adoption of various programs of macroeconomic and sectoral policy reforms in many countries in Sub-Saharan Africa since the mid-1980s, with active support from the World Bank and International Monetary Fund (IMF) aimed at achieving macroeconomic stability and a satisfactory rate of economic growth. Among southern African countries, there has also been a strong interest in promoting regional market integration, made even stronger by the end of white minority rule in South Africa in 1994. Increasingly, these countries are looking to the future with an eye to greater economic prosperity and social progress sustained by better functioning political systems, more dynamic and flexible economies, and closer economic relations with the world economy and especially with one another.

Given agriculture's considerable economic importance among southern African countries, the impact on agricultural

[2]This is the explanation given in Bautista (1995) for the disappointingly slow GDP growth and persistent, severe income inequality and poverty that accompanied rapid agricultural growth during the Green Revolution period 1965–80 in the Philippines. Similarly, Berry (1995) reports that land and income concentration were important factors in the poor growth of nonagricultural sectors during the rapid expansion of agricultural exports from 1967 to 1980 in Colombia.

[3]See Schiff and Valdes (1992) and Bautista and Valdes (1993). For analyses of the political-economy determinants of agricultural protection, see Krueger (1992), Anderson and Hayami (1986), and Bates (1981).

performance would be a key determinant of the success of the policy reforms undertaken. Indeed, without agricultural growth and rural development to raise the real incomes of the large majority of the poor in rural areas, it is difficult to envisage rapid, equitable, and sustainable growth of the national economy.[4] Equitable growth is a particularly important—if not overriding—development objective for Zimbabwe, given its recent history of sluggish economic growth and persistent income inequities (Muir-Leresche 1985; Rukuni 1994; World Bank 1995b). Any examination of policy reforms undertaken in Zimbabwe needs to assess progress toward economic growth with equity.

This study aims to contribute to the understanding of macroeconomic policy adjustments and their implications for economic growth and equity in Zimbabwe, focusing on the links between agriculture and the rest of the economy. Both historical analysis and economic modeling are used, the latter emphasizing economywide income effects of macroeconomic reform measures considered in isolation of, or conjunction with, concurrent changes in other government policies.

This study neither examines the political factors affecting Zimbabwe's economic performance, nor the design and conduct of macroeconomic policy reforms. It is of course important to recognize the political constraints on policy choices and their implementation that necessarily affect any country's prospects for income growth and equity. Indeed, political considerations too often prevent governments in developing countries from adopting economically superior policies. Apart from economic rationality, a key ingredient in effective policymaking is political feasibility. It is difficult to disagree with Professor Schultz, however, that policy analysts "lose their potential as educators" if they "merely accommodate governments" and "rationalize what is being done" (Schultz 1978, 9). The experience of many developing countries shows the variance—only too well and frequently—between official declarations of social-welfare oriented goals on the one hand, and the government's revealed preferences on the other.

Zimbabwe is not an exception to the often-noted capacity of governments to adopt policies that have a negative effect on publicly announced development goals. While the promotion of equitable growth is a paramount objective expressed in official documents such as the *Economic Structural Adjustment Program 1991–95* (ESAP) and the *Zimbabwe Program for Economic and Social Transformation 1996–2000* (ZIMPREST), actual policy choices made by the government in the 1990s were not always supportive of economic growth or equity (see above)—for which political-economy factors and governance problems are often the reasons cited. (Jenkins 1997; Muir-Leresche 1998). It is also possible, however, that inappropriate policies were implemented resulting at least in part to inadequate knowledge of their adverse effects on declared government objectives. In such cases, the results of positive (as opposed to normative) analysis would have contributed to the knowledge base and served as an important input to rational policymaking.

The need to improve the knowledge base for policymaking increases where intersectoral linkages need to be identified and indirect government policy effects are not readily discernible (as exemplified in some of the findings in this study). Apart from policymakers (or at least their

[4]It is notable that even in the context of a less heavily agrarian economy such as Mexico, Adelman and Taylor (1990, 406) concluded from their quantitative analysis of alternative policy reform scenarios that "agricultural development is a key to successful adjustment policies from a macro point of view."

advisers), the general public also needs to be informed of the direct and indirect consequences of proposed policy changes. This could prove critical in achieving the necessary political consensus to ensure the feasibility of policy reforms.

The next chapter (a) develops a conceptual framework that traces the effects of macroeconomic policy reforms on agriculture and the rural sector through induced changes in "markets and infrastructure"; (b) identifies key causal relationships in the transmission of the demand-side effects of agricultural growth to the rest of the economy; and (c) indicates the role of economic policies in directing desirable nonagricultural supply responses. Existing land policies in Zimbabwe are a major constraint to broad-based agricultural growth, and are emphasized in a deeper examination of the macrolinkages of rural income growth. Other "complementary policies" likely to increase the effectiveness of macroeconomic policy reform in promoting equitable growth in Zimbabwe are also discussed.

Chapter 3 describes the changes in Zimbabwe's economic policies and performance since independence in 1980, emphasizing the agricultural sector and how its performance might have been affected by the policy developments over the period. Particular attention is given to the recent period of major economic reform under ESAP and ZIMPREST, and the evolution of macroeconomic imbalances and changes in agricultural performance since 1991. Important components of ESAP and ZIMPREST include the liberalization of trade and exchange rate policies, fiscal policy reform, deregulation of domestic and external marketing of agricultural products, and land reform. Despite the setbacks resulting from the two severe droughts of 1992 and 1995, Zimbabwe has made substantial progress in some aspects of the two reform programs, such as in liberalizing the foreign trade regime and in relaxing state control of the domestic marketing of agricultural products. Reforms in fiscal and land policies have been less successful.

It bears emphasis that the massive disruption in agricultural production and the secondary adverse effects arising from the two droughts served to effectively confound the economic impact of policy reforms undertaken by the government. A real need exists to investigate the economic repercussions of policy reform measures independently of the droughts. Differing views have been expressed on whether the country's poor overall economic performance since 1991 is attributable to ESAP measures implemented during the period. Alternative policy reform packages addressing various impediments to equitable growth also need to be considered along with their comparative impacts on Zimbabwe's economy. This study makes use of counterfactual model simulations to quantitatively examine the growth and equity effects of economic policy reforms in Zimbabwe.

An economywide, multisector model with an agricultural focus and farm household differentiation allows distributional issues to be addressed. Zimbabwe's extremely dualistic agricultural economy requires that a distinction be made between the (mostly, communal) smallholder (SH) sector and the large-scale commercial (LSC) sector. These two sectors differ widely in land quality, rainfall, infrastructure development, crops planted, and access to agricultural input. It is also desirable, in view of marked differences in their average incomes, to differentiate between owner/manager and farm-laborer households in the LSC farm sector. In urban areas, low- and high-income households also need to be distinguished.

Chapter 4 describes the construction and structure of the 1991 social accounting matrix (SAM) for Zimbabwe, which incorporates the important economic features indicated above. It provides an appropriate benchmark data set, reflecting initial conditions prior to the implementation of ESAP

and other exogenous factors in Zimbabwe (in particular, the 1992 and 1995 droughts). The numerical SAM is used to calculate the (direct and indirect) multiplier effects of exogenous income injections to different household groups and production sectors. These income multipliers are indicative of the relative strength of economywide linkage effects for different SAM accounts (assuming no supply constraints) and have implications for the relationship between income growth and equity in Zimbabwe. SAM multipliers associated with alternative agricultural growth paths for Zimbabwe are also calculated and their comparative values analyzed.

The SAM also provides the accounting framework around which the computable general equilibrium (CGE) model for Zimbabwe—developed to conduct quantitative policy analysis—is built. Chapter 5 discusses the rationale and structure of the CGE model, the parameters of which are calibrated to the benchmark SAM, and highlights the novel features of the model specification.

The CGE model scenarios simulate a variety of policy reform packages relevant to Zimbabwe. Chapter 6 describes the scenarios and presents and interprets the simulation results—especially those concerning the effects on aggregate income and on the real incomes of specific household groups. Finally, Chapter 7 synthesizes the study's findings and offers some policy perspectives on the promotion of equitable growth in Zimbabwe.

CHAPTER 2

Conceptual Framework and Hypotheses

In countries where agricultural production contributes heavily to national income and poverty is overwhelmingly rural, the success (or failure) of any policy reforms—in terms of their growth and equity effects—crutially depends on the treatment of agriculture and the rural sector. In quantitatively investigating the overall impact of policy changes, however, it is not enough to examine only direct effects on agriculture and the rural sector. Significant repercussions are likely to occur throughout the economy, further affecting national income growth and distribution. Moreover, existing institutional structures and conditions that facilitate or hinder economywide responses to policy reforms need to be taken into account.

Impact of Macroeconomic Policies on Rural Incomes

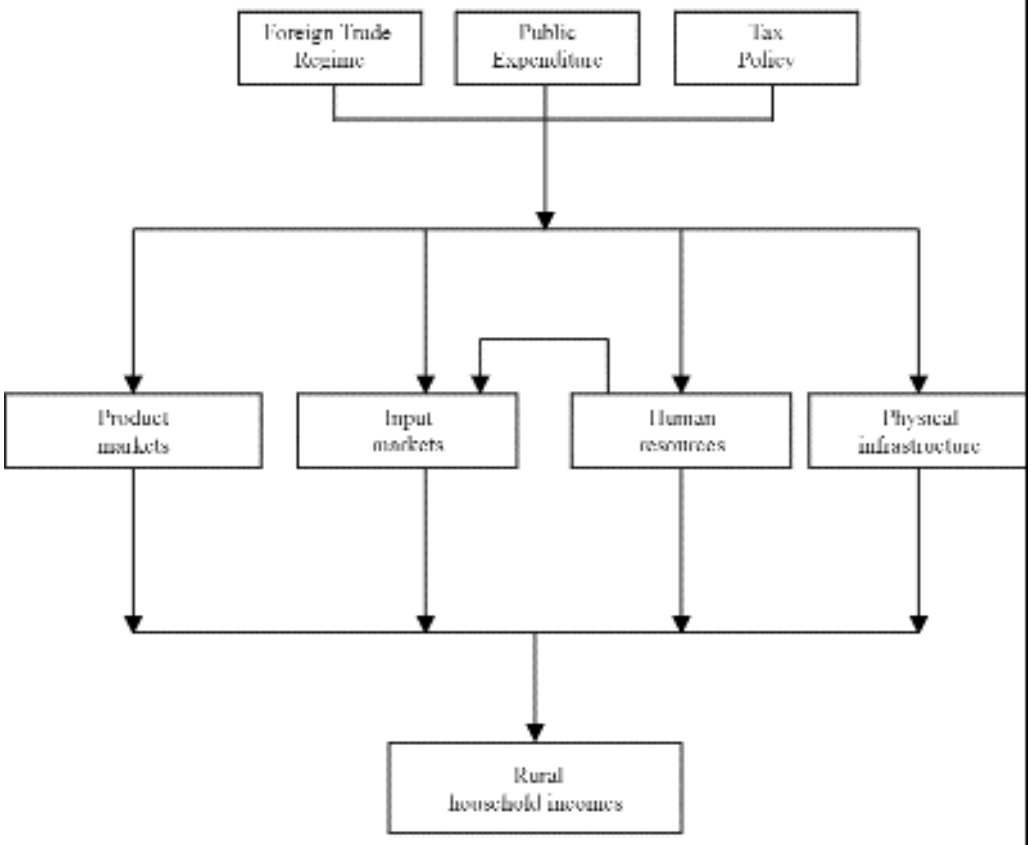
Ultimately, the income and equity effects of macroeconomic policy reforms need to be evaluated at the household level. Figure 2.1 schematically represents the relationships underlying the influence of macroeconomic policies on rural household incomes. The three major types of macro-policy instruments—trade and exchange rate policies, public expenditure, and taxation—are shown in the first tier. While this list is not exhaustive of government interventions affecting agriculture and the rural sector in developing countries, in the context of Zimbabwe's macroeconomic reforms they appear to be the most relevant. The effects that these macroeconomic policies have on households depend on the conditions of the "meso-economy" of markets and infrastructure.[5] Changes in markets and infrastructure affect rural household incomes both in terms of demand and supply.

Total rural income and its distribution among various household classes are a function of physical infrastructure and human resources, which in turn are critically influenced by the size and pattern of public expenditure. Underdeveloped rural infrastructure often characterizes low-income economies, negatively affecting both agricultural and overall growth, and equity.

Product and input markets interact, in part reflecting the need for factor services in both agricultural and nonagricultural production. Moreover, product markets are influenced by trade policy, either directly through import tariffs, export taxes, and other trade restrictions, or indirectly through induced changes in the real exchange rate (the price of foreign exchange). In many developing countries, relative agricultural prices are artificially lowered by export taxes on farm products and, more importantly, by heavy import-protection of domestic industry (Krueger, Schiff, and Valdés 1988; Bautista and Valdés 1993). Under trade liberalization,

[5] "Meso-economy" is the term used to describe the market structures and institutions that determine how macroeconomic policies are transmitted to households and enterprises.

Figure 2.1 Transmission of income effects of macroeconomic policies to rural households



Source: Devised by authors

barriers to foreign trade are reduced creating expected benefits for agricultural producers and, through the likely depreciation of the real exchange rate, raising the domestic prices of agricultural (and nonagricultural) tradable goods—an area of Zimbabwe's comparative advantage.

The quantity and quality of human resources affect input markets, particularly the labor market. Rural labor demand and supply are influenced not only by the level and composition of human capital (a determinant of labor productivity) but also by the foreign trade regime. Exchange rate overvaluation and low tariff rates on imported capital equipment distort relative factor prices and penalize labor-intensive production. This weakens the competitiveness of rural industries, which are inherently more labor-intensive than their urban counterparts.

Rural producers' supply response is determined by relative price signals from product and input markets and by their access to factor inputs, including skilled labor and capital. If import restrictions constrain fixed capital investment in rural industries, or if public investment is distorted against expenditures on health, education, and the development of skilled labor in rural areas, growth of rural production is hampered. The effects of market changes on rural output supply are also conditioned by the existing physical infrastructure, which may or may not permit low-cost marketing. A strong anti-rural bias in infrastructure policy, for example, is likely to impair the ability of rural producers to respond to

improved market conditions, perhaps preventing rural incomes from increasing significantly.

Agricultural Growth Linkage Mechanisms

In the context of this study, the relationships presented in Figure 2.1 are incomplete because they only include the initial effects of macroeconomic policies; among other things, the agricultural linkages to the rest of the economy are excluded. Increases in agricultural output stimulate the demand for production inputs from the industrial sector (such as fertilizer and farm equipment) and expand the supply of agricultural products to nonagricultural production (such as raw materials). These two types of production linkages are called "backward linkage" and "forward linkage," respectively. Agricultural crop and livestock production is generally characterized by a "weak" backward linkage and "medium-strong" forward linkage (Hirschman 1958, 110)

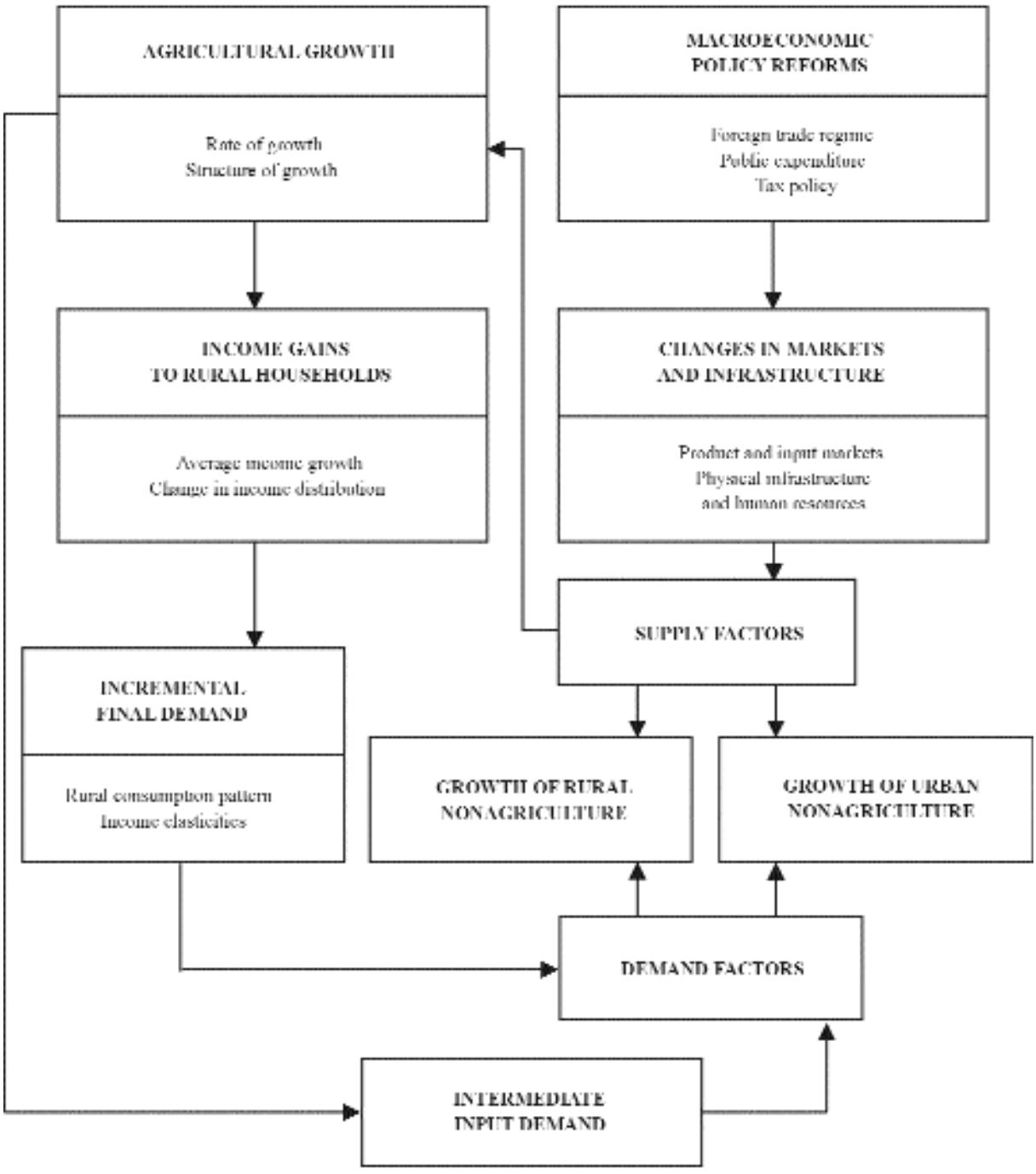
Aside from the linkage effects on the production side, agricultural growth also raises the real incomes of farm households and hence their consumption demand for food and other agricultural products, and (likely even more so) their demad for industrial goods and services. These "consumption linkages" may initially focus on sectors such as food processing, light industry, transportation, residential construction, and personal services. In turn they generate additional production and consumption linkages to other sectors in the economy as part of the economywide income multiplier process. As shown in the seminal work of Mellor and Lele (1973) and more recently by Ranis, Stewart, and Reyes (1989), Haggblade and Hazell (1989), and Delgado, Hopkins, and Kelly (1998), consumption linkages are more significant compared with production linkages. They are critical to the nature and extent of the influence of agricultural growth on the overall growth performance of the rural or national economy. Additionally, they have important distributional implications in most low-income countries where poverty is predominantly rural.

Figure 2.2 depicts some elements in the transmission of demand-side effects of agricultural growth to nonagriculture. Also represented in the block diagram are the three major aspects of macroeconomic policy reform that influence, on the supply side, both agricultural and nonagricultural growth through the induced effects on markets and infrastructure. This framework is useful in showing the principal mechanisms underlying the macroeconomic linkages of agricultural growth.

On the demand side, the consumption linkage mechanism is emphasized. The magnitude of the consumption linkage effects is determined not only by the total income gains from agricultural growth but also by their distribution among rural households. Concentration of income gains to the wealthier segment of the rural population is unlikely to result in a significant demand stimulus for nonagricultural production in the rural economy because affluent households, whether in rural or urban areas, tend to spend more on capital-intensive goods produced by urban industry or imported from abroad. On the other hand, a wider sharing of agricultural income growth is associated with a more labor-intensive incremental consumption demand and larger multiplier effects on the national economy from a given increase in rural expenditure.

Also shown in Figure 2.2 is the agricultural growth linkage on the production side, which adds to the demand for nonagricultural products through intermediate input purchases but, as indicated already, is not as empirically strong as the consumption linkage. Not shown in Figure 2.2 are the linkages operating in the reverse direction. As part of the secondary effects of agricultural growth, the induced expansion of nonagricultural output generates increased demand for agricultural products through the same mechanisms of production and

Figure 2.2 Macroeconomic policy reforms and agricultural growth linkages



Source. Devised by authors.

consumption described above, but flowing in the opposite direction—from nonagriculture to agriculture. Indeed, in production, the forward linkage of agriculture corresponds to the backward linkage of nonagriculture. On the consumption side, the income gains to nonagricultural producers can lead to increased food demand and stimulate the expansion of food crop and livestock production.

Obviously additional ramifications occur with agricultural growth beyond the local economy. Even in the first-round effects, farmers and rural households increase their demand—in production and consumption, respectively—for goods produced by urban industries and for imported products. Among the second-round effects that need to be considered are the forward and backward linkages of expanded nonagricultural production outside the rural economy and the final demand effects of increased income. If the linkages of agricultural growth are to be fully captured, repercussions throughout the economy must be examined.

Beyond the demand side, supply factors affect the response of (both agricultural and nonagricultural) domestic producers to the demand stimuli arising from agricultural growth, thereby restricting income and equity effects. As previously stated, this study focuses closely on the influence of Zimbabwe's economic policies, particularly the foreign trade regime, public expenditure, and taxation. Each warrants systematic analysis for its intermediate effects on markets and infrastructure, as shown in Figure 2.2. Whether domestic suppliers can meet the increased demand for their products will depend on the availability of production inputs and their prices. For instance, if intermediate inputs to industrial production are made artificially scarce or expensive by a restrictive trade regime, the full benefits from expanded final demand, in terms of output growth and employment generation, will not be realized. It is also clear that public agricultural investments are critical to the generation and diffusion of new technologies that can improve crop productivity.

As previously described, the SAM-based CGE model for Zimbabwe used in this study accounts for the interrelations among sectoral production, household incomes, and household expenditures in both rural and urban areas, along with their macroeconomic linkages, at the same time accounting for relative price effects arising from changes in sectoral supply and demand conditions. The SAM structure and CGE model specification are fully described in Chapters 4 and 5.

Land-use Policy and Agricultural Growth in Zimbabwe

Land as a primary factor in agricultural production requires special attention in any discussion of government policies designed to promote equitable growth in Zimbabwe. It is widely recognized that the existing land tenure system is a formidable barrier to broad-based agricultural growth (Rukuni 1994; Masters 1994; World Bank 1995a).

As mentioned already, Zimbabwe's agriculture is overtly dualistic, consisting of a densely populated communal sector and a modern, LSC sector. Population density and cropping intensity are around three times as high in communal areas than in the LSC sector. The latter occupies roughly one-third of the country's total land area and has a disproportionately large share of the high-potential agricultural land. LSC farms are highly mechanized and show very high crop yields in the small proportion of total farm area actually cultivated.[6] By contrast, lower yields characterize the communal

[6]As Masters (1994, 43) points out, "their high degree of input use is profitable only on the most convenient and best soils: to use large, low-cost tractors, plowed areas must be relatively large and accessible, and to apply high levels of fertilizer, soils must be relatively deep and well-watered."

farms, in which a much higher fraction of the arable area is cropped. This important distinction between the two farming systems reflects historical land allocation, regulatory restrictions on farm subdivisions, and the virtual absence of land taxes in Zimbabwe.[7]

Given the under-utilization of LSC farms, a potential source of equity-enhancing agricultural growth is land reform (and supporting services) that would enable the movement of low-income communal households into unused areas within the LSC sector (through land purchase or lease) for crop cultivation using communal farm technology, such as ox-plows instead of tractors. The direct positive effects on overall growth and poverty reduction would increase the effectiveness of economic policy reform in achieving egalitarian growth because any induced improvements in agricultural product prices and access to inputs would reach a larger proportion of low-income farmers. The demand stimulus arising from the increased income of the low-income households would favor labor-intensive, domestically produced goods and services over capital-intensive and imported products.

In light of this discussion, it is evident that macro policy reform measures will have limited success in advancing equitable growth in Zimbabwe without land reform. Indeed, trade liberalization alone will likely benefit the already affluent export producers in LSC agriculture and mining. A critical question, therefore, is which approach to land reform will contribute most to equitable growth: transfer of unplanted LSC land to communal farmers through a market-based, decentralized process, or the administered resettlement program, in effect since independence, that prohibits voluntary land subdivision—the perceived inadequacies of which have attracted considerable attention in recent years.

Policy Complementarities

The preceding discussion suggests that a full assessment of the income and equity repercussions of macroeconomic policy reform must incorporate a systematic appraisal of the complementary effects of other government policies. The general-equilibrium analysis used in this study lends itself to an assessment of the economywide effects of changes to multiple policies simultaneously. The CGE model can simulate various combinations of macroeconomic and other policy changes and evaluate their income and equity effects. The model can also simulate counterfactual scenarios for specific macro policy reform measures, either in isolation or in conjunction with other, potentially complementary, policies. In addition to land reform, as discussed above, the simulations can also incorporate concurrent improvements in smallholder farm productivity for consideration.

Under ESAP, some progress has been made in liberalizing agricultural markets in Zimbabwe; maize pricing and marketing, in particular, have undergone significant changes (see Chapter 3). Maize is the staple crop of low-income households both in terms of production and consumption. Hence complementarity between macroeconomic reform measures and maize pricing and marketing policies is a potentially important factor in promoting equitable growth. The next chapter examines this relationship.

[7]Voluntary subdivision of land is strictly limited, as is commonly stated, to avoid land speculation and maintain "economically viable" farm sizes.

CHAPTER 3

Economic Performance and Policies Since Independence

After the white-settler regime's "unilateral declaration of independence" (UDI) in 1965, international economic sanctions were imposed on Zimbabwe (then Southern Rhodesia). Over the 15-year UDI period that followed, a highly regulated, import-substituting policy regime developed, persisting beyond independence in 1980. The new black-majority government continued the heavily interventionist, inward-oriented domestic policies of the pre-independence period.[8] In particular, direct controls on imports, foreign exchange, investment, agricultural marketing, and prices were maintained. This lasted until the adoption of a comprehensive reform program, ESAP. Targeting trade and exchange market liberalization, domestic deregulation, and fiscal policy reform, ESAP was devised to reduce government interventions in the economy and allow market forces to play a more decisive role (Government of Zimbabwe 1991). Further reform was implemented under ZIMPREST, which incorporated the "critical element" of land reform.

Macroeconomic Performance and Agricultural Growth

1980–91 is frequently described as a period of economic stagnation for Zimbabwe, during which "overall economic growth remained below population growth [and] GDP per capita steadily declined" (World Bank 1996, 567). Recent national accounts data, however, including the September 1997 Central Statistical Office (CSO) revision for 1985–96 (undertaken with international technical assistance) contradicts this characterization of Zimbabwe's pre-reform growth performance.[9]

Based on the recent World Bank estimates, the average annual growth rate of real GDP at market prices for 1980–85 is 5.0 percent (as of February 1997), while that of GDP at factor cost is 4.0 percent, as shown in Table 3.1. Both figures are higher than Zimbabwe's average annual population growth of 3.5 percent for the same period. While the corresponding GDP rates for 1985–91 based on World Bank estimates, omitting the CSO's September 1997 revision, are lower than the average annual population growth of 3.3 percent for 1985–91 (2.2 percent at market prices and 3.2 percent at factor cost), the revised CSO estimates yield discernibly higher GDP growth rates for the same period, again exceeding the population growth

[8]See Jenkins (1997) and Muir-Leresche (1998) for details.

[9]According to the CSO (1997), the revised national income accounts are based on improved data sources and estimation methods, incorporate informal-sector production, and conform to the 1993 System of National Accounts (SNA) of the United Nations.

Table 3.1 Average annual growth rates of gross domestic product and agricultural value-added, 1980–85, 1985–91, and 1991–96

	Growth rates (percentage)		
Indicator	**1980–85**	**1985–91**	**1991–96**
Gross domestic product (GDP) at market prices			
Constant 1987 prices	5.0	2.2	n.a.
Constant 1990 prices	n.a.	4.8	1.3
Gross domestic product (GDP) at factor cost			
Constant 1987 prices	4.0	3.2	n.a.
Constant 1990 prices	n.a.	3.9	1.8
Agricultural value-added			
Constant 1987 prices	7.6	–0.6	n.a.
Constant 1990 prices	n.a.	1.2	5.1

Sources: 1987 data are from World Bank 1997b; 1990 data are from CSO 1997.
Note: N.a. indicates not available.

rate (4.8 percent at market prices and 3.9 percent at factor cost).Thus, the latest available data do not confirm declining real GDP per capita in Zimbabwe during 1980–91.

Based on the revised CSO estimates, it can also be observed from Table 3.1 that the GDP growth rates—at market prices and at factor cost—for the ESAP period, 1991–96, are markedly lower than the corresponding rates for the pre-reform period, 1985–91. Moreover, each of the two GDP growth rates for 1991–96 is lower than the average annual population growth of 2.4 percent for the same period. Hence, GDP per capita in Zimbabwe apparently declined during the 1990s, rather than the 1980s.

Based on World Bank estimates, Table 3.1 also shows a remarkably high average agricultural growth rate during 1980–85, which fell sharply during 1985–91. The average agricultural GDP growth rate for the period 1980–91 is 3.5 percent. The revised CSO estimates indicate a low positive average growth rate of agricultural GDP for 1985–91, which climbed significantly during 1991–96. Extreme variability in the annual agricultural growth rate marked the latter period, largely attributable to the two severe droughts in 1992 and 1995, which presumably also influenced the erratic behavior of GDP growth during 1991–96 (Table 3.2).

The rapid agricultural growth during the half-decade after independence was fueled by the dramatic expansion in marketed output of smallholder farms, at an average annual rate of nearly 20 percent (World Bank 1995b, 87). In particular, smallholder deliveries of maize and sorghum to the Grain Marketing Board increased 12-fold while cotton output rose 4-fold (Muir and Blackie 1994, 198). By contrast, given the uncertainty of post-independence government policy, LSC farming slowed during 1980–85. In some years, marketed output actually decreased as a result of the sale of farmland and reduction of cultivated area.

Since the mid-1980s, the LSC farm sector crop plantings and marketed output have increased, particularly in tobacco and horticulture, and poultry and wildlife production has grown rapidly. This reflects a shift toward export and other noncontrolled crops and livestock products concurrent with rising international commodity prices.[10]

[10]Zimbabwe's export price index (1987 = 100) increased from 84.8 in 1985-86 to 112.5 in 1990-91 (World Bank 1997a).

Table 3.2 Annual growth rates of gross domestic product and agricultural value-added, 1991–96

Period	Gross domestic product (percentage)		Agricultural value-added (percentage)
	At market prices	At factor cost	
1991–92	– 9.0	– 5.5	– 23.2
1992–93	1.3	2.0	27.1
1993–94	6.8	5.3	7.3
1994–95	0.1	–0.2	–7.3
1995–96	7.3	7.2	21.4

Sources: CSO 1997.
Note: Rates are calculated from constant 1990 base prices.

Table 3.3 Gross fixed capital formation, exports, and imports, 1991–96

Activity	1991	1992	1993	1994	1995	1996
Gross fixed capital formation (GFCF)						
Z$ million at 1990 prices	4,816	4,407	4,753	5,003	4,457	4,399
Share of GDP (percentage)	21.2	21.4	22.7	22.4	19.9	18.3
Exports						
US$ million at 1987 prices	1,762	1,824	2,062	2,481	2,555	2,779
Annual change (percentage)		3.5	13.0	20.3	3.0	8.8
Imports						
US$ million at 1987 prices	1,880	1,954	1,753	2,019	2,230	2,352
Annual change (percentage)		3.9	-10.3	15.2	10.5	5.5

Source: 1987 data are from World Bank 1997a; 1990 data are from CSO 1997.

Overall growth of LSC marketed crops and livestock products is estimated at an average annual rate of 1.8 percent during 1985–93 (World Bank 1995b, 87). On the other hand, output and productivity in smallholder agriculture stagnated, the average annual growth in marketed output declining dramatically to 0.9 percent during 1985–91 (World Bank 1995a, 4).

The dismal performance of SH farming apparently restrained the overall agricultural growth rate for 1985–91, which fell markedly from the first half-decade after independence (as indicated above). The country's GDP growth, however, (especially at factor cost) declined less precipitously during 1985–91 (see Table 3.1), implying that the nonagricultural sectors on average grew more rapidly than agriculture. This is borne out by the revised CSO estimates yielding average annual growth, from 1985 to 1991, of 4.8 and 4.6 percent for "secondary" and "tertiary" industries, respectively.

Despite such expansion of the industrial and services sectors, formal-sector employment grew relatively slowly. From 1986 to 1991, an annual average of only about 30,000 jobs were created, considerably lower than the yearly rate of about 200,000 school leavers seeking employment. This was "a source of grave concern for the policymakers, and a principal reason for the adoption of the economic structural adjustment program" (World Bank 1995b, 14). It is also notable that the real wage index declined by 5 percent between 1986 and 1991,

which reinforces the argument that domestic nonagricultural investments were directed not to labor-intensive production but to industries with high incremental capital-output ratios. As is indicated below, the latter resulted in part from the anti-employment bias in existing government policies.

According to the revised CSO (1997, 39) national income estimates, gross fixed capital formation (GFCF) in Zimbabwe, averaged about 15 percent of GDP during 1985–90. As shown in Table 3.3, the GFCF-GDP ratio increased to 21–22 percent in the first four years of ESAP, and then fell to 18 percent in 1996.

Reflecting the increasing openness of the Zimbabwean economy, exports of goods and nonfactor services (in real terms) grew at an average annual rate of 9.7 percent from 1991 to 1996 (Table 3.3), sharply higher than the corresponding growth rate of less than 3 percent during 1985–90. On the other hand, real imports increased at an average 5.0 percent annually during the reform period 1991–96. That the latter figure is even (slightly) lower than the corresponding import growth rate of 5.1 percent during 1985–90 and can be explained by the much higher import prices (in domestic currency) associated with the ESAP-induced real exchange rate depreciation (see below). Unsurprisingly, there was a marked reduction in Zimbabwe's current-account deficit from 5.3 percent of GDP in 1991 to only 0.5 percent in 1996 (CSO 1997, 33).

Pre-Reform Macroeconomic and Agricultural Policies

During the first half of the 1980s, the Zimbabwean government incurred large budget deficits averaging about 8.4 percent of GDP annually (at market prices). An expansionary monetary policy carried the deficit, nearly doubling the money supply between 1980 and 1985. Moreover, the current-account balance showed continuing deficits that averaged nearly 5 percent of GDP during 1980–85. In addition to a concomitant decline in international reserves, the government resorted to foreign borrowing, increasing the country's external debt more than three-fold, from US$786 million (or 16 percent of GDP) in 1980 to US$2,415 million (or 52 percent of GDP) in 1985. Thus, expansionary macroeconomic policies and heavy foreign borrowing artificially supported the country's relatively rapid economic growth following independence.

Government current account expenditure increased from 30 percent of GDP in 1980–81 to 35 percent in 1984–85, but was not matched in revenue. While spending for defense remained high, social investment (education and health) and smallholder agriculture spending markedly increased in response to the new government's objective of redressing racial inequities and increasing communal farmer incomes. Indeed, the agricultural research system and support services (especially extension and veterinary services) were not only expanded but also restructured to address the production problems of the previously neglected smallholder sector.[11] The government also undertook a land reform program that resettled about 50,000 communal farmers on about two million hectares of land from 1980 to 1985. In addition, under significant government subsidy, public transport and marketing facilities were expanded into communal areas, particularly those of the Grain Marketing Board, Cotton Marketing Board, and Cold Storage Commission. At the same time, the Agricultural Finance Corporation increased credit availability to smallholder farmers. The combination of these factors accelerated the growth of smallholder output and sales during 1980–85, as observed above.

[11]For a detailed discussion, see Mabeza-Chimedza (1998, 532-536).

The heavy external borrowing supported a significant increase in imports, especially during the immediate post-independence period in the face of a sluggish export growth (averaging 0.5 percent annually). The latter reflected not only the stagnation of the LSC farm sector (as indicated above), which accounted for most of Zimbabwe's agricultural exports, but also the domestic industry's relative lack of competitiveness as a result of continuing import-protection policies and its associated exchange rate overvaluation.

The rapidly expanding government spending during 1980–85 proved unsustainable in the face of the growing macroeconomic imbalances. Government current expenditure fell from an average 37 percent of GDP in 1985–86 to 31 percent in 1990–91, while the fiscal deficit averaged 8.2 percent of GDP during 1986–91. The budgetary constraint led to a substantial reduction in public support services and credit availability to smallholder farmers, as well as a significant slowdown in government-sponsored land resettlement. It is not surprising, therefore, that growth of marketed output in the SH sector declined dramatically during 1985–91 and, despite the recovery in LSC farming, that the country's agricultural growth decelerated markedly (Table 3.1).

As indicated earlier, the nonagricultural sectors contributed more significantly to Zimbabwe's economic growth during 1985–91, but this growth failed to provide a satisfactory rate of employment generation and industrial export expansion. The low labor absorption rate was influenced, presumably, by substantial tax incentives for capital equipment investment and negative real interest rates that prevailed throughout the period, serving to distort the relative factor price toward capital use.[12]

Moreover, the import prices of capital goods were artificially lowered by the real exchange rate overvaluation, estimated at about 50 percent for 1990 (Jansen and Muir 1994, 180), and the less restrictive foreign exchange allocation to equipment and machinery imports. Policy bias against the employment of labor was also created by the minimum wage rates legislated in the early 1980s, which, along with strict anti-dismissal rules, artificially raised the real wages of formal-sector workers.

While Zimbabwe's merchandise exports (in real terms) grew at an average 5.5 percent annually during 1985–91 (Bautista 1996, Table 3), the major contribution came not from the industrial sector but from (LSC) agriculture, the latter's export share increasing from 30 percent in 1985–86 to 40 percent in 1990–91. The inability of manufacturing exports to expand rapidly is related to the highly regulated and distortionary trade and exchange rate regime adopted by the government after independence in continuation of UDI policy. The high tariff and nontariff barriers (especially, foreign exchange rationing, import licensing, and quotas) favored the inward-oriented, import-substituting industries, while export producers were heavily penalized. It has been estimated, for example, that a uniform tariff rate of 10 percent in Zimbabwe would effectively tax exports by 7.6 percent (Wiebelt 1990, Table 1), thus creating a strong incentive to divert resources from the export sector.

The nominal protection rate, including the effects of border charges (tariffs and surcharges), varied across products and over time. For total manufactures, the average has been calculated at about 28 percent for most of the 1980s (Erzan et al. 1989; Jansen and Muir 1994, 184) report a qualitative shift in average agricultural

[12]For 1985-91 the average interest rate is calculated at -3.0 percent (Bautista 1996, Table 6), a clear symptom of financial repression in Zimbabwe during the period.

protection from 14 percent in 1981–84 to –14 percent in 1985–89.

In conjunction with foreign trade restrictions, the operation of parastatal marketing boards (which have existed in Zimbabwe since the early 1930s) had a pervasive influence on the domestic pricing of agricultural products through the early 1990s. "Controlled" commodities, such as maize, wheat, soybeans, cotton, groundnuts, sorghum, sunflower, beef, and dairy products, could only be marketed through the designated marketing boards at prices set by the government.[13] The nominal protection coefficient (NPC) estimates shown in Table 3.4 indicate that producer prices of the major controlled crops in 1989 were lower than the corresponding export or import prices at the official exchange rate by 5 to 28 percent. The price bias increases to 41–61 percent when the effects of input policies and exchange rate overvaluation are included, shown in the estimated net effective protection coefficient (NEPC) for the five crops. This implies that producer incomes from the major controlled crops were effectively taxed to a significant extent.

Table 3.4 Nominal and net effective protection coefficients for major controlled crops, 1989

Crop	Nominal protection coefficient (NPC)	Net effective protection coefficient (NEPC)
Maize	0.95	0.59
Cotton	0.77	0.44
Groundnuts	0.74	0.45
Wheat	0.91	0.56
Soybeans	0.72	0.39

Sources: GATT (1995), based on Masters (1994) estimates.

Notes: NPC is the ratio of the domestic producer price to the border price, evaluated at the official exchange rate; NEPC is the ratio of value-added at domestic prices to value-added at border prices, evaluated at the equilibrium exchange rate.

Smallholder and LSC farms have different crop patterns, raising a question about the equity effect of the marketing boards' pricing policies on the controlled crops. It is not immediately evident from Table 3.4 whether smallholder or LSC farmers were more heavily discriminated against.[14] In calculating the coefficient averages for the two farm groups, weighted by the respective shares of their crops to the total marketed value of output, both smallholder and LSC farmers yield an average NPC of 0.86 and an average NEPC of 0.52 for 1989. This remarkable result suggests that the marketing boards' pre-ESAP pricing policy may, on balance, have been neutral with respect to the production patterns of crops. On the other hand, the predominantly LSC beef and dairy sectors were heavily subsidized (Jansen and Muir 1994).

Policy Changes Since 1991

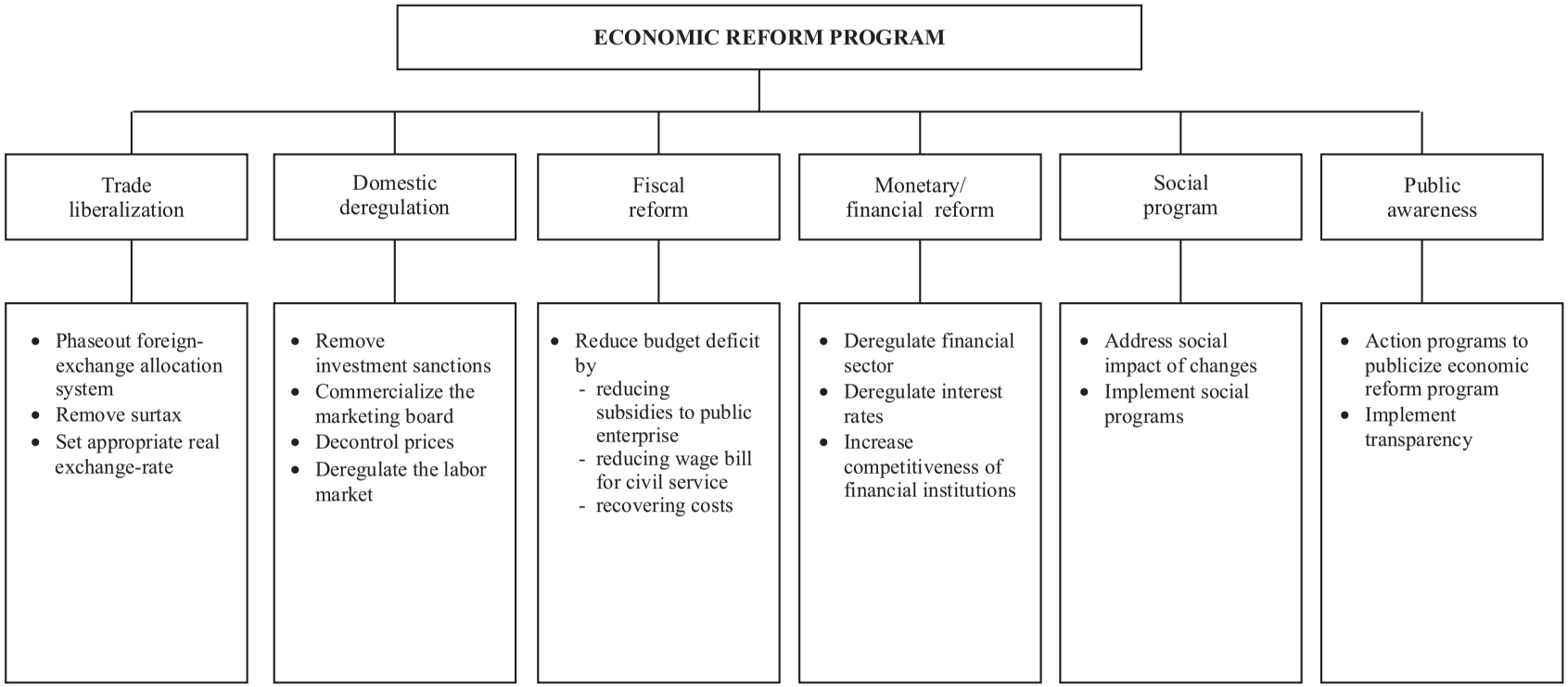
Toward the end of the 1980s it became increasingly evident that extensive government interventions and discretionary allocation policies were serving Zimbabwe's economy poorly . No significant advances had been made in the post-independence decade in either economic growth or income equity. Relatedly, employment generation was disappointingly slow, unable to match the annual increases in the country's rapidly expanding labor force. In addition, domestic investment was low, in part because of the "crowding-out" effect of large government budget deficits, and minimal foreign investment.

The decision to embark on economic policy reform was formally announced in the July 1990 budget statement, followed later that year by "the announcement that a structural adjustment program would be drawn up with assistance from the World

[13]For details, see Takavarasha (1994, 157-158).

[14]In the late 1980s smallholder farms produced very little wheat and soybeans, but relatively more maize and cotton than LSC farms.

Figure 3.1 Elements and primary tasks of the economic reform program



Source: CSO 1991.

Bank and the International Monetary Fund" (Takavarasha 1993, 125). The *Framework for Economic Reform,1991–95*, published in January 1991, set out detailed plans to move to a more market-oriented policy environment with a view to achieving sustainably rapid economic growth and employment expansion.

The elements and primary tasks of the reform program are represented in Figure 3.1. Three major areas are of particular relevance to this study: the foreign trade regime, fiscal policy, and agricultural marketing.

Trade and Exchange Rate Policies

Prior to 1991, a highly restrictive import licensing system, rationed foreign exchange, and administered setting of the exchange rate characterized Zimbabwe's trade and payments regime. Wide disparity prevailed between the official and market exchange rates—a reflection of the shortage of foreign exchange and overvaluation of the domestic currency. Under ESAP, the range of goods able to be imported without license—the Open General Import License (OGIL) list—gradually expanded, in turn increasing the foreign exchange earnings that enterprises could maintain and use to import unrestricted goods under the Export Retention Scheme (ERS).[15] By the beginning of 1994 most goods were on the OGIL list.[16] In July, further implementation of ESAP enabled exporters to retain 100 percent of their foreign exchange earnings resulting in a single exchange rate; hence the Zimbabwe dollar became fully convertible.

Significant exchange rate adjustments were achieved in the first two years of ESAP as the Zimbabwe–U.S. dollar rate more than doubled, and the real effective exchange rate depreciated by nearly 25 percent (Table 3.5). While subsequent currency devaluations were undercut by domestic inflation, and the real exchange rate even appreciated in some years, an overall depreciation of the real exchange rate

Table 3.5 Consumer price index, exchange rates, and commercial bank lending rate, 1990–97

Index/Rate	1990	1991	1992	1993	1994	1995	1996	1997
Consumer price index								
(1987=100)	142.3	175.5	249.4	318.2	389.0	476.9	579.1	687.4
Change (percentage)		23.3	42.1	27.6	22.3	22.6	21.4	18.7
Official exchange rate								
(Z$/US$)	2.5	3.6	5.1	6.1	8.2	8.7	9.9	11.9
Change (percentage)		44.0	41.7	19.6	16.4	6.1	13.8	20.2
Real effective exchange rate								
(1990=100)	100.0	84.0	76.5	79.7	74.2	78.3	83.3	n.a.
Change (percentage)		–16.0	–8.9	4.2	–6.9	5.5	6.4	
Commercial bank lending rate								
(percentage)	11.7	15.5	19.8	36.3	34.9	34.7	34.2	32.6

Source: World Bank 1999; IMF 1999.

Notes: N.a. indicates data are not available. A decrease or a negative change in the real effective exchange rate indicates a depreciation.

[15]For a detailed discussion, see Sithole (1996, 10-12).

[16]Textiles and clothing were a significant exception.

characterized the entire 1990–96 period (17 percent). ESAP was successful, therefore, in reducing the degree of exchange rate overvaluation, thereby improving the incentive structure for tradable goods production. This lent credibility to the trade liberalization program, indicating that it would not cause an unsustainable deficit in the current account. Indeed, favorable movement in Zimbabwe's current account was occurring, as the deficit fell from 5.3 percent of GDP in 1991 to 0.5 percent in 1996.

With quantitative restrictions largely removed and the foreign exchange market decontrolled, tariffs and other charges became the principal barrier to imports. ESAP reform aimed to lower and simplify tariff levels over time. In 1994 the minimum tariff was raised from zero to 10 percent, which served to rationalize the tariff structure—that is, reduce the dispersion of tariff rates to improve allocative efficiency. The maximum tariff rate was 75 percent, but most tariffs were in the 10–20 percent range, accounting for 91 percent of imports. Nearly all imports carried a surcharge of 15 percent (reduced from an earlier 20 percent). In addition, an import tax was applied at the same rate as the sales tax on domestic goods. The total tax rate on 1994 imports is estimated to have averaged about 40 percent—17 percent from tariffs, 14 percent from the surcharge, and 9 percent from the import tax (World Bank 1995b, 135). Actual revenue collected during 1994 (accounting for exemptions) was 24 percent of imports.

In 1994, the structure of border charges (that is, surcharge and tariffs) was only "mildly escalating" by developing-country standards at an average 24.8 percent for primary products, 30.9 percent for semiprocessed products, and 32.3 percent for final products (GATT 1995, 33–34). Tariffs followed a similar pattern in isolation: 12.1 percent for primary products, 16.4 percent for semiprocessed products, and 18.9 percent for final products. In 1996, however, the government broadly adjusted tariff rates in response to requests for domestic protection as follows: 5 percent for raw materials, 15 percent for partially processed goods and consumables, 30 percent for intermediate goods, and 50–100 percent for finished goods (EIU 1996). Subsequently, rates for some categories of intermediate goods were further revised downward and some categories of finished goods further revised upward, increasing the degree of tariff escalation.

As is well known, the taxation of imported inputs creates a trade policy bias against export producers, whose output is not protected in the world market. This price bias is reinforced in some developing countries by export quotas and taxes that further depress the domestic prices of export products (although export taxes did not exist in 1991, a tobacco tax has been in force since 1997). In Zimbabwe, duty drawback and duty suspension schemes have been used to relieve export producers of duties on imports, but for various reasons, few "actually get effective relief" (World Bank 1995b, 141). Ultimately, it is the lowering of import barriers that can lower the anti-export bias of trade policy.

An overall measure of trade policy bias is considered here, indicating the extent to which the trade regime raises or lowers the domestic price of exportables relative to importables. This aggregate trade policy (ATP) measure is represented by $(P_x/P_m)/(P_x^*/P_m^*)$, where Px and Pm are the domestic prices of exportables and importables, respectively, and P_x^* and P_m^* are their respective border prices.[17] This measure incorporates the effect of trade restrictions on

[17]A similar measure has been used in Diaz-Alejandro (1982) and Bautista (1987), among other studies.

the domestic prices of exportables and importables relative to their border prices.[18] An ATP value of less than one indicates the relative promotion of the production of importables over exportables, tending to reduce foreign trade. An ATP value greater than one, on the other hand, points to a policy-induced price bias favoring export production over import substitution, increasing the possibilities for trade. This measure takes into account two potentially important influences on the domestic price of exports relative to imports: the external terms of trade (denoted by P_x^*/ P_m^*, an exogenous influence under the small-country assumption) and trade policy.

The ATP measure for Zimbabwe is calculated as an index, with 1990 equal to 100 based on (a) national accounts data on the values of exports and imports at current and constant prices (to derive the index for P_x/P_m) and (b) the external terms of trade index (P_x^*/P_m^*). In any given year, an increase in the ATP index means a change in Zimbabwe's trade policy leading to an improved price incentives to export producers relative to import-competing producers. Available data permits the calculation of annual values of the ATP index through 1995 only.

As shown in Table 3.6, the domestic price of exports relative to imports increased by 6.6 percent from 1990 to 1991, after which it gradually declined to the 1995 level of less than 23.3 percent that for 1990. Meanwhile, Zimbabwe's terms of trade fluctuated, albeit to a relatively small extent. The implication is that trade policy was a dominant influence on the domestic price of exports relative to imports. Indeed, the time profile of the ATP index closely followed that of the domestic price ratio. Hence changes in the trade regime were responsible for the sharp rise in the relative export price in 1991 and, as a policy reversal (resulting from tariff rate changes), for the subsequent shift to increased import protection.

The latter occurred despite the continuing government objective, expressed in ZIMPREST, of "moving towards the goal of low and uniform tariffs . . . to maximize the benefits of global trade for Zimbabwe" (Government of Zimbabwe 1998, 20). The Minister of Finance also acknowledged in the preface that sustained growth in exports was a basic requirement to meeting economic growth targets under ZIMPREST.

This discussion should end on a positive note. Exchange rate convertibility was achieved, foreign exchange controls were substantially dismantled, and import licensing was largely removed over a short period of time, constituting a remarkable accomplishment for Zimbabwe—one of the last African countries to reform its trade and payments regime. It is important for Zimbabwe's long-term economic growth that tariff policy ceases to undermine the effectiveness of the above reforms in providing a

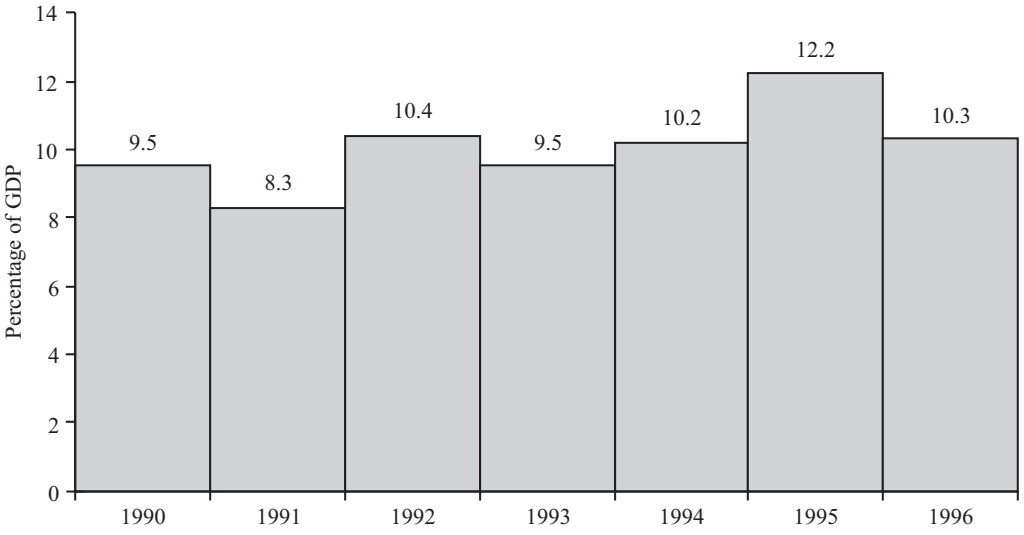
Table 3.6 Indices of domestic price of exports relative to imports, external terms of trade, and trade policy bias, 1991–95

Index	1990	1991	1992	1993	1994	1995
Domestic price ratio	100	106.6	96.0	83.8	79.5	76.7
Terms of trade	100	86.9	93.0	93.8	89.7	94.9
Trade policy bias	100	122.7	103.2	89.3	88.6	80.8

Source: Calculated by authors from CSO 1997.

[18] Assuming that the same exchange rate and marketing margin apply to export and imported products, the right-hand side of equation (1) can be written as (1-tx/1+tm), where tx is the implicit tax rate for all exports and tm is the implicit tariff rate for all imports.

Figure 3.2 Government budget deficits, 1990–96



Source: Calculated by authors from World Bank 1997a.

more level playing field for export producers.

Fiscal Policy

During the 1980s, large deficits characterized Zimbabwe's budget, adversely affecting national savings and domestic investment (given the low levels of foreign investment inflow), and constraining economic growth. The inflationary consequences were not so severe because the repressive financial policy regime, among other things, sustained the artificially low interest rates of the pre-ESAP years.[19]

The fiscal deficit (excluding grants) averaged about 11 percent of GDP during 1987–90, more than double the 4.5 percent average among Sub-Saharan African countries (World Bank 1997a, 190). It was forecast to be reduced gradually to 5 percent under ESAP by 1995, but this objective was no doubt compromised by the 1992 drought. The budget deficit increased from 8.3 percent of GDP in 1991 to 10.4 percent in 1992 (Figure 3.2), caused in large part by increases in the government wage bill and in subsidies to public enterprises related to the drought (Sithole 1996). Even after 1992, however, the deficit remained high, averaging 10.6 percent of GDP during 1993–96.[20] Gunning (1996) argues that the fiscal crisis represented a major threat to the sustainability of trade liberalization in Zimbabwe.

The effects of large fiscal deficits were felt on interest rates and domestic inflation under the more liberalized financial regime

[19]The average annual inflation rate was 13.2 percent during 1981-90, while the Central Bank discount rate was fixed at 9.0 percent (IMF 1997).

[20]Notably higher at 12.2 percent in 1995 (as compared with the target of 5 percent) when Zimbabwe was again visited by a serious drought (though not as severe as the 1992 drought).

Table 3.7 Central government expenditure by function, 1990–95

	Share of total (percentage)					
Sector	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
General public services	20.3	21.0	22.2	25.5	30.0	32.6
Defense	14.1	13.5	10.7	11.8	10.4	9.6
Education and health	28.2	29.0	25.0	21.2	28.7	25.2
Economic services	17.6	15.5	20.5	16.0	8.5	11.7
Agricultural	6.7	5.6	13.1	9.0	3.3	4.2
Nonagricultural	10.9	9.9	7.4	7.0	5.3	7.5
Other	19.8	21.0	21.6	25.5	22.4	20.9

Source: Calculated by authors from CSO 1997.

during the ESAP period. Average commercial bank lending rates increased sharply from 13 percent in 1989–90 to 35 percent in 1993–95, while the annual inflation rate went up from 12 to 24 percent (Table 3.5). This served to dampen domestic investment and limit the supply response to the deregulated policy environment, improving the incentive structure in Zimbabwe after 1991 (Muir-Leresche 1998).

The failure to attain the fiscal-deficit objective in 1995 was reflected on both expenditure and revenue, the government targets for which, that year, were 38 and 33 percent of GDP, respectively. However, government expenditure increased to 42 percent of GDP under drought conditions in 1995, while government revenue was lower than targeted, at 29 percent. In the following year, government expenditure fell back to 39 percent of GDP but revenue remained at 29 percent. Thus, the government had more success in cutting expenditure relative to raising revenue in terms of the ESAP fiscal targets. In addition to budget deficit reduction, fiscal policy under ZIMPREST aimed "to restore revenue performance, while enhancing the equity and efficiency of the tax system" (CSO 1998, 15).

The direction of government expenditure cuts "has been of concern" (Muir-Leresche 1998, 15). Table 3.7 shows the changing composition of central government expenditure from 1990 to 1995. Considering that the 1992 and 1995 expenditure shares would have been influenced by drought conditions, it is reasonable to focus on the changes from 1990–91 to 1994. The category "economic services" was evidently the hardest hit, its share having been reduced by almost half, which applies to both agricultural and nonagricultural services. Indeed, budget cuts had impaired the outreach and effectiveness of public agricultural services, contributing to the ongoing stagnation of smallholder agriculture that began in the mid-1980s.[21]

It can also be seen from Table 3.7 that the social sectors, education and health, retained their relatively large share in central government spending (which also compares favorably with most other Sub-Saharan African countries). The expenditure share of defense decreased from an average

[21]There was a substantial reduction of budgeted resources for agricultural research, extension, and field activities, particularly in smallholder areas (World Bank 1995b, 92).

13.8 percent in 1990–91 to 10.4 percent in 1994, which may need to be further reduced because the justification for earlier high levels of defense spending has been removed in view of the peace accord in Mozambique and the majority rule government in South Africa (Muir-Leresche 1998, 44). General public services became the sole beneficiary of disproportionately larger cuts elsewhere in the central government budget, its share increasing by more than nine percentage points from 1990–91 to 1994. Civil-service wages and salaries dominate this budget component; their share in GDP, even at the start of the ESAP period, was higher in Zimbabwe than in most other developing countries (World Bank 1995a, 17).

Agricultural Marketing and Price Policy

Domestic deregulation, including the reform of agricultural marketing and price policy, was one of the first areas addressed under ESAP.[22] In early 1991, the government announced its intention to restructure the agricultural marketing boards. Independent boards of directors were later established and given greater autonomy in pricing and business decisions. Despite the setback related to the 1992 drought, the government succeeded in reducing agricultural parastatal subsidies significantly during the ESAP period,[23] largely as a result of increasing commercial orientation, cost reduction, and improving efficiency of marketing boards.

An early reform measure was the permission granted to two commercial dairy cooperatives in May 1991 to market milk products and compete with the Dairy Marketing Board (DMB). In August, sorghum and millet were decontrolled, becoming "regulated" crops for which the Grain Marketing Board (GMB) would set floor prices and act as a residual buyer. In September, private coffee marketing was permitted in cooperation with the GMB. It was also announced that cotton and groundnut farmers would receive supplemental payments to raise the final prices in line with export parity.

Yellow maize had been partially decontrolled in 1990, allowing farmers to sell to any domestic buyer. Decontrol of the white maize market started when the movement of maize was permitted between contiguous and then, in February 1992, noncontiguous communal areas. The price effects of maize market liberalization have apparently been

Table 3.8 Indices of agricultural prices, nonagricultural prices, and domestic terms of trade, 1991–96

Index	1990	1991	1992	1993	1994	1995	1996
Implicit price deflator for agriculture, P_a	100	124.6	93.9	185.6	284.2	307.9	402.4
Implicit price deflator for nonagriculture, P_{na}	100	132.9	176.7	204.5	243.9	291.2	340.6
Domestic terms of trade, TOT = P_a / P_{na}	100	93.8	53.1	90.8	116.5	105.7	118.1

Source: Calculated by authors from CSO 1997.

[22]See Takavarasha (1993) and Sithole (1996), among others, for a more comprehensive description of agricultural reforms under ESAP.

[23]Central government subsidies increased sharply from Z$377 million in 1991 to Z$1,366 million in 1992, but subsequently declined to Z$687 million in 1993, Z$142 in 1994, and Z$101 million in 1995 (CSO 1997, 53).

positive for maize producers, especially when the relative price of maize (deflated by the CPI) increased in 1992 and 1993 by 53 and 21 percent, respectively.

Other substantial reforms affecting domestic and foreign marketing rules were implemented beginning mid-1993 as the Zimbabwean economy rebounded from the 1992 drought. Thus, floor prices for beef and milk in the domestic market were eliminated (Sithole 1996). By the end of 1993, domestic market trade was fully decontrolled for all commodities except maize and wheat. During 1994–96 the domestic marketing of wheat was decontrolled and limited quotas were allocated for exports and imports by non-GMB entities. Domestic marketing and prices of maize were also liberalized but GMB remained the sole importer and exporter, taking on the price stabilization role by setting floor and ceiling grain prices and holding national strategic grain reserves.

As the private marketing of major commodities opened up for investment and development, local traders emerged. Once established, they then began marketing other commodities creating additional opportunities for local production and trade. Eventually, both small and large traders, including multinational corporations, offered marketing services. An agricultural commodities exchange (ZIMACE) was established in 1994, initially concentrating on grain trading but later expanding to trade in livestock products and oilseeds. ZIMACE prices have tended to be higher than those offered by the GMB and those in direct sales agreement with processors; however, participation requires better access to information and involves more risk because prices are not known in advance.

The effectiveness of decontrolling markets was enhanced by other ESAP elements, especially the removal of restrictions on foreign exchange and imports. The latter enabled the purchase of transportation and processing equipment and other previously scarce imported inputs needed to expand marketing and production facilities.

Most farmers have benefited from the ongoing safety-net of the GMB as a buyer of last resort, while taking advantage of a more open trading environment. Those negatively affected by decontrol and commercialization are the small, surplus farmers in remote areas where GMB depots have closed. These areas have high transport and transaction costs with relatively few, scattered farmers producing small surpluses. Until infrastructure improves and larger, more consistent supplies of commodities or

Table 3.9 Real agricultural prices by commodity, 1990–96

	Real agricultural prices						
Commodity	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
Maize (Z$/ton)	225	219	334	403	329	313	295
Sorghum (Z$/ton)	200	219	334	233	190	194	226
Wheat (Z$/ton)	460	422	568	648	530	627	627
Cotton (Zc/kg)	117	109	93	119	117	110	103
Soybean (Z$/ton)	485	454	542	592	585	477	491
Groundnuts (Z$/ton)	1,250	1,014	856	805	878	1,343	1,228
Tobacco (Zc/kg)	426	518	647	359	505	564	713

Source: Calculated by authors based on nominal prices from Muir-Leresche 1997, Table 4, and consumer price index from World Bank 1997a.

Notes: With the exception of tobacco, where the average price paid on auction is used, nominal prices are the government-established prices paid for the crops harvested in the year indicated.

Table 3.10 International commodity prices in real terms, 1990–96

Commodity	1990	1991	1992	1993	1994	1995	1996
Maize ($/bushel)	2.78	2.71	2.62	2.55	2.64	2.89	3.82
Sorghum ($/mt)	104	104	102	98	100	109	137
Wheat ($/bushel)	3.69	3.47	4.07	3.77	3.94	4.43	5.16
Cotton ($/lb)	71.8	70.0	54.2	55.1	71.2	87.2	72.2
Soybeans ($/mt)	247	237	233	252	244	238	278
Groundnuts ($/mt)	1,326	1,227	791	1,077	923	836	879
Tobacco ($/mt)	3,392	3,469	3,406	2,658	2,872	2,429	2,793

Source: IMF 1997.
Note: Data represent nominal prices in U.S. dollars deflated by the export unit-value index.

higher-value outputs are produced, it is likely that these areas will remain outside the development nexus.

In view of the pre-ESAP nominal price disprotection of agriculture, as indicated earlier, the agricultural market reforms toward decontrol and commercialization would have had a positive impact on agricultural product prices (Muir-Leresche 1998). There are, of course, other influences including macroeconomic policy changes and world market price movements that could offset (or reinforce) the favorable effect of agricultural-sector reforms on producer prices.

At the most aggregated level, actual changes in the agricultural domestic terms of trade during 1991–96 are dealt with first. Table 3.8 contains the annual values of the implicit price deflators for agricultural and nonagricultural value-added from the national accounts (CSO 1997), as well as the corresponding (implied) values of the agricultural terms of trade. Relative agricultural prices apparently fell by 6.2 percent on average in 1991, followed by a steep decline in the drought year 1992, and subsequent recovery to comparatively higher levels during 1994–96. In general, therefore, farmers in Zimbabwe benefited from favorable product price changes during the first five-year period of economic reforms.

The latter inference is corroborated by the generally rising trend in domestic prices of specific crops relative to the CPI as shown in Table 3.9 (cotton being the possible exception). With the exception of tobacco, the nominal prices used are the prices paid to producers by marketing boards—the only relevant prices before the market reforms. For the years after markets were liberalized, the price data shown in the table are minimum prices set by the marketing boards, and do not represent the average prices from all marketing channels. Data on the latter prices are unfortunately not available, but they can only be higher than the marketing board prices contained in Table 3.9 for the years 1994 to 1996. This should add to the upward trend in domestic real prices of Zimbabwe's major crops.

Changes in the relative domestic price of a tradable goods are the outcome of many factors, including changes in the foreign price, in the real exchange rate, and in sectoral protection.[24] Other factors remaining equal, an increase in the foreign price, a depreciation of the real exchange rate, or an

[24]An accounting framework that decomposes, under certain assumptions, a given change in domestic price into these three components can be found in Bautista and Gehlhar (1996).

improvement in sectoral protection could result in an increase in the relative domestic price.

As indicated earlier, the real exchange rate depreciated and sectoral protection improved during the ESAP period. These factors therefore contributed to the observed general increases in domestic agricultural prices. Moreover, foreign prices in real terms showed generally favorable movements from 1991 to 1996, with the exception of groundnuts and tobacco (Table 3.10). Since the domestic prices of these two crops increased over the period, the decline in their foreign prices was more than made up for by the policy reforms that reduced the exchange rate overvaluation and agricultural price disprotection in Zimbabwe.

In general, therefore, the policy environment for agricultural producers in Zimbabwe has improved between 1991 and 1996 as a result of economic reform targeted toward market decontrol and more market-oriented price policy. The reform presumably contributed to the higher average agricultural growth rate in the 1990s relative to the preceding half-decade—all the more remarkable given the drought conditions of 1992 and 1995. Furthermore, the impact of reform on income distribution would have been favorable, given the concentration of low-income households in rural areas where agriculture, almost by definition, is the primary means of livelihood. However, as pointed out in Chapter 2, such factors as the inadequacy of support services to smallholders and outdated land policies served to restrict not only the agricultural supply response to the improvement in price incentives but also its equity effect.

Land Policy

The state owns 70 percent of the Zimbabwean landmass (including communal and resettlement areas); the remaining 30 percent is on freehold, of which 24 percent is owned by LSC farmers. Zimbabwe's land laws virtually exclude the possibility of subdivision of freehold land titles. The system discourages land sharing through selling or giving surplus land to small farmers. Such subdivisions would offer opportunities for farmers to provide assistance in training and infrastructure, and in the processing and marketing of produce. The sale of small parcels of land on the open market would free black Zimbabwean farmers from dependence on political patronage and bureaucratic fiat. Communal farmers live on tribal land owned by the state. They share resources and infrastructure and have reasonable security over their arable land and homesteads, though the state can, and does, appropriate land for public works without compensation. Communal farms are penalized because they cannot offer land as collateral but most of all because they have no independence or control over their lives and resources.

About 10 percent of Zimbabwe has been acquired for resettlement since independence in 1980. By 1993, 55,274 families had been resettled on 3.37 million hectares. Until recently, settlers had no security of tenure. Permits are now being converted to leases but not to deeds of title. The reason so few people have been resettled since independence is not because of a shortage of land; 1994 figures show that the government owned 345 farms acquired expressly for resettlement, and of those 29 were vacant, 71 were leased, and 64 were on offer of lease. Analysis of successive Zimbabwean budgets showed that less that 0.02 percent of expenditure was allocated to land acquisition and resettlement. Future reform must incorporate a land resettlement strategy that strikes a balance between the competing claims of racial inequity and productivity. Acquiring half the white-owned land in Zimbabwe might dramatize the government's commitment to redressing racial inequality but it will not change economic inequality between Zimbabwe's rural and urban sectors, nor between

different regions. If the regulatory structure for land resettlement scheme is retained, its capacity to redress social and economic inequity will be negligible. Government regulation and political patronage in land allocation impedes modernization of the farm sector. Zimbabwe land usage will continue as before with a relatively few, large, capital-intensive productive farms and a mass of small, state-owned, subsistence farms with low incomes.

Conclusion

Despite the significant progress toward a more market-oriented policy environment, Zimbabwe's growth performance during the 1990s economic reform period was less than satisfactory. Undoubtedly, the droughts of 1992 and 1995 adversely affected growth not only in agriculture but also across the entire economy. Moreover, the external terms of trade deteriorated in the 1990s, its index decreasing from 92 in 1989–91 to 80 in 1994–96 (World Bank 1997a, 69). Negative effects also arose from some post-1991 policies, such as persistant fiscal deficits, and in the second half of the decade, increased tariff protection for import-competing industries. Lastly—and this is outside the scope of this study—it has been argued that political-economy factors have had a significant negative influence on overall income growth and equity in Zimbabwe during the 1990s (Jenkins 1997; Muir-Leresche 1998).

The historical analysis contained in this chapter needs the supplementation of economic modeling to isolate the effects of ESAP and other policy reform packages from the droughts, external developments, and other influences on past economic performance. In Chapter 5, a CGE model for Zimbabwe is developed as an analytical foundation for quantitative examination of the economywide income and equity effects of changes in trade, fiscal, and agricultural policies. As indicated already, the model's underlying accounting framework and baseline conditions are provided by the benchmark 1991 Zimbabwe SAM, as described in Chapter 4.

CHAPTER 4

A 1991 Social Accounting Matrix and a Multiplier Analysis for the Economy of Zimbabwe

This chapter describes the construction of the benchmark SAM, examines the structure of the Zimbabwe economy from a SAM perspective for 1991, and applies the calculated SAM multipliers to the analysis of intersectoral linkages and the income and equity effects of alternative agricultural growth paths for Zimbabwe.

A 1991 Social Accounting Matrix for Zimbabwe

A SAM is a square matrix describing economic transactions quantitatively over a specific time period.[25] The columns and rows represent the country's economic sectors (or accounts); by convention, columns represent expenditures, and rows represent revenues. In keeping with the underlying principle of double-entry accounting, for each account in the SAM, total revenues (the row total) must equal total expenditures (the column total).

The SAM can be expressed either algebraically as accounting identities (see below) or as numbers that represent the database for a given benchmark period (typically a year). The numerical SAM integrates national income, input-output, flow-of-funds, and foreign trade statistics into a comprehensive and consistent data set. SAM construction in developing countries is often hindered by insufficient and fragmented data sources, as well as by problems of data reliability. In many cases, the process of estimating a disaggregative SAM has a social value in itself because it provides a consistency check on various data sources and helps to identify data gaps and errors (Thorbecke 1998).

Characteristics of the Zimbabwe SAM

The 1991 Zimbabwe SAM, which is much more disaggregated than existing SAMs for Zimbabwe, required data from various sources. The primary source is Zimbabwe's Central Statistical Office (CSO), which includes the national accounts (CSO 1997 and 1998a), the 1990/91 household survey report (CSO 1994), and the 1993/94 industrial census report (CSO 1995). Even so, data discrepancies needed to be reconciled and data gaps filled.

[25]See Pyatt and Round (1985) for a discussion of the SAM structure, and de Melo (1988), Pyatt (1988), and Robinson and Roland-Holst (1988) for perspectives on SAM-based modeling.

The following characteristics of the benchmark SAM for Zimbabwe constructed for this study are worth noting:

- Given the SAM is for 1991, it provides a useful starting point for analyzing the effects of ESAP reforms initiated that year. Further, in at least one important respect, 1991 can be considered a "normal" year in that, unlike subsequent years, agricultural production and trade were not disrupted by the severe droughts of 1992 and 1995.
- The SAM has an agricultural focus (15 of 27 production sectors are agricultural), and captures the highly dualistic, agrarian economy of Zimbabwe by distinguishing between large-scale commercial (LSC) and smallholder (SH) farms.
- The SAM's "household" classification reflects differences in levels and sources of incomes as well as in the consumption patterns of various household groups. Five household categories are distinguished: LSC farm owner/manager (high-income) households, LSC farm-worker households, SH farm households, urban high-income households, and urban low-income households.
- Marketing margins are explicitly taken into account, differentiating among domestic, export, and import products, to reflect deficiencies in trade and transport infrastructure.
- Home consumption, which represents the output by SH farm households for their own needs and is not subject to marketing margins, is distinguished from the consumption of marketed goods.
- Informal employment and its contribution to value-added in nonagricultural activities are taken into account.

The benchmark SAM is the result of a three-step process: building a macro-SAM, which serves as the control matrix for the micro-SAM; generating the micro-SAM by disaggregating each cell of the macro-SAM into various subsectors; and balancing the micro- SAM using the "cross-entropy" approach.[26]

A Macro-SAM for 1991

A simplified framework for economywide analysis is shown in Figure 4.1. It traces the circular flow of incomes from product markets through factor payments to households and back to product markets through expenditures on final goods. Additionally, income flows involving producers, government, rest of the world, and the capital account are included in the diagram.

Most of the economic transactions shown in Figure 4.1 are quantified in Zimbabwe's national accounts for 1991, and are summarized in the balanced sheet in Table 4.1. The macro-SAM entries are derived for the most part from these national accounts aggregates. Entries such as GDP at factor cost, final consumption by households and government, gross capital formation, exports and imports, and foreign saving are reported exactly in the macro-SAM as they appear in the balance sheet. Entries requiring some level of disaggregation are derived from other tables in the national accounts, such as the central and local government budget tables. This process ensures balance and consistency among the different accounts.

The structure of the macro-SAM reflects the following relationships and income flows among the various accounts (Table 4.2):

- Production activities purchase intermediate inputs from the commodities

[26]For a more detailed discussion of the process of constructing the 1991 Zimbabwe SAM and of the data sources used, see Thomas and Bautista (1999). For a detailed discussion of the cross-entropy approach to SAM estimation, see Robinson, Cattaneo, and El-Said (1998).

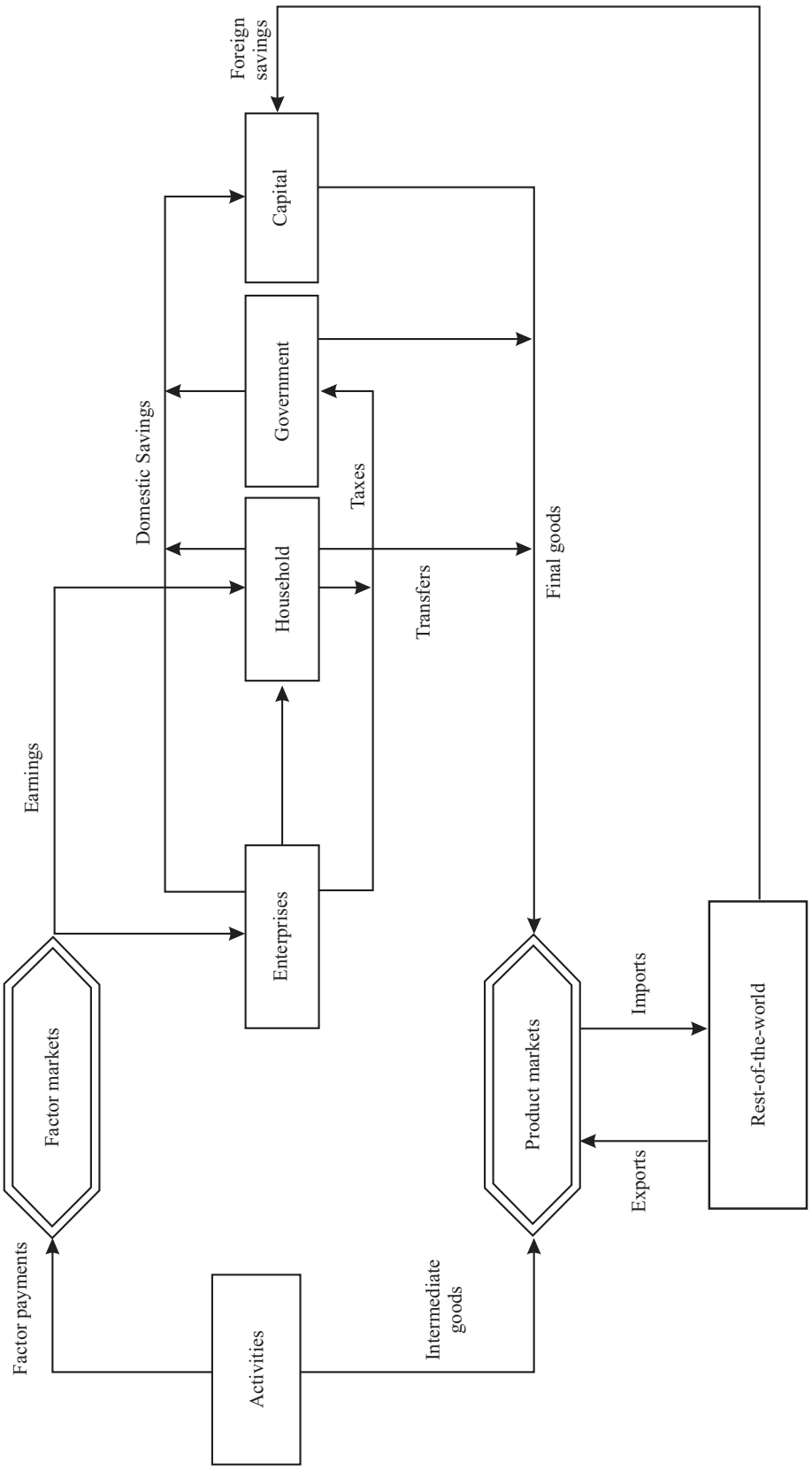


Figure 4.1 Economywide circular income flow

Source : Devised by authors.

Table 4.1 Zimbabwe national accounts balance sheet for 1991

National accounts balance sheet (million Zimbabwe dollars)			
Gross domestic product (GDP)			
GDP f.c.	26,284	Government consumption	4,775
Indirect taxes	3,339	Private consumption	20,163
		Gross capital formation	5,658
		Exports	7,075
		less Imports	(8,048)
Total (GDP m.p.)	29,623		29,623
Gross national product (GNP)			
Wages and salaries	11,239	Final consumption	24,938
Rent	529	Gross saving	4,099
Gross operating surplus (less imputed banking charges)	14,516	Net factor income paid abroad	979
Indirect taxes	3,339		
Net current transfer from abroad	393		
Total	30,016		30,016
Capital account			
Domestic saving	4,099	Gross capital formation	5,658
Foreign Saving	1,559		
Total	5,658		5,658
Rest of the world			
Imports	8,048	Exports	7,075
Net factor income	979	Net current transfer	393
		Surplus	1,559
Total	9,027		9,027

Note : CSO 1998a.
Notes: GDP f.c. indicates domestic product at factor costs; GDP m.p., gross domestic product at market prices.

account and also the services of primary factors.

- Commodity output is retained by producers for home consumption or sold in the market (sales).
- Factors of production distribute their income to enterprises, households, and the rest of the world (ROW).
- Net earnings of enterprises (capital income net of corporate taxes and saving) are distributed to households and ROW.
- Households and enterprises receive factor payments and income transfers from other households, government, and ROW.
- Incomes received by institutions are spent on final goods and services: private consumption in the case of households, current expenditures in the case of government, and investment in the case of capital accounts.
- The government derives income from the levy of indirect taxes on activities and commodities and direct taxes on enterprises and households.
- The capital account receives payments from enterprises, households, government, and the ROW in the form of savings.
- The ROW account identifies flows between the domestic and the foreign sectors, of which the main components are imports and exports of commodities. It receives additional income and incurs additional expenditures in the form of factor income and current transfers (remittances and grants).

As previously mentioned, the recently revised set of national accounts (CSO 1997,

Table 4.2 The structure of the Zimbabwe macro-SAM

	Activities	Commodities	Factors	Enterprises	Households	Government	Capital	Rest of the world	TOTAL
Activities	Sales				Home consumption				Total domestic production
Commodities	Intermediate inputs	Marketing margins			Private consumption	Government consumption	Investment expenditures	Exports	Total marketed supply
Factors	Value added								Total factor income
Enterprise			Factor payments			Transfers			Total enterprise income
Households			Factor payments	Retained earnings	Inter household transfers	Transfers		Foreign remittances	Total household income
Government	Indirect taxes	Import tariffs		Corporate taxes	Income tax			Foreign grants	Total government income
Capital				Corporate savings	Household savings	Government savings		Foreign savings	Total savings
Rest of the world		Imports	Factor payments	Enterprise transfers		Government transfers			Total foreign exchange outlays
TOTAL	Total cost of production	Total absorption	Total value added	Total enterprise expenditure	Total household expenditure	Total government expenditure	Total investment	Total foreign exchange earnings	

Source: Devised by authors.

1998a) is used as the principal data source to construct entries in the macro-SAM (Table 4.3). A few entries are based on data from other sources. Total home consumption is estimated from the production account of agriculture, forestry, and fishing for communal lands (CSO 1996a). Inter-household transfers are estimated from the income consumption and expenditure survey (CSO 1994), referred to below as ICES for short. Marketing margins rates for agricultural products were not available and therefore are derived from farm survey data reported in Masters (1994); those for non-agricultural products are based on trade and transport data from the 1980 Input-Output Table (CSO 1988).

A Micro-SAM for 1991

No previous SAM for Zimbabwe exists with the level of disaggregation needed for this study. Consequently, the Zimbabwe micro-SAM is essentially built from scratch using scattered data sources. The outcome is an 88 by 88 matrix that includes 36 activities, 30 commodities and marketing sectors, 9 primary factors of production

Table 4.3 Zimbabwe macro-SAM in million of Zimbabwe dollars, 1991

	Activities	Commodities	Factors	Enterprises	Household	Government	Capital	World	TOTAL
Activities		47,823			685				48,508
Commodities	20,746	6,120			19,478	4,775	5,658	7,075	63,852
Factors	26,284								26,284
Enterprises			10,733			1,209			11,942
Household			15,525	8,832	259	1,459		102	26,177
Government	1,478	1,861		1,667	2,060			291	7,357
Capital				908	3,695	–504		1,559	5,658
World		8,048	26	535		418			9,027
Total	48,508	63,852	26,284	11,942	26,178	7,357	5,658	9,027	

Source: Compiled by authors based on Table 4.2 using data from the sources outlined in Appendix Table A.2.

(4 labor, 3 capital, and 2 land categories), 1 enterprise account, 5 household groups, the government, an investment/savings account, and the ROW account (Table 4.4).

The national accounts table on production (CSO 1998a, Table 7.3) provides the basis for disaggregating the value of output into intermediate consumption and value-added. The agricultural sector, including forestry and fisheries, is disaggregated into 15 agricultural commodities using published agricultural production accounts (CSO 1996a, 1996b). The manufacturing sector is disaggregated into grain milling, food processing, textiles, other light manufacturing, fertilizer, and other manufacturing, based on industrial census data (CSO 1995).[27] The national accounts sectors, which include finance and insurance, real estate, hotels and restaurants, public administration, education, health, domestic services, and other services, are aggregated into public services and private services using the shares of ownership of the public and private sectors (CSO 1998a, Table 7.4). Distribution and transport and communications are aggregated into the trade and transport account (Table 4.4).

Cross-Entropy Balancing of the Micro-SAM

The process described in the previous section yields a complete but unbalanced micro-SAM, although it is reconciled with the corresponding macro-SAM cells. The micro-SAM is balanced using a cross-entropy approach. This method is used to find a new set of SAM coefficients that minimizes the "entropy distance" between prior coefficients from the unbalanced SAM and the new estimated coefficients, given prior knowledge about any part of the SAM. The entropy equations ensure that the column and row totals balance, and that the column coefficients are smaller than, and add up to, one. Other constraints can be imposed, representing prior knowledge and certainty about any part of the SAM derived from official data or "best estimates." For example, entropy estimation of factor incomes is constrained not only by the equality of relevant row and column sums but also by the equality of the new estimates over all factor categories to GDP at factor cost (GDP f.c.). In the case of Zimbabwe, the national accounts aggregates are used as constraints to ensure that

[27]The fertilizer account includes other agricultural chemicals such as pesticides.

Table 4.4 Accounts of the 1991 Zimbabwe micro-SAM: Names and descriptions

#	Code	Description
Activities		
1.	AMZLC	Maize-LSC
2	AMZSH	Maize-SH
3.	AWT	Wheat
4.	AOGRNLC	Other grains-LSC
5.	AOGRNSH	Other grains-SH
6.	AHORTLC	Horticulture-LSC
7.	AHORTSH	Horticulture-SH
8.	ACOF	Coffee
9.	ATEA	Tea
10.	AGRNTLC	Groundnuts-LSC
11.	AGRNTSH	Groundnuts-SH
12.	ACOTLC	Cotton-LSC
13.	ACOTSH	Cotton-SH
14.	ASUG	Sugar
15.	ATOB	Tobacco
16.	AOCRPLC	Other crops-LSC
17.	AOCRPSH	Other crops-SH
18.	ACATLC	Cattle-LSC
19.	ACATSH	Cattle-SH
20.	AOLVKLC	Other livestock-LSC
21.	AOLVKSH	Other livestock-SH
22.	AFISH	Fisheries
23.	AFORLC	Forestry-LSC
24.	AFORSH	Forestry-SH
25.	AMIN	Mining
26.	AGRM	Grain milling
27.	AOFDP	Other food processing
28.	ATEXT	Textile
29.	AOLGT	Other light manufacturing
30.	AFERT	Fertilizer
31.	AOMAN	Other manufacturing
32.	AELWA	Electricity and water
33.	ACONS	Construction
34.	ATDTP	Trade and transport
35.	APUB	Public services
36.	APRIV	Private services
Commodities		
37.	CMZ	Maize
38.	CWT	Wheat
39.	COGRN	Other grains
40.	CHORT	Horticulture
41.	CCOF	Coffee
42.	CTEA	Tea
43.	CGRNT	Groundnuts
44.	CCOT	Cotton
45.	CSUG	Sugar
46.	CTOB	Tobacco
47.	COCRP	Other crops
Commodities		
48.	CCAT	Cattle
49.	COLVK	Other livestock
50.	CFISH	Fisheries
51.	CFOR	Forestry
52.	CMIN	Mining
53.	CGRM	Grain milling
54.	COFDP	Other food processing
55.	CTEXT	Textile
56.	COLGT	Other light manufacturing
57.	CFERT	Fertilizer
58.	COMAN	Other manufacturing
59.	CELWA	Electricity and water
60.	CCONS	Construction
61.	CTDTP	Trade and transport
62.	CTDTP-E	Marketing margin-export
63.	CTDTP-M	Marketing margin-import
64.	CTDTP-D	Marketing margin-domestic
65.	CPUB	Public services
66.	CPRIV	Private services
Factors of production		
67.	LABUSKLS	LSC-unskilled labor
68.	LABUSKF	Formal unskilled labor
69.	LABUSKIF	Informal unskilled labor
70.	LABSK	Skilled labor
71.	CAPLSC	LSC-capital
72.	CAPSH	SH-capital
73.	CAPOT	Other capital
74.	LANDLS	LSC-crop land
75.	LANDSH	SH-crop land
Nongovernmental institutions		
76.	ENT	Enterprises
77.	HLSUPP	LSC-owner/manager households
78.	HLSLOW	LSC-workers households
79.	HSHHLD	SH-households
80.	HURBUPP	Urban high-income households
81.	HURBLOW	Urban low-income households
Other institutional accounts		
82.	GOV	Government
83.	DTAX	Direct taxes
84.	ITAX	Indirect taxes
85.	IMPTAR	Import taxes
86.	SAVINV	Saving and investment
87.	DSTOCK	Change of stocks
88.	ROW	Rest of the world

Source: Devised by authors.

the entropy estimations keep the balanced micro-SAM within the boundaries of official macrostatistics.

The following additional constraints are imposed to estimate sectoral values:

- For each sector, the sum of intermediate inputs must equal intermediate demand, and the sum of primary factor inputs must equal value-added.
- The sum of value-added across all LSC agricultural activities and factor categories must equal total LSC value-added, and the sum of value-added across all SH agricultural activities and factor categories must equal total smallholder value-added.

Appendix Table B.1 shows the complete and balanced micro-SAM.

Structure of the Zimbabwean Economy, 1991

By African standards, the Zimbabwe economy in 1991 was characterized by a diversified and highly industrialized production base. This is illustrated in Table 4.5, showing that manufacturing (grain milling, other food processing, textiles, other light manufacturing, fertilizers, and other manufacturing) is the largest sector in the economy and contributes more than 27 percent of GDP, followed by trade and transport, and private services—at nearly 17 percent each. Agriculture accounted for 15 percent of GDP, slightly higher than public services, at 14 percent.

While agriculture contributes only 15 percent of GDP, it contributes 42 percent of exports with tobacco as the main export (nearly 35 percent). The next largest export sector is private services (more than 22 percent). The crops destined primarily for exports are coffee (73 percent of its output), tea (53 percent), cotton (43 percent) and tobacco (92 percent). With the exception of cotton, these crops are produced by LSC farmers. In nonagriculture, mining and private services exports account for 44 and 24 percent of their respective production.

Most imports are nonagricultural (notably manufacturing, which accounts for 93 percent of total imports) and are used mostly in agriculture by LSC farmers. In agriculture, wheat imports are 12 percent of supply, and other grains, 30 percent. In manufacturing, nearly half of the fertilizer and other manufacturing categories are imported.

Agricultural Production

The structure of Zimbabwe's two distinct farming systems is shown in Table 4.6

- LSC farm production is highly diversified, with most crops contributing between 3 and 5 percent of total LSC production (tobacco is the sole exception). As a percentage of total LSC crop area, maize is grown on 30 percent, horticulture on 24 percent, cotton on 12 percent, tobacco on 11 percent, wheat on 8 percent, and sugarcane on 6 percent. LSC production includes high-value crops such as tobacco, which represents 51 percent of total LSC farm output, and intensive use of capital and material inputs, representing 34 and 42 percent of output value, respectively. The major export crops are tobacco, the ouput of which is nearly 92 percent exported; coffee, 73 percent exported; tea, 53 percent exported; and cotton, 43 percent exported (Table 4.5).
- Smallholder, mostly communal, farms are characterized by labor-intensive production (52 percent of output value) and low use of material inputs (18 percent). Maize is the dominant crop, accounting for 27 percent of production and 45 percent of cropped area. Livestock, especially cattle used for animal traction, contributes 35 percent of smallholder output. Smallholder grain production is significantly oriented to home-consumption. Although SH farms account for 63 percent of total maize production, they contribute only 40 percent of the marketed supply; in

Table 4.5 The economic structure of Zimbabwe, 1991

	Component (percentage)				
				Share	
Sector	Gross domestic product	Exports	Imports	Exports	Imports
Maize	1.54	1.04		22.27	
Wheat	0.44		0.21		11.80
Other grains	0.26		0.14		30.34
Horticulture	0.64	0.23	0.06	7.24	2.09
Coffee	0.28	1.18		72.91	
Tea	0.21	0.65		52.87	
Groundnuts	0.30	0.13		28.74	
Cotton	0.98	2.35		43.31	
Sugar	0.63	1.45		38.96	
Tobacco	6.60	34.52	0.19	91.70	0.58
Other crops	0.71				
Cattle	1.37				
Other livestock	1.01	0.35		4.51	
Fisheries	0.08				
Forestry	0.25				
Mining	4.51	12.58	1.25	44.06	4.73
Grain milling	0.57				
Other food processing	6.87	2.52	1.97	4.75	4.05
Textiles	2.99	1.71	3.69	6.70	14.13
Other light manufacturing	5.96	2.05	5.29	4.71	12.14
Fertilizer	0.49	0.13	4.02	1.96	40.49
Other manufacturing	10.28	16.53	77.61	18.61	49.85
Electricity and water	2.66				
Construction	3.09				
Trade and transport	16.73				
Public services	14.06				
Private services	16.53	22.59	5.60	23.98	6.33
Total agriculture	15.27	41.90	0.60		
Total industry	37.41	35.52	93.80		
Total manufacturing	27.16	22.94	92.58		
Total services	47.32	22.59	5.60		

Sources: Calculated by authors from the Zimbabwe micro-SAM.

the same way, other grains produced by SH farms account for only 18 percent of marketed supply. Cotton is an important export crop for SH households. The conditions for growing cotton—a drought-tolerant and labor-intensive crop—make it attractive for communal farms (World Bank 1991, 199). While cotton accounts for 15 percent of SH production, its contribution to marketed supply is more than half—52 percent (Table 4.6), and close to half of total cotton production is exported—45 percent (Table 4.5).

Significant linkages in production exist between agriculture and the manufacturing sector. More than half of total intermediate inputs used in agricultural production come from manufacturing (55 percent), while agricultural products account for 30 percent

Table 4.6 The structure of agricultural production

	Agricultural production (percentage)					
	Total production		Cropped land use		Share of marketed production	
Sector	LSC	SH	LSC	SH	LSC	SH
Maize	4	27	30	45	60	40
Wheat	3	neglible	8	neglible	100	
Other grains	0	6	2	28	82	18
Horticulture	3	6	24	5	95	5
Coffee	2	neglible	1	neglible	100	
Tea	2		1		100	
Groundnuts	0	6	1	5	61	39
Cotton	3	15	12	7	48	52
Sugarcane	5		6		100	
Tobacco	51	neglible	11	neglible	100	
Other crops	5	3	3	10	86	14
Cattle	9	26			64	36
Other livestock	10	9			99	1
Fisheries	1				100	
Forestry	1	2			99	1
Totals						
Value (millions Z$)	5,074	1,312				
Area (thousand hectares)			501	3,164		
Production technology (percent)						
Intermediate input	42	18				
Labor	15	52				
Capital	34	20				
Land	9	10				

Source: Calculated by authors from the 1991 Zimbabwe micro-SAM.

Notes: SH indicates smallholder production; LSC, large-scale commercial production. Negligible indicates less than 1 percent of total SH production.

of total intermediate inputs used in manufacturing (computed from the micro-SAM, Appendix Table B.1).

Household Incomes

The SAM distinguishes among five household groups. The selection of three rural household groups is suggested by the social and economic characteristics of the two farming systems and by the way the ICES data set is organized. The two urban household groups distinguished in the SAM reflect the difference in the source and level of income of urban dwellers.

The five household groups differ greatly in income level. Per capita income in each group is calculated from the micro-SAM household income and group population estimates. The two poorest are the LSC farm-labor and SH farm households with per capita incomes of Z$257 and Z$312, respectively. These estimates, which include the value of production for home-consumption, are slightly above the rural poverty line used in the World Bank poverty assessment (World Bank 1995b). Urban low-income households have a per capita income of Z$1,267. The two wealthiest groups are the LSC and urban high-income households with Z$11, 951 and Z$12,083 per capita income, respectively.

The structure of income for each household group is derived from the Zimbabwe micro-SAM (Appendix Table B.1). The two poorest household groups mainly derive their income from (formal and informal) wages and transfers from other households and the government. Smallholder households, for example, draw as much as 14 percent of their income from urban household transfers and 26 percent from the government. Workers in LSC farms are an isolated group, and their income is derived entirely from wages. Earnings of urban low-income households come mainly from wages (30 percent) and informal activities (61 percent). The LSC high-income household group derives most of its income from nonlabor farm earnings (24 percent) and investment in agrobusiness activities (60 percent). In urban areas, the most important source of

Table 4.7 Household expenditures, by household groups

	Share of expenditure (percentage)				
Sector	LSC owner/ managers	LSC-workers	Small-holders	Urban high-income earners	Urban low-income earners
Maize		13.1	3.6		8.5
Wheat	n.a.				
Other grains	0.2	2.3	0.6	0.2	
Horticulture	0.6	6.5	0.7	1.2	4.3
Coffee					
Tea					
Groundnuts					
Cotton					
Sugar					
Tobacco					
Other crops	0.0	3.1	1.2	0.0	2.2
Cattle	2.3	2.0	2.4	0.0	0.0
Other livestock	2.2	8.0	4.7	0.0	5.7
Fisheries	0.3	0.6	0.6	0.3	0.5
Forestry	0.1	0.0	1.2	0.2	0.0
Mining					
Grain milling	4.2	12.0	5.8	1.9	8.6
Other food processing	20.3	11.5	18.3	21.0	17.7
Textiles	5.6	3.1	3.6	5.6	3.4
Other light manufacturing	17.6	24.3	26.3	15.3	23.3
Fertilizers	0.0	0.0	0.0	0.5	0.0
Other manufacturing	15.0	5.0	7.6	21.8	8.8
Electricity and water	1.6	0.8	1.0	4.5	3.4
Construction					
Trade and transport	7.5	3.1	5.7	6.6	3.3
Public services	3.0	3.6	8.0	1.8	2.3
Private services	19.2	1.2	8.7	18.9	7.9
Total food	30.3	59.0	37.9	24.8	47.5
Light manufacturing	23.2	27.3	29.9	20.8	26.7
Services	29.7	7.9	22.4	27.3	13.5
Savings rate	15.7	1.9	3.8	18.5	8.5
Income tax rate	7.4		1.1	10.0	4.3

Source: Calculated by authors from the 1991 Zimbabwe micro-SAM.
Note: Home consumption is not included in smallholder data.

income for the high-income household group is wages (73 percent) followed by capital earnings (37 percent).

Household Expenditures

The various household groups also differ significantly in their consumption patterns. The two lowest income household groups spend between 38 and 59 percent of their consumption expenditures on food, between 27 and 30 percent on light manufacturing products, and less than 8 percent on private services. Higher-income households spend much less on food, with a larger share on processed food items; they spend between 20 and 23 percent on manufactured products, and close to 20 percent on private services (Table 4.7).

SAM Multiplier Analysis

Analytical Framework

Assuming some accounts are exogenous—in this case government, capital, and ROW accounts—the algebraic SAM can be transformed into a multisectoral model of the economy in which the interlinkages among sectoral production, household incomes and expenditures, and macroeconomic balances are systematically taken into account. There are 78 endogenous accounts in the Zimbabwe SAM, including 27 commodities, 36 activities, 9 factors of production (2 agricultural land, 3 capital, and 4 labor categories), 1 enterprise account, and 5 household groups (Table 4.4).

Analytically, the total income (row sum) in each endogenous account is equal to the sum of products of the expenditure coefficient and corresponding income plus the total exogenous income from the government, capital, and ROW accounts; that is,

$$Y = A_n Y + X, \quad (1)$$

where Y is a column vector of total incomes from the 78 endogenous accounts (78x1), X is a column vector of total income from exogenous accounts (78x1), and A_n is the expenditure coefficient matrix pertaining to the endogenous accounts (Appendix Table C.1).

Solving for Y in equation (1) yields:

$$Y = (I - A_n)^{-1}X = M_a X, \quad (2)$$

where M_a is the SAM multiplier matrix (Appendix Table D.1). Equation (2) can be used to calculate the endogenous incomes associated with any constellation of total exogenous incomes, given M_a. Also, the effects on Y arising from any given changes in X (such as an exogenous income injection in any production sector) can be derived from equation (2).

Each cell in the multiplier matrix can be interpreted to indicate the total (direct and indirect) income change in the row-account induced by an exogenous unit-income injection in the column-account. This interpretation is subject to the familiar limitations of conventional SAM-based analysis, including the assumption of purely demand-driven adjustments, absence of relative price and monetary effects, externally determined exports, and exogenous government and capital accounts. Because supplies of goods and services are assumed to be perfectly elastic, they expand readily in response to increases in demand at given (fixed) prices. The SAM model (multiplier analysis) thus leads to larger quantity (and income) responses to exogenous shocks in economies operating at or near full employment compared with the corresponding results from a price-endogenous CGE (computable general equilibrium) model.[28]

[28]Adelman and Taylor (1991, 162) argue that general-equilibrium constraints often lead to excessive price changes and an understatement of quantity adjustments. Corresponding simulation results from SAM and CGE models might then provide the upper and lower bounds on the induced changes in real incomes.

Sectoral Linkage Effects

Based on the above discussion, the magnitude of the SAM multipliers reflects the strength of sectoral interdependencies in the economy. Each cell entry in the multiplier matrix indicates the (direct and indirect) total income effect of an exogenous unit-income increase in the column account on the corresponding row account.

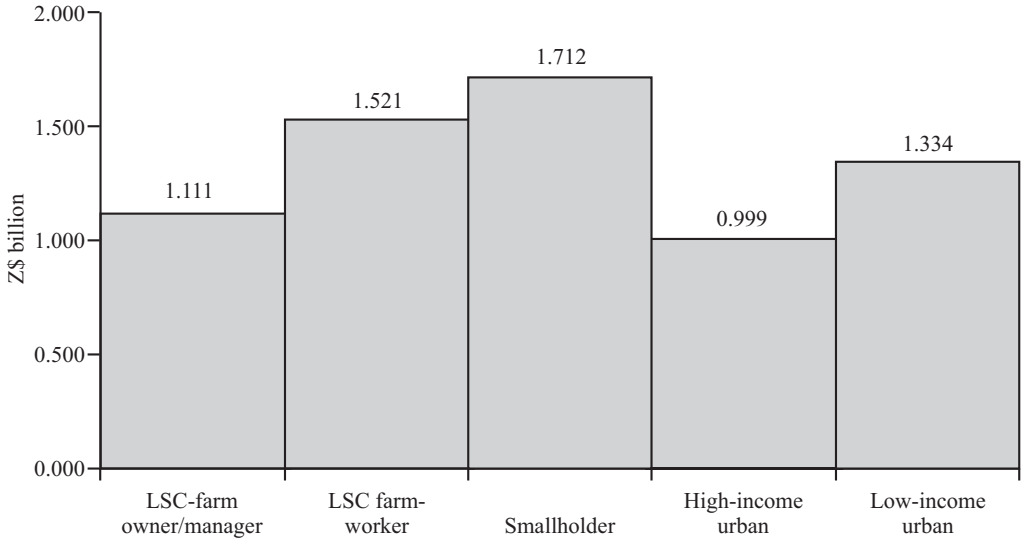
In agriculture, an increase in SH farm production generates, in most cases, larger increases in GDP than that of LSC farms. The change in GDP is calculated by adding the induced income changes in all the primary factors of production (sectoral value-added). In nonagriculture, the light manufacturing sectors (grain milling, other food processing, textiles, and other light manufacturing) yield higher GDP multipliers compared with the other manufacturing sectors but not with the agricultural production sectors.

The SAM model can also be applied to the analysis—again, focusing on the demand side—of the direct and indirect effects of exogenous income injections to different household groups. The calculated income multipliers for the five household groups distinguished in the Zimbabwe SAM are shown in Figure 4.2. Notably, the low-income household groups—SH, LSC farm-worker, and low-income urban households—have significantly larger multipliers compared with LSC owner/manager and high-income urban households. This finding suggests that the distribution of income benefits from agricultural growth is a potentially significant factor in the latter's influence on overall economic growth.

Income and Equity Effects of Alternative Agricultural Growth Paths

Various pathways of agricultural growth in Zimbabwe can be identified that are likely to have differing influences on overall income growth and distribution. Since independence in 1980, especially for the first five years, the government aimed to support SH farm production in large part as a pro-equity measure. Moreover, "a smallholder road to (agricultural) development holds promise as a profitable and feasible

Figure 4.2 Multiplier analysis results : GDP effects of a one billion Zimbabwe dollar increase in household income



Source : Authors' calculations from Appendix Table C.1.

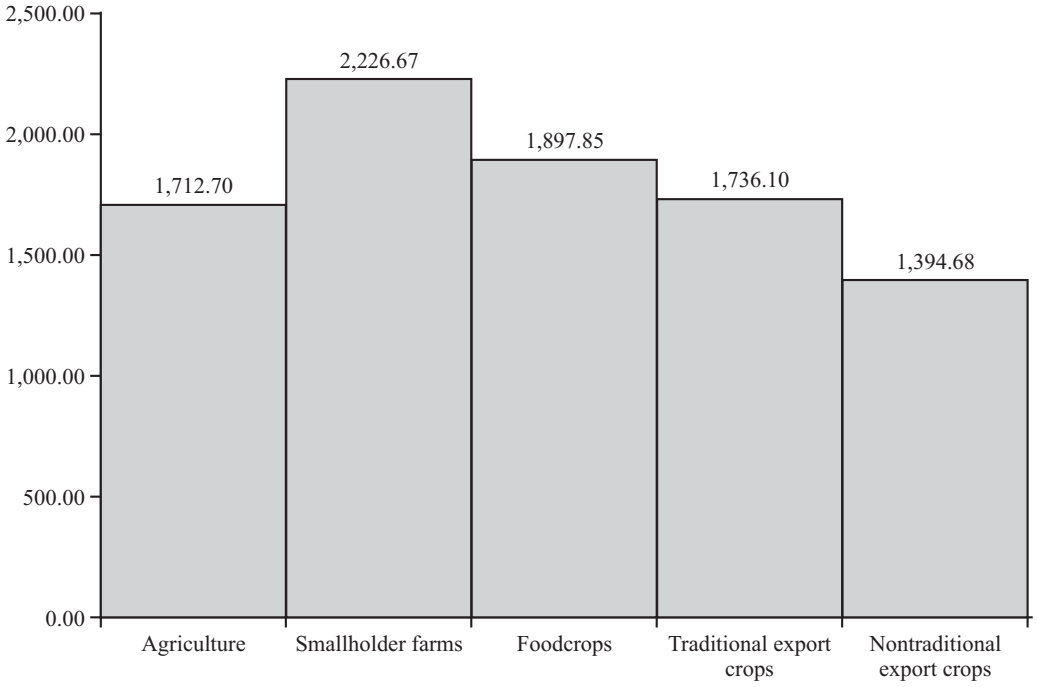
pathway for the twenty-first century," according to Eicher and Rukuni (1994, 406). They also argue for promoting several elements of a "new agricultural revolution" in Zimbabwe that include the expansion of food production (especially, maize), traditional exports (tobacco and cotton), and nontraditional exports (cut flowers and other horticultural products).

The comparative effects on GDP and household incomes arising from an exogenous income injection to the following groups of agricultural accounts are examined below:

1. *Agriculture,* consisting of all crop and livestock commodity accounts;
2. *Smallholder agriculture,* consisting of all smallholder activity accounts;
3. *Food crops,* consisting of the maize and other grain commodity accounts;
4. *Traditional export crops,* consisting of the tobacco and cotton commodity accounts; and
5. *Nontraditional export crops,* consisting of the horticulture commodity account.

Based on the multiplier matrix shown in Appendix Table D.1, the GDP effects generated from an exogenous income injection of Z$1 billion along the five agricultural growth paths indicated above, are computed and shown in Figure 4.3. Each multiplier is a weighted average of the different multipliers for the various accounts constituting each group. The weights used are the account shares in the total final demand for commodities in the group or in the total value of production for activities in the group. Smallholder agriculture is found to have the largest GDP multiplier, at 2.23; on this basis, each Zimbabwe dollar of

Figure 4.3 Multiplier analysis results: GDP effects of alternative agricultural growth paths



Source : Calculated by authors from Appendix Table C.1.

additional value-added generated in SH farms (in 1991 prices) leads to an increase of Z$1.23 in income elsewhere in the economy. Food-crop production, in which the contribution of smallholders is significantly higher than that of LSC farms, has the next largest multiplier (1.90), which exceeds the "average" agricultural multiplier (1.71). Relatively lower GDP multipliers characterize both traditional and nontraditional export crop production, in which LSC farms predominate.

It is of some policy interest to compare these multipliers with those associated with an exogenous unit-income injection to the activity account of other light manufacturing, which is a labor-intensive sector and represents a potentially significant source of needed employment generation in Zimbabwe. The GDP multiplier for the latter sector is calculated to be 1.44, remarkably lower than any of the agricultural multipliers shown in Figure 4.3, except for nontraditional exports. Evidently, the demand stimulus generated from four of the agricultural growth paths exceeds that from the expansion of labor-intensive manufacturing. This finding lends support to the hypothesis of strong macrolinkages of rising agricultural incomes, especially from SH production, favored by advocates of agriculture-based development.

The calculated multiplier matrix also provides information on the relative strength of sectoral growth linkages to household incomes. Table 4.8 indicates the additional incomes generated for the five household groups from the same stimulus described above. A general agricultural income expansion is seen to benefit LSC owner/manager households more than SH households in terms of both absolute and proportionate income gains. LSC farmworker households, whose base total income is much lower compared with the two other rural household groups, receive the least absolute—albeit the largest proportionate—income increment. Among urban households, larger income gains accrue to the high-income group, perhaps reflecting a heavy orientation of LSC household expenditures toward the more capital- and

Table 4.8 GDP and household income effects of a one billion Zimbabwe dollar increase in exogenous income along alternative agricultural growth paths

	Agricultural growth paths (million Zimbabwe dollars)				
GDP and household groups	Agriculture	Smallholder farms	Food crops	Traditional export crops	Nontraditional export crops
Gross domestic product	1,712.7	2,226.7	1,897.9	1,736.1	1,394.5
	(6.5)	(8.5)	(7.2)	(6.6)	(5.3)
Smallholders	123.5	658.9	265.0	99.2	74.3
	(6.8)	(36.0)	(14.5)	(5.4)	(4.1)
LSC owner/managers	675.7	401.4	666.8	715.2	602.9
	(7.3)	(4.3)	(7.2)	(7.7)	(6.5)
LSC farm-workers	17.9	5.9	19.4	17.3	19.1
	(17.9)	(5.9)	(19.4)	(17.4)	(19.1)
Urban high-income earners	608.3	523.1	575.1	639.2	481.5
	(4.9)	(4.2)	(4.6)	(5.1)	(3.9)
Urban low-income earners	157.6	534.8	248.2	136.6	110.3
	(6.1)	(20.6)	(9.5)	(5.2)	(4.2)

Source: Calculated by authors from the 1991 Zimbabwe micro-SAM multiplier matrix (Appendix D).

Notes: Data in parentheses are percentages of base household incomes. LSC indicates larger-scale commercial.

skilled labor-intensive products of urban industry.

The smallholder road to agricultural development understandably benefits SH households the most. It also greatly benefits low-income urban households, related presumably to the more labor-intensive structure of SH household expenditures, but leads to smaller income gains for the three other household groups. It would appear that the outcome for LSC farms significantly affects the fortunes not only of the two LSC household groups but also of urban high-income households generally. Agricultural growth emphasizing food crop production likewise favors SH households and low-income urban households. The patterns of income gains for the five household groups arising from the expansion of traditional and nontraditional export crops do not differ significantly. Relative to the effects of general agricultural growth, an emphasis on export crop production leads to larger income benefits for the two LSC household groups.

These results of conventional multiplier analysis bear out the expectation of a stronger demand stimulus generated by rising agricultural incomes from the less affluent farm households. It is also evident that greater participation of smallholders in export crop production—which can be promoted, for example, through land redistribution—would enhance the overall income and equity effects of an export-led agricultural growth in Zimbabwe.

The Zimbabwe SAM analysis is a first step in identifying the strong linkages, first between agriculture and the economy, and second between the SH production and GDP. This analysis suggests that any policy reform must include instruments that target agriculture and the SH sector to achieve both growth and equity. In the next step—the CGE analysis—simulations of macroeconomic, trade, and agricultural policy reforms include policy instruments that target these sectors to take advantage of these strong linkages.

CHAPTER 5

A Computable General Equilibrium Model for Zimbabwe

Chapter 3 uses historical analysis to examine the policy developments in Zimbabwe since independence and how they may have influenced the observed pace and pattern of the country's economic growth. While much can be gained from merely observing the implemented policies and actual economic performance, such analysis does not establish causal relationships between particular policy instruments and outcomes; it cannot control the many determinants of the endogenous variables relating to economic growth and equity, as exemplified by the disruption of agricultural production and trade in Zimbabwe through the severe droughts of 1992 and 1995. Economic modeling can overcome this by allowing analysis of the effects of specific policies on income growth and distribution, either in isolation, or in combination with other policies.

The CGE model for Zimbabwe described in this chapter (the ZimCGE model for short) is intended to provide a policy simulation laboratory in which exogenous changes in some aspects of the policy environment can be analyzed for their economywide effects, particularly on the real incomes of different household groups. Some of its distinctive features—representing a significant departure from earlier work—are the explicit focus on agriculture, special attention to the distribution of rural and urban household incomes, and a detailed specification of factor markets.[29] Specific aspects of economic policy existing in the pre-reform benchmark year (1991) are also taken into account in the base model, such as the administered setting of the foreign exchange rate, quantitative import restrictions, and government-determined producer price of the staple crop (maize).

The ZimCGE model distinguishes among 27 commodities: 13 agricultural (maize, wheat, other grains, horticulture, coffee, tea, groundnuts, cotton, sugar, tobacco, other crops, cattle, and other livestock), 3 other primary-producing (forestry, fisheries, and mining), 6 manufacturing (grain milling, other food processing, textiles, other light manufacturing, fertilizer, and other manufacturing), and 5 tertiary (electricity, construction, commerce and transport, private services, and public services). Households are classified into 3 rural (LSC farm owner/manager, LSC farm-worker, and smallholder) and 2 urban (high-income and low-income)

[29]To date, a highly aggregative CGE model for Zimbabwe based on a 1985 SAM has been used to analyze the variability of national income in the 1980s (Davies, Rattso, and Torvik 1994) and the short-run effects of trade policy reform in the early 1990s, among other applications (Davies, Rattso, and Torvik 1998). It has no household disaggregation and distinguishes only five production sectors, where small-scale agriculture is one sector and commercial farming is a part of the export sector.

groupings. The model also differentiates between smallholder (SH) and large-scale commercial (LSC) production of 9 primary products and between public and private services. These are the same classifications used in the Zimbabwe SAM discussed in the preceding chapter. Indeed, the ZimCGE model is built around the SAM structure and makes use of the numerical SAM for 1991 as its database. The latter represents the initial conditions that are influenced by policy scenarios postulated in the model simulations.

This chapter describes the major features of the ZimCGE model, presents the model equations, and discusses model parameterization. Using the base model, reflecting pre-reform conditions in 1991, the sectoral bias of trade and exchange rate policies in Zimbabwe is quantitatively examined, focusing on the agricultural terms of trade.

ZimCGE Model Features

Markets for goods, factors, and foreign exchange are assumed to respond to changing demand and supply conditions, which are in turn affected by government policies, the external environment, and other exogenous influences. The model is "Walrasian" in that it determines only relative prices and other endogenous variables in the real sphere of the economy. Changes in all prices in the model are relative to a fixed "numéraire," in this case the producer price index of nontradables (that is, domestic output for domestic use).[30] Hence the exchange rate variable shows the real exchange rate—the price of tradable, relative to nontradable goods. Notably, the exchange rate represents the relative price of tradable goods vis-à-vis nontradables (in units of domestic currency per unit of foreign currency).

Activities and Commodities

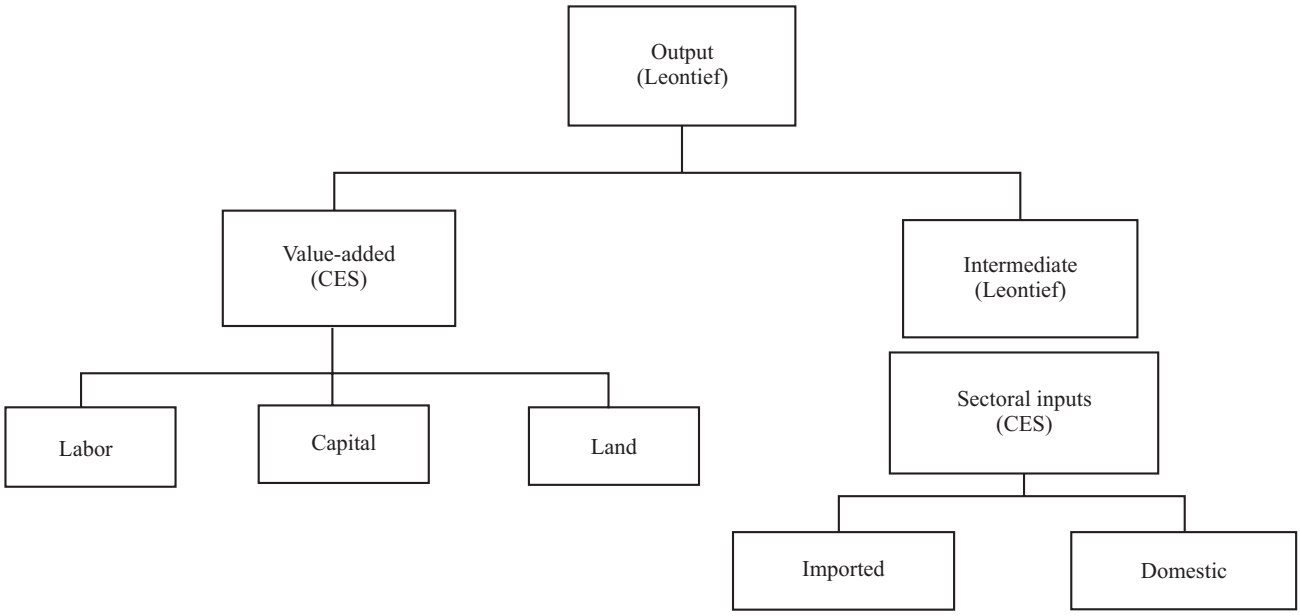
As described earlier, Zimbabwe's agricultural economy is extremely dualistic, warranting a distinction between the modern, LSC farm sector and the traditional—mostly communal—SH farm sector (Muir 1994). These two farm sectors differ widely in land quality, production technology, infrastructure development, level of rainfall, crops planted, and household income. Consistent with the distinction made in the benchmark SAM between activities and commodities (see Chapter 4), the ZimCGE model differentiates between SH and LSC production of the following commodities: maize, other grains, horticulture, groundnuts, cotton, other crops, cattle, other livestock, and forestry. Smallholder farms are invariably more labor-intensive, and in crop production use less fertilizer and other agricultural chemicals, than LSC farms. Outside agriculture, the commodity disaggregation is identical to the activity disaggregation. Altogether there are 36 production activities in the SAM and in the model, 9 more than the number of commodities.

The production technology is represented by a set of nested constant-elasticity-of-substitution (CES), value-added functions and fixed (Leontief) intermediate input coefficients (see Figure 5.1). Imperfect substitutability is assumed between SH and LSC farm products of the same commodity. Domestic prices of commodities are flexible, varying to clear markets in a competitive setting where individual suppliers and demanders are price-takers (Figure 5.2). The important exception is maize, for which the producer price in the base model, reflecting pre-reform conditions, is exogenously determined by the Grain Marketing Board (Figure 5.3).

Following Armington (1969), the model assumes imperfect substitutability, in each

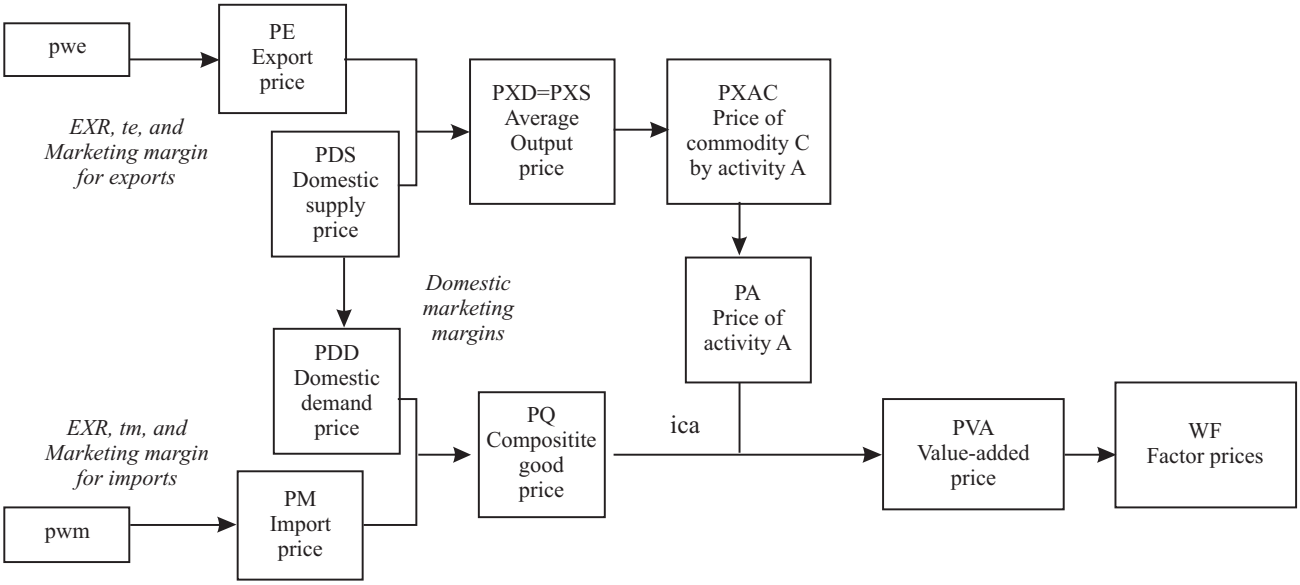
[30]In a general equilibrium model, one of the prices is set to equal a constant, against which all other prices are relatively measured. Such a price is called the numeraire.

Figure 5.1 Nested production functions in the ZimCGE model



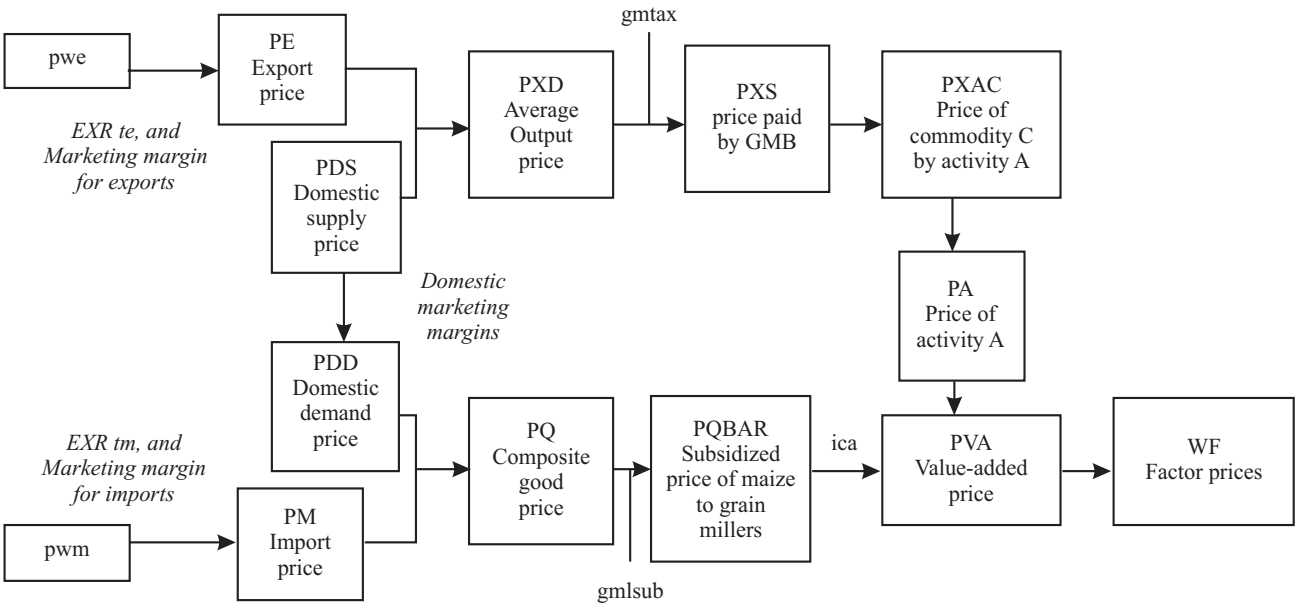
Source : Devised by authors based on the ZIMCGE model.

Figure 5.2 Price transmission mechanism in the ZimCGE model



Source : Devised by authors based on the ZIMCGE model.

Figure 5.3 Price transmission of maize with maize tax and grainmilling subsidies



Source : Devised by authors based on the ZIMCGE model.

sector, between the domestic product and imports. What is demanded is the composite consumption good, which is a CES aggregation of imports and domestically produced goods. In light of the earlier policy discussion (Chapter 3), it is assumed in the base model that the foreign exchange rate is fixed and that quantitative import restrictions, which characterized Zimbabwe's trade regime in 1991, lead to a difference between desired imports and actual imports. The domestic price of sectoral imports is unaffected by supply scarcity under the assumption of "fixprice" rationing (Dervis, de Melo, and Robinson 1982, 293), which is reasonable for imports of producer goods (comprising the bulk of Zimbabwe's imports in 1991) and other imported products not being resold in the domestic market.

For export commodities, the allocation of domestic output between exports and domestic sales is determined on the assumption that domestic producers maximize profits subject to imperfect transformability between these two alternatives. The composite production good is a constant-elasticity-of-transformation (CET) aggregation of sectoral exports and domestically consumed products. In the case of maize, in view of the Grain Marketing Board's (GMB's) role in the grain market, the base model assumes perfect substitutability between domestic sales and exports.

These assumptions of imperfect substitutability and transformability grant the domestic price system some degree of autonomy from international prices and serve to dampen export and import responses to changes in the producer environment. Such treatment of imports and exports provides a continuum of tradability and allows two-way trade at the sectoral level—reflecting the empirical reality in Zimbabwe.

Factors of Production

Labor. There are four labor categories in the ZimCGE model—LSC-farm unskilled workers, formal unskilled workers, informal unskilled workers, and skilled workers. For historical and institutional reasons, the unskilled labor market in the LSC-farm sector is isolated.[31] Unskilled workers in LSC farms are assumed to stay within this sector, and are allocated among the different production activities based on their marginal value-added in those activities. The average wage rate for LSC-farm workers is determined through supply-demand equations that are independent of labor-market conditions elsewhere in the Zimbabwean economy.

Smallholder farm and informal nonagricultural workers are linked to the formal, nonagricultural, unskilled labor market. Minimum wage requirements and strict antidismissal rules artificially raise the real wages for unskilled formal workers in the nonagricultural sectors (World Bank 1995b), resulting in excess labor supply. The scarcity of formal-sector jobs forces many unskilled laborers to work in the lower-paying informal nonfarm sector and smallholder farms. Given the exogenous wage rate, formal unskilled-labor employment in the nonagricultural sector is demand-determined. Subtracting this category from the fixed total supply of unskilled workers (net of those working in LSC farms) yields the supply of unskilled workers for SH farm and informal, nonagricultural production. Demand for the latter category of workers is determined by their marginal value-added, and the market-clearing wage rate is inevitably lower than the exogenously determined formal-sector wage rate.

Skilled workers, including those occupying management positions in LSC farms and in the nonagricultural sectors, are relatively scarce in Zimbabwe (Davies, Rattso, and Torvik 1994,157). They are assumed in the model to be fully employed, and mobile across sectors. However, there are intersectoral differences in skilled-labor wage rates, the average rate determined by equating the fixed supply with total demand.

Land. Land appears as a factor of production only in the crop sectors. Market segmentation of land between SH and LSC farms is assumed in the model. Within each farming system, land is allocated among the various crop sectors according to its marginal value-added in those sectors.

Slightly less than 5,000 LSC farms occupy 11.2 million hectares (roughly one-third) of Zimbabwe's agricultural land. On the other hand, there are over a million communal and other SH farms on 21.3 million hectares. The average size of LSC farms is 2,300 hectares— more than a 100 times that of communal farms. A majority (57 percent) of LSC farms are in the high-potential areas (Regions I-III); however, only a small portion (about 31 percent of arable land) is actually cultivated. LSC cropland area amounted to about 501,000 hectares in 1991.[32] Within the cultivated area, LSC-farm production shows high crop yields, and is known to be economically efficient (based on domestic resource cost analysis); as pointed out by Masters (1994, 43), "breaking up established LSC cropping patterns is unlikely to increase productivity." However, overall land use in LSC farms is inefficient because high-potential

[31]According to Masters (1994, 9-10), "LSC farm workers enjoy almost no mobility… and their wages bear little relation to wages elsewhere; 'this isolation' is caused in part by their history of state-sponsored recruitment from very low-income areas in neighboring Malawi and Mozambique" and in part to "their relative lack of education."

[32]This is explained analytically in Masters (1994, 40–41) in terms of the negative relationship between yield per hectare planted and cropping intensity (ratio of planted to total land in LSC farms).

agricultural land—one of the country's scarce resources—is heavily underused. It has been estimated that about 1,114 thousand hectares of under-utilized LSC farmland could have been used for crop cultivation in 1991 (World Bank 1995b). Conceivably, the under-utilized (uncultivated) land in large-scale farms could be transferred to the SH sector without changing the cropped area used by large-scale farms (if farm subdivision were allowed).

The SH sector has a much higher population density, utilizes its arable land more fully, and has lower crop yields than LSC farms. Over 70 percent of communal farms are located in the less favorably endowed Natural Regions IV and V. Total cropped area of SH farms in 1991 was about 3,164 thousand hectares. Based on the existing technologies, communal farms have been found to be economically efficient (Masters 1994).

Capital. Capital markets are segmented into three categories: SH agriculture, LSC agriculture, and the nonagricultural sector. Given the medium-term perspective of this study, it is assumed that capital is mobile across sectors within each capital market category.

Households

The disaggregation of households closely follows the factor disaggregation—that is, the household groups are largely determined by the functional factor distribution. The model differentiates between owner/manager and farm-laborer households in the LSC sector, in view of marked differences in their average incomes. Smallholder households comprise the third rural household group. In urban areas, distinction is made between high-income (nonagricultural capitalist and skilled worker) and low-income (informal and unskilled worker) households. The induced relative income changes in the five household groups provide the basis for assessing the equity impact of policy experiments in the CGE model.[33]

Consumption demand by households is determined by the linear expenditure system (LES), in which the marginal budget share is fixed and each commodity has a minimum consumption (subsistence) level. The model takes account of home consumption of the following SH farm products: maize, other grains, horticulture, groundnuts, cattle, other livestock, and forestry. Home-consumed goods are valued at producer prices, while marketed goods are valued at purchaser prices.

Marketing margins

The model structure gives explicit treatment of marketing margins—at differing rates for domestic, export, and imported commodities.

Marketing margins combine trade and transport costs. They represent the real costs associated with the distribution of products from their point of production or port of importation to the point of purchase. In agriculture, these costs are dominated by the high cost of transport related to poor roads, isolated areas, and limited transport equipment (Jayne et al. 1990). In manufacturing, environment poses high risk; unreliable delivery schedules and deficiencies in contract enforcement contribute heavily to marketing costs (Collier and Gunning 1999).

Marketing margins are introduced into the SAM and the CGE model using input-output coefficients pertaining to the

[33]The rural population accounts for about 88 percent of the poor in Zimbabwe, 81 percent coming from the SH farm sector (World Bank 1995a, 27). The remaining rural poor are in LSC farm-worker households (about 7 percent). The poverty share of the urban population is 12 percent, much lower than its population share of 28 percent.

demand for trade and transport services needed to move goods from suppliers to the market. A single production activity provides the marketing services for imported, export, and domestically purchased commodities.

Closure Rules

These rules are defined by a set of constraints that need to be satisfied by the economic system but are not considered in the decisions of micro-agents (Robinson 1989, 907–908). Aside from the supply-demand balances in the product and factor markets, three macroeconomic balances are specified in the ZimCGE model: (i) the fiscal balance, showing that government savings is the difference between government revenue and spending;[34] (ii) the external balance, equating the supply and demand for foreign exchange; and (iii) the specification that total investment is determined by total saving, which corresponds to the neoclassical macroeconomic closure.

Model Equations

The ZimCGE model equations form a fully determined, nonlinear system, which first specifies the price equations, then equations relating to various SAM components, including sectoral supply and trade and the income and expenditures of households, enterprises, and government. Finally, there are a number of "system constraints" that need to be satisfied. They include market clearing conditions and macroclosure that specify the equilibrating variables in the system.

Table 5.1 gives the definition of symbols used for the variables, parameters, and indices in the ZimCGE model. Some notational conventions are followed consistently. Variables, whether endogenous or exogenous, are written in upper case, while parameters are in lower case. A bar over a variable indicates that the it is exogenously fixed. Indices appear as lower case subscripts, and specific entries from a set are labeled in full.

Price Equations

Table 5.2 contains the price equations. In equations (1) and (2), domestic prices of imports and exports are expressed in terms of the exchange rate and their foreign prices, as well as the trade tax and marketing margin rates. Notably, the import tax rate in equation (1) includes both the tariff and import surcharge. Based on the "small-country" assumption, world price (in foreign currency) of imports and exports are exogenous.

In equation (3), the composite product price paid by domestic demanders (households, producers, and government) is expressed as a weighted average of the import price (in domestic currency) and the price of domestic output sold domestically. The weights are the share of domestic and imported quantities in total supply. The GMB subsidy to grain millers associated with the distribution of maize, is included in the subsidized price of the commodity maize, shown in equation (4), when used as an input by the grain milling activity. The subsidy is expressed as a share of the consumption price, which is determined in equation (3). The GMB's control of the maize market is modeled by specifying two prices for the composite price of maize (Figure 5.3). The supply price, which is the price the GMB pays maize producers, differs from the demand price, which corresponds to the average output price of domestic product and exports shown in equations (5) and (6). When the supply price is

[34]Government capital expenditure is assumed to be part of government savings, causing an overstatement of the fiscal balance (or understatement of the fiscal deficit) relative to instances where capital expenditure is included under government spending.

Table 5.1 Definition of variables, parameters, and indices in the ZimCGE model

Variables	Definition
Price variables	
$\overline{EXR}$	Exchange rate
PM_c	Price of imports
$\overline{PWM}_c$	World price of imports
PE_c	Price of exports
$\overline{PWE}_c$	World price of exports
PQ_c	Price of composite good c
$PQBAR_{cmz,agrmil}$	Subsidized price of commodity maize as intermediate input to activity grain milling
$GMLSUB_{cmz,agrmil}$	Rate of price subsidy for commodity maize purchased by the activity grain milling
PXD_c	Average selling price of commodity c
PXS_c	Average commodity price received by domestic producers
$GRNTAX_{cmz}$	Tax rate on maize
PDD_c	Demand price for commodity c produced & sold domestically
PDS_c	Supply price for commodity c produced & sold domestically
$PXAC_{a,c}$	Price of commodity c from activity a
PA_a	Output price of activity a
PVA_a	Value added price
WF_f	Average factor price
CPI	Consumer price index
$\overline{DPI}$	Index for domestic sales producer prices
Quantity variables	
QA_a	Domestic activity output
$QF_{f,a}$	Demand for factor f from activity a
$QINT_C$	Intermediate demand for c
$QXAC_{a,c}$	Output of commodity c from activity a
$QXACM_{a,c}$	Marketed output of commodity c from activity a
$\overline{QXACF_{a,c}}$	Onfarm consumption of output of commodity c from activity a
QX_c	Commodity output
QD_c	Domestic sales
QE_c	Exports
QQ_c	Composite goods supply
QM_c	Imports
QT_c	Trade and transport demand for commodity c

(continued)

Table 5.1—Continued

Variables	Definition
Income and expenditure variables	
YF_f	Factor income
$\overline{QFS_f}$	Factor supply
$YIF_{id,f}$	Income of institution i from factor f
YI_{id}	Income of (domestic nongovernmental) institution i
$TRII_{id,idp}$	Transfers to domestic institutions id from domestic institutions idp
$\overline{DSHTAX}$	Change in domestic institution tax share
$\overline{DTAXADJ}$	Direct tax scaling factor
$\overline{SADJ}$	Savings adjustment variable for domestic institutions
EH_h	Household consumption expenditure
$QH_{c,h}$	Household consumption demand
YG	Government income
EG	Government expenditure
QG_c	Government consumption
$\overline{GADJ}$	Government demand scaling factor
GSAV	Government savings
$QINV_c$	Fixed investment demand
$\overline{IADJ}$	Investment scaling factor (for fixed capital formation)
INVEST	Total investment value
$\overline{QDST_c}$	Change in inventory stock
SAVINGS	Total savings value
FSAV	Foreign savings
Parameters	
tm_c	Import tax rates on imports of c
$icm_{c,cp}$	Trade input of c per unit of commodity cp imported
$ice_{c,cp}$	Trade input of c per unit of commodity cp exported
$icd_{c,cp}$	Trade input of c per unit of commodity cp produced and sold domestically
α_c^{ac}	shift parameter for domestic commodity aggregation function
$\delta_{a,c}^{ac}$	Share parameter for domestic commodity aggregation function
ρ_c^{ac}	Domestic commodity aggregation function exponent
$\theta_{a,c}^{a}$	Yield of commodity c per unit of activity a
$itaxa_a$	Indirect tax rates for activity a
$ica_{c,a}$	Intermediate input c per unit of activity a
$wfdist_{f,a}$	Factor market distortion
α_a^a	Shift parameter for CES activity production function
$\delta_{f,a}^{a}$	Share parameter for CES activity production function
ρ_a^a	CES activity production function exponent

(continued)

Table 5.1—Continued

Variables	Definition	
Parameters (continued)		
$cwts_c$	Consumer price index weights	
$dwts_c$	Domestic sales price index weights	
α_c^T	Shift parameter for CET function	
δ_c^T	Share parameter for CET function	
ρ_c^T	CET function exponent	
α_c^q	Shift parameter for Armington function	
δ_c^q	Share parameter for Armington function	
ρ_c^q	Armington function exponent	
$qmrat_c$	Import quantity rationing rate	
$ftax_f$	Tax per physical unit of factor f	
$shif_{i,f}$	Share of domestic institution i in income of factor f	
$tr_{i,aac}$	Transfers from institution or factor to institution i	
$shii_{i,ip}$	Share of institution i in post tax post saving income of institution ip	
$p01_i$	0 1 parameter (1 for institution with variable tax rate 0 for others)	
$shtax_i$	Direct tax rate for domestic institution i	
mps_i	Marginal propensity to save for domestic institution i	
$\gamma_{c,h}^h$	LES subsistence minima	
$\beta_{c,h}^h$	Marginal budget shares	
$qbarg_c$	Exogenous (unscaled) government demand	
$qbarinv_c$	Exogenous (unscaled) investment demand	
Indices		
a	Activities	
c	Commodities	
Subsets of c:	cm(c)	Commodities imported
	cmn(c)	Commodities not imported
	ce(c)	Commodities exported
	ce2(c)	Export sectors without CET function
	cen(c)	Commodities not exported
f	factors	
Subsets of f:	fac1(f)	All factors except informal unskilled workers and formal unskilled workers
	fac2(f)	Informal unskilled workers and formal unskilled workers
i	institutions	
Subsets of i	id(i)	Domestic nongovernmental institutions
	h(i)	Households

Source: Compiled by authors from the ZimCGE model.
Note: A "p" after an index indicates an alias for the corresponding index.

Table 5.2 Price equations

Equation	Number
$PM_{cm} = \overline{PWM_{cm}} \cdot (1 + tm_{cm}) \cdot \overline{EXR} + PQ_{ctdtp} \cdot icm_{ctdtp,cm}$	(1)
$PE_{ce} = \overline{PWE_{ce}} \cdot \overline{EXR} - PQ_{ctdtp} \cdot ice_{ctdtp,ce}$	(2)
$PQ_c \cdot QQ_c = PDD_c \cdot QD_c + PM_{cm} \cdot QM_{cm}$	(3)
$PQBAR_{cmz,agrmil} = PQ_{cmz} \cdot (1 - GMLSUB_{cmz,agrmil})$	(4)
$PXD_c \cdot QX_c = PDS_c \cdot QD_c + PE_{ce} \cdot QE_{ce}$	(5)
$PXS_{cmz} \cdot (1 + GRNTAX_{cmz}) = PXD_{cmz}$	(6)
$PDD_c = PDS_c + PQ_{ctdtp} \cdot icd_{ctdtp,c}$	(7)
$PA_a = \sum_c \theta_{a,c} \cdot PXAC_{a,c}$	(8)
$PVA_a = PA_a \cdot (1 - itaxa_a) - \sum_c ica_{c,a} \cdot PQ_c \cdot (1 - GMLSUB_{cmz,agrmil})$	(9)
$CPI = \sum_c cwts_c \cdot PQ_c$	(10)
$\overline{DPI} = \sum_c dwts_c \cdot PDS_c$	(11)

Source: Compiled by authors from the ZimCGE model.

lower (or higher) than the demand price, GMB is taxing (or subsidizing) maize producers. It is assumed that in the base model, the prices are inclusive of ad-valorem taxes and subsidies, which are set at 10 and 15 percent respectively.[35] In equation (7), the demand (or purchaser) price PDDC differs from its supply (or producer) price PDSC by the amount of the domestic marketing margin.

While equations (1) to (7) define prices of commodities, equations (8) to (10) pertain to prices of activities. Equation (8) gives the first-order condition of the output aggregation and defines a matrix of producer prices. The output price for an activity, PAa, in equation (9) is the sum of products of the price of the commodity C produced by activity A and its yield coefficient ($theta_{a,c}$). If an activity produces more than one commodity, the yield coefficient represents the share of each commodity in the total output of the producing activity.

Equation (10) expresses the sectoral price of value-added as the output price adjusted for indirect taxes, minus the unit cost

[35]These rates illustrate the maize grain and maize meal pricing structure recorded in Rubey (1993).

of intermediate inputs (based on fixed coefficients), which allow for the subsidized price of maize as an input to grain milling. Equation (11) shows the first-order conditions for profit maximization, which determine the price of factors. Factor market distortions are allowed, differentiated by sector. The parameter wfdistf,a indicates the degree to which the actual return for a factor in a given sector differs from the marginal value-added of that factor. Finally, equations (12) and (13) define, respectively, a consumer price index (CPI), used to evaluate the results of model simulations' aggregate household income in real terms (in Chapter 6), and a producer price index (DPI) for domestically purchased goods that serves as the numeraire price index in the model.

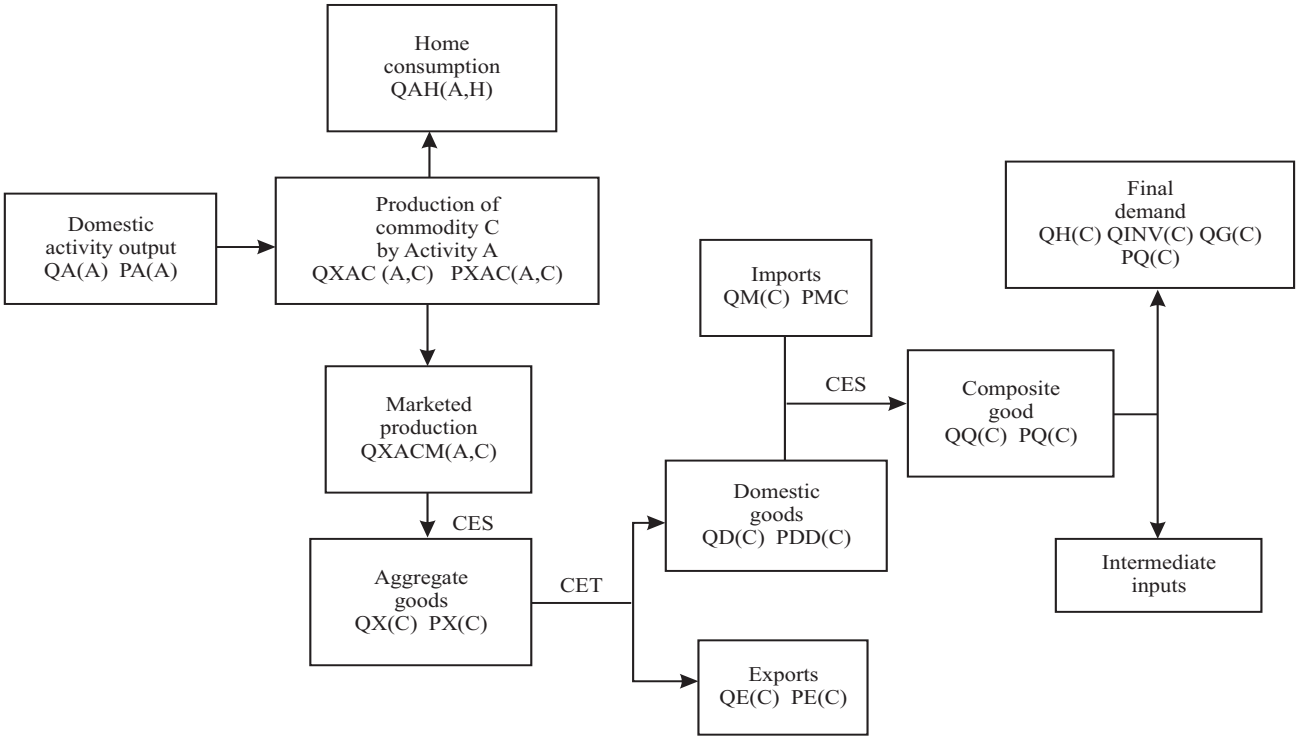
The associated price links in the ZimCGE model are summarized in Figures 5.2 and 5.3.

Quantity Equations

Table 5.3 presents the quantity equations of the model, mostly involving sectoral output supply and foreign trade. The production function is given in equation (14) as a CES function of the primary factors. Equation (15) shows the demand for intermediate inputs, which is a fixed-coefficient function of total real output. Equation (16) determines the "make matrix," which reflects the composition of commodities C produced by activity A. Equation (17) computes the marketed output of commodity C from activity A as the gross output of activity A net of home-consumption. In equation (18), the output aggregation, QX_c, is the composite of different activities that are imperfectly substitutable.

The allocation of total marketed output between domestic sales and exports is represented as a CET function. Export supply is determined by the first-order conditions

Figure 5.4 Flow of goods in the ZimCGE model



Source : Devised by authors based on the ZIMCGE model.

Table 5.3 Quality equations

Equation	Number
$QA_a = \alpha_a^a \cdot \left(\sum_f \delta_{f,a}^a \cdot QF_{f,a}^{-\rho_a^a} \right)^{-\frac{1}{\rho_a^a}}$	(12)
$WF_f \cdot wfdist_{f,a} = PVA_a \cdot (1 - vatax) \cdot \alpha_a^a \cdot \sum_{fp} \delta_{fp,a}^a \cdot QF_{fp,a}^{-\rho_a^a} \Big)^{-\frac{1}{\rho_a^a}-1} \cdot \delta_{f,a}^a \cdot QF_{f,a}^{-\rho_a^a-1}$	(13)
$QINT_c = \sum_a ica_{c,a} \cdot QA_a$	(14)
$QXAC_{a,c} = \theta_{a,c}^a \cdot QA_a$	(15)
$QXACM_{a,c} = QXAC_{a,c} - \overline{QXACF_{a,c}}$	(16)
$QX_c = \alpha_c^{ac} \cdot \sum_a \left(\delta_{a,c}^{ac} \cdot QXACM_{a,c}^{-\rho_c^{ac}} \right)^{-\frac{1}{\rho_c^{ac}}}$	(17)
$PXAC_{a,c} = PXS_c \cdot \alpha_c^{ac} \cdot \left(\sum_a \delta_{a,c}^{ac} \cdot QXACM^{-\rho_c^{ac}} \right)^{-\frac{1}{\rho_c^{ac}}-1} \cdot \delta_{a,c}^{ac} \cdot QXACM_{a,c}^{-\rho_c^{ac}-1}$	(18)
$QX_{ce} = \alpha_{ce}^T \cdot \left[\delta_{ce}^T \cdot QE_{ce}^{\rho_{ce}^T} + (1 - \delta_{ce}^T) \cdot QD_{ce}^{\rho_{ce}^T} \right]^{\frac{1}{\rho_{ce}^T}}$	(19)
$QX_{cne} = QD_{cne}$	(20)
$QX_{ce2} = QE_{ce2} + QD_{ce2}$	(21)
$QE_{ce} = QD_{ce} \cdot \left(\frac{PE_{ce}}{PDS_{ce}} \right) \cdot \left(\frac{1 - \delta_{ce}^T}{\delta_{ce}^T} \right)^{\frac{1}{\rho_{ce}^T - 1}}$	(22)
$QQ_{cm} = \alpha_{cm}^q \cdot \left[\delta_{cm}^q \cdot QM_{cm}^{\rho_{cm}^q} + (1 - \delta_{cm}^q) \cdot QD_{cm}^{-\rho_{cm}^q} \right]^{\frac{1}{\rho_{cm}^q}}$	(23)
$QQ_{cnm} = QD_{cnm}$	(24)
$QM_{cm} = QD_{cm} \cdot qmrat_{cm} \cdot \left(\frac{PDD_{cm}}{PM_{cm}} \right) \cdot \left(\frac{\delta_{cm}^q}{1 - \delta_{cm}^q} \right)^{\frac{1}{1+\rho_{cm}^q}}$	(25)
$QT_c = \sum_{cp} \left(icm_{c,cp} \cdot QM_{cp} + ice_{c,cp} \cdot QE_{cp} + icd_{c,cp} \cdot QD_{cp} \right)$	(26)

Source: Compiled by authors from the ZimCGE model.

shown in equation (22), and is a function of the export price relative to the price of domestic supply. In the case of maize, in which perfect substitutability is assumed between exports and domestic sales, exports are determined as a residual of domestic supply net of domestic sales.

The Armington assumption is used in equation (23) to model the choice between imports and domestic products. Import demand is determined in equation (25) by the first-order condition for cost minimization of the composite good. Under the pre-reform condition of direct import control, actual imports are lower than desired imports by $qmrat_{cm}$, the quantity rationing rate (ratio of actual to desired imports), which differs across sectors.

Equation (26) gives the demand for trade and transport services used in marketing imported, exported, and domestically purchased products. The marketing margin rate for each product type is multiplied by the composite consumption-good price for trade and transport to obtain the marketing margin per unit of product.

Figure 5.4 illustrates the flow of goods in the ZimCGE model.

Income and Expenditure Equations

Table 5.4 presents the income and expenditure equations for the different institutions—the five household groups, enterprises, and government, as well as the investment and saving relationships.

Factor incomes are expressed in equation (26) in terms of the average factor price, the quantity of the factor demanded in each sector, and the factor-price distribution parameter. Factor income is adjusted by a factor tax rate (per physical unit of the factor). While Zimbabwe has no existing factor tax, the factor tax rate in the model permits the introduction of a land tax in later policy scenarios involving land reform (see Chapter 6). In equation (27) factor incomes are distributed to the enterprise and household accounts after the amounts transferred to the rest of the world (ROW) are netted out. In equation (28), incomes of enterprises and households consist of factor payments and transfers from the government and ROW. Equation (29) defines transfers between nongovernment domestic institutions, which correspond to fixed shares of their total income. The marginal propensity to save and the tax rate for institutions are parameters calibrated on the basis of SAM entries. Both savings and tax rates are fixed but can be scaled up or down in model simulations by the variables SADJ and DTAXADJ (Chapter 6). They are set to equal one in the base model. The parameter p01 has a value of either zero or one; it effectively acts as a "switch" by subjecting institutions to a variable tax when it is "activated" (value 1).

In equation (30), the total consumption expenditure of each household group is the household income net of taxes, savings, and transfers to other institutions. It includes both consumption expenditure on marketed goods and home consumption. Household consumption of marketed goods is determined by a linear expenditure system (LES) function in equation (31). The marginal budget shares are obtained from average budget shares calculated from the SAM and income elasticities of demand (Teklu 1996) for each household group. The subsistence parameter is computed from the average budget shares and the "Frisch parameter," which measures the elasticity of the marginal utility of income (Dervis, de Melo, and Robinson 1982, 482–485).

Equations (32) to (35) define government income, expenditures, and savings. Government income is the sum of direct and indirect taxes (including import tariffs and factor taxes), plus transfers from the ROW (foreign grants). Fixed real government consumption is written in equation (34) and can be scaled up or down by the factor variable GADJ. Government savings, in equation (35), are the difference between total income and expenditures, representing the fiscal current budget balance.

Table 5.4 Income and expenditure equations

Equation	Number
$YF_f = \sum_a WF_f \cdot wfdist_{f,a} \cdot QF_{f,a} - CPI \cdot ftax_f \cdot \overline{QFS_f}$	(27)
$YIF_{id,f} = shif_{id,f} \cdot (YF_f - tr_{row,f} \cdot \overline{EXR})$	(28)
$YI_{id} = \sum_f YIF_{id,f} + \sum_{idp} TRII_{id,idp} + tr_{id,gov} + tr_{id,row} \cdot \overline{EXR}$	(29)
$TRII_{id,idp} = shii_{id,idp} \cdot [(1 - \overline{SADJ} \cdot mps_{idp}) \cdot (1 - \overline{DTAXADJ} \cdot shtax_{idp} - \overline{DSHTAX} \cdot p01_{idp}) \cdot YI_{idp} - tr_{row,idp} \cdot \overline{EXR}]$	(30)
$EH_h = (1 - \sum_i shii_{i,h}) \cdot [((1 - \overline{SADJ} \cdot mps_h) \cdot (1 - \overline{DTAXADJ} \cdot shtax_h - \overline{DSHTAX} \cdot p01_h) \cdot YI_h - tr_{row,h} \cdot \overline{EXR}]$	(31)
$PQ_c \cdot QH_{c,h} = PQ_c \cdot \gamma^h_{c,h} + \beta^h_{c,h} \cdot (EH_h - \sum_{a,cp} PXAC_{a,c} \cdot \overline{QXACF_{a,cp}} - \sum_{cp} PQ_{cp} \cdot \gamma^h_{c,h})$	(32)
$YG = \sum_i (\overline{DTAXADJ} \cdot shtax_i + \overline{DSHTAX} \cdot p01_i) \cdot YI_i + \sum_a itaxa_a \cdot PA_a \cdot QA_a + vatax \cdot \sum_a PVA_a \cdot QA_a + \sum_c tm_c \cdot QM_c \cdot \overline{PWM_c} \cdot \overline{EXR} + CPI \cdot \sum_f ftax_f \cdot \overline{QFS_f} + \sum_c GRNTAX_c \cdot PXS_c \cdot QX_c + tr_{gov,row} \cdot \overline{EXR}$	(33)
$EG = \sum_c PQ_c \cdot QG_c + \sum_{id} tr_{id,gov} + tr_{row,gov} \cdot \overline{EXR} + \sum_c \sum_a GMLSUB_{c,a} \cdot PQ_c \cdot ica_{c,a} \cdot QA_a$	(34)
$QG_c = \overline{GADJ} \cdot qbarg_c$	(35)
$GSAV = YG - EG$	(36)
$QINV_c = \overline{IADJ} \cdot qbarinv_c$	(37)
$INVEST = \sum_c PQ_c \cdot (QINV_c + QDST_c)$	(38)
$SAVINGS = \sum_i \overline{SADJ} \cdot mps_i \cdot (1 - \overline{DTAXADJ} \cdot shtax_i - \overline{DSHTAX} \cdot p01_i) \cdot YI_i + GSAV + FSAV \cdot \overline{EXR}$	(40)

Source: Compiled by authors from the ZimCGE model.

Equation (36) determines investment demand for fixed capital formation. It includes a scaling factor (IADJ), which allows aggregate investment to adjust to equal aggregate saving with unchanged sectoral investment expenditure shares. Total investment in equation (37) is the sum of sectoral fixed investment and change in inventory.

Total saving in equation (38) is the sum of government, private, and foreign savings. Private (household and enterprise) savings are determined by fixed saving rates.

Market Clearing Equations

Table 5.5 contains equations defining the system constraints that involve the clearing of markets for goods, factors, and foreign exchange. Equation (40) states that the sectoral supply of each composite commodity must equal demand, the equilibrating variable being the commodity price. Factors are mobile within specified sector groupings. In the case of unskilled formal labor, the average wage rate is exogenously determined, as shown in equations (41) and (42). Formal unskilled-labor employment in the nonagricultural sectors is demand-determined. It is subtracted from the fixed total supply of unskilled workers (net of those working in LSC farms) to yield the supply of unskilled workers for SH farm and informal nonagricultural production.

The current account is expressed in foreign currency in equation (43), which equates the country's earning and spending of foreign exchange. Foreign saving is equal to the current-account deficit. Two variables may serve the role of clearing the current-account balance—the foreign exchange rate (EXR) and foreign savings (FSAV). To reflect the rigidity of foreign exchange policies in place in 1991, the real exchange rate is fixed, leaving the value of the foreign savings (in foreign currency) as the equilibrating variable.

In equation (44) aggregate saving equates with aggregate investment. This specification corresponds to a "savings driven" closure, in which aggregate investment in the model is effectively determined by aggregate savings.

Calibration of Model Parameters

The specification and solution of the ZimCGE model are based on a software

Table 5.5 Market clearing equations

Equation	Number
$QQ_c = QINT_c + \sum_h QH_{c,h} + QG_c + QINV_c + \overline{QDST_c} + QT_c$	(40)
$\overline{QFS_{fac}}1 = \sum_a QF_{fac1,a}$	(41)
$\overline{QFS_{labuskif} + QFS_{labuskf}} = \sum_{a,fac2} QF_{fac2,a}$	(42)
$\sum_{cm} \overline{PWM_{cm}} \cdot QM_{cm} + \sum_f tr_{row,f} + \sum_i tr_{row,i} = \sum_{ce} \overline{PWE_{ce}} \cdot QE_{ce} + \sum_{id} tr_{id,row} + FSAV + tr_{gov,row}$	(43)
$SAVINGS = INVEST$	(44)

Source: Compiled by authors from the ZimCGE model.

package called the General Algebraic Modeling System (GAMS).[36]

Two types of parameters are contained in the model. Values of the share parameters are computed directly from the benchmark SAM, while the behavioral parameters are assigned values based on estimates used in earlier CGE applications to Zimbabwe and other Sub-Saharan African countries, validated by "expert opinion" in discussions with knowledgeable persons in Zimbabwe.[37] The 1991 SAM is assumed to represent equilibrium for the model economy, and the parameters of the model are initialized and calibrated to ensure that the model solution—derived from the set of equations described above—in fact replicates the base values of the variables in the benchmark year. A description of the calibration of some key parameters follows.

Production and trade parameters. The substitution elasticities in the CET and CES functions and the Armington substitution parameter are initialized for each sector and calibrated using the reverse of the model equations. The base values of the variables obtained from the SAM entries, together with the elasticity values contained in Table 5.6, lead to the calculated shift parameters in the CES and CET functions. The import quantity rationing rates for the relevant commodities, also shown in the table, are based on the more aggregative estimates used in Davies, Rattso, and Torvik. (1998).

Factor income proportionality constants. The $wfdist_{f,a}$ parameter indicates the degree of factor-market distortion by sector, and is calculated as the ratio of sector-specific factor returns to the economywide average factor returns. Average factor returns are estimated as the total amount of factor payments given in the SAM, divided by the aggregate supply of each factor (in physical quantity); for example, the total value-added of each labor category is divided by the number of workers in that category. The sectoral factor returns are estimated as the ratio of sectoral factor payments to the sectoral demand of each factor (in physical quantity); for example, the land value-

Table 5.6 Production and trade parameters by sector

Sector	Elasticity of factor substitution (CES)	Armington substitution elasticity	Elasticity of transformation (CET)	Import quantity rationing rate (qmrat)
Agriculture, forestry, and fisheries	0.8	4.50	2.5	1.0
Mining	0.5	1.13	4.0	0.7
Grain milling	1.5			
Other food processing	1.5	1.88	4.0	0.7
Textiles	0.5	2.25	4.0	0.7
Other light manufacturing	0.5	2.25	4.0	0.5
Fertilizers	0.5	2.25	4.0	1.0
Other manufacturing	0.5	2.25	4.0	0.9
Electricity and water	1.5			
Construction	1.5			
Trade and transport	0.9			
Public services	1.5			
Private services	1.5	0.75	1.0	1.0

Source: Calculated by authors.

[36]The full model in GAMS format is available from the authors.

[37]Even so, there is a need to do "sensitivity analysis," involving alternative values of some elasticity parameters, which is undertaken in Appendix E.

added in LSC maize production is divided by the number of hectares allocated to LSC maize (Table 5.7).

Import tariff and marketing margins rates. The import tax rates are the ratio of import tariff revenue, including the amount of the surtax, to the value of imports. The marketing margins are computed for imports, exports, and domestic goods and are in real terms. The rates are the ratio of the corresponding unit margins to the quantity of imports, exports, and output (Table 5.8).

Tax and saving rates. While the tax rate for each institution is computed as the ratio of taxes paid to total income, the saving rates are the ratio of savings to total income net of taxes (Table 4.7). SAM data provide the values of taxes, savings, and total income for each institution.

Sectoral expenditure shares. The sectoral composition of demand by institution (producers, households, investors, and government) is obtained from SAM data. Intermediate commodities are demanded in fixed proportions of total output defined in real terms ($ica_{c,a}$). Both intermediate and final demands are specified in terms of the sectoral composite good (imports plus domestic products).

Household consumption shares are defined with respect to expenditures on marketed consumption, which is household income net of direct taxes, savings, and transfers (Table 4.7). These average expenditure shares are multiplied by the corresponding sectoral income elasticities to yield the marginal expenditure shares for each household group.

Allocations of investment ($qbarinv_c$) and government consumption ($qbarg_c$) by sector are fixed in real terms, and are calculated using SAM data.

Table 5.7 Allocation of cropland for large-scale commercial and smallholder farms, by crop

	Allocation (thousand hectares)	
Crop	Large-scale commercial farms	Smallholder farms
Maize	151	1,430
Wheat	42	
Other grains	10	890
Horticulture	119	166
Coffee	7	
Tea	5	
Groundnuts	5	148
Cotton	60	227
Sugar	32	
Tobacco	55	
Other crops	15	303
Total	501	3,164

Sources: World Bank 1991, Table 3.6 and Annex 3.8.

Agricultural Bias of Trade and Exchange Rate Policies

To what extent has the distorted foreign trade regime in pre-ESAP Zimbabwe affected relative production incentives in agriculture? This question merits systematic examination in view of the strong macrolinkages of agricultural growth shown by the SAM multiplier analysis earlier. The base ZimCGE model as specified above is used here to investigate quantitatively the price bias of trade and exchange rate policies against or in favor of agriculture. Past empirical studies of foreign trade regimes in developing countries, especially those undertaken since the early 1980s, generally point to a substantial price bias against agriculture. However, the analytical framework used is essentially partial equilibrium that does not take into consideration important economic interactions in both product and factor markets.

The measure of overall agricultural bias employed below is the change in the domestic terms of trade, which is the ratio of the agricultural price index to the nonagricultural price index, induced by the removal of any given source or a combination of sources of distortion in the foreign trade and payments regime. Import taxes and rationing (quotas) are distinguished for industrial products so as to isolate the impact of

Table 5.8 Tariff and marketing margin rates

Sector	Tariff rate (percentage)	Marketing margin rate (percentage)		
		Import	Export	Domestic
Maize			19.8	12.6
Wheat	18.2	13.6		17.8
Other grains	17.8	12.3		18.0
Horticulture	22.6	13.8	24.4	23.2
Coffee			24.4	14.3
Tea			24.4	17.1
Groundnuts			24.4	18.4
Cotton			24.4	13.6
Sugar			24.4	16.9
Tobacco	23.4	13.7	24.4	18.2
Other crops				19.4
Cattle				20.4
Other livestock			27.7	21.1
Forestry				19.1
Fisheries				15.3
Mining	24.4	10.4	18.3	9.7
Grain milling				72.1
Other food processing	24.2	14.3	33.0	22.9
Textiles	27.8	12.7	18.3	16.1
Other light manufacturing	32.7	7.2	18.3	12.5
Fertilizers	15.0	11.9	18.3	29.1
Other manufacturing	23.5	16.1	18.3	13.9
Electricity and water				
Construction				
Trade and transport				
Public services				
Private services	11.4			

Sources: Calculated by authors from the Zimbabwe micro-SAM.

industrial protection. The agricultural price bias of macroeconomic policies is reflected in the terms of trade effect of the current account deficit; the latter serves to defend an overvalued exchange rate.

While there are various ways of representing the price variable in the agricultural terms-of-trade index (see Bautista et al. 2001), producer price (PXS) weighted by commodity output (QX) can be considered to best reflect production incentives. Table 5.9 contains the calculated values of the terms-of-trade index for each agricultural sector resulting from the removal of specific sources of policy distortion existing in the base period. Thus, any value exceeding 100.0 implies policy bias against the indicated agricultural sector.

The last line in Table 5.9 shows the effects on relative agricultural prices in the aggregate. That all entries are greater than 100.0 indicates an overall price bias against agriculture arising from the identified sources of policy distortion. Elimination of import quotas and taxes on industrial products leads to a six percent rise in the agricultural terms of trade, which increases to 7.7 percent if accompanied by the removal of agricultural protection (entailing a slight negative effect) and the current account deficit.

Table 5.9 Agricultural terms-of-trade index under various policy scenarios

	Terms-of-trade index simulations					
Sector	**S-I**	**S-II**	**S-III**	**S-IV**	**S-V**	**S-VI**
Maize	104.4	105.6	104.2	104.4	97.5	102.6
Wheat	103.6	104.8	93.2	103.6	92.1	87.1
Other grains	102.3	104.4	82.1	102.3	95.0	79.9
Horticulture	102.7	103.5	100.2	102.7	93.4	94.6
Coffee	107.3	113.9	108.2	107.3	97.7	109.3
Tea	105.6	108.5	105.8	105.6	95.2	101.8
Groundnuts	104.4	106.9	104.2	104.4	99.2	105.2
Cotton	98.9	94.2	99.0	98.9	102.9	96.0
Sugarcane	104.9	106.6	104.9	104.9	94.2	99.2
Tobacco	107.6	110.4	108.0	107.6	111.7	121.6
Other crops	104.4	105.0	103.9	104.4	97.3	101.5
Cattle	100.2	99.0	100.1	100.2	90.8	90.2
Other livestock	101.6	101.5	101.5	101.6	92.9	94.4
Fisheries	102.5	103.2	102.3	102.5	93.6	96.8
Forestry	104.3	105.7	104.1	104.3	97.8	102.8
Total	104.7	106.0	104.4	105.8	102.6	107.7

Sources: ZimCGE model simulation results.

Notes: The base index equals 100.

S-I Zero import tax rate for industrial products.

S-II Zero import tax rate and no import rationing for industrial products.

S-III Zero import tax rate for all products.

S-IV Zero import tax rate and no import rationing for all products.

S-V Zero current account deficit.

S-VI Zero current account deficit, zero import tax rate, and no import rationing for all products.

At a disaggregate level, the terms of trade for each agricultural sector understandably improve when industrial protection is removed, except for cotton and (insignificantly) cattle. It would appear that restrictions on textile imports, by raising the domestic price of textiles and the derived demand for cotton (the principal intermediate input to textile production), served to increase the producer price of cotton relative to the nonagricultural price index. Completely liberalizing imports (including agricultural imports) and balancing the current account are seen to result in higher terms of trade for export crops like tobacco and coffee but lower for less traded products like wheat, other grains, cattle, other livestock, and fisheries. While there is wide variability in sectoral terms-of-trade effects, the results show an overall price bias against agriculture, as pointed out already. It is notable that the extent of sectoral biases is generally moderate. Indeed, corresponding estimates of nominal and effective protection rates for agricultural products in Zimbabwe (see Table 3.4) are mostly higher. As discussed in Bautista et al. (2001), the latter measures of price bias are partial equilibrium, abstracting from intersectoral linkages that are systematically taken into account in a CGE framework.

Conclusion

To summarize, the ZimCGE model allows an analysis of the economywide income

and equity effects of various policy reform measures and packages relevant to Zimbabwe. The base model reflects pre-reform conditions in 1991 and is implemented using GAMS; the parameters are callibrated based on data from the benchmark SAM and other sources. The model solution reproduces the SAM entries, representing the initial conditions (or baseline) to be manipulated through policy changes postulated in the model simulations discussed in the next chapter. Model simulations eliminating various sources of policy distortion reveal a pervasive anti-agriculture price bias of the pre-ESAP foreign trade regime; however, the magnitude of the policy bias is invariably smaller than previous estimates based on partial equilibrium analysis.

CHAPTER 6

Effects of Policy Reforms

This chapter reports simulations conducted using the ZimCGE model to analyze the economywide income and equity effects of specific macroeconomic policy reform measures either in isolation of or conjunction with other policies that—in light of the earlier discussion—are potentially complementary. Counterfactual model simulations serve to disentangle policy effects from other possible influences on economic performance (such as external market developments and weather disturbances). The various policy "experiments" simulated are described below—including trade liberalization, changes in government expenditure and tax policies, maize marketing reform, and land redistribution—followed by the presentation and interpretation of the results of model simulations.

The Policy Experiments

As discussed in Chapter 3, trade liberalization was the most significant policy reform implemented under ESAP. Direct controls on imports and foreign exchange characterized the foreign trade regime in 1991, along with import tariffs at varying rates across commodities, and a 20 percent import surtax—all incorporated into the base model. Gradual elimination of import licenses and freeing of foreign exchange controls occurred under ESAP, also simplifying the tariff structure and significantly reducing the average tariff rate (to 17 percent by 1994). The government intended to phase out the import surtax and "move toward greater uniformity in the tariff structure" (GATT 1995, 28)—a declared objective in ESAP that was also expressed in ZIMPREST (see Chapter 3). In later years, however, tariffs were adjusted in variance with the latter objective. Responding to requests by some producer groups for protection, for example, the government modified the tariff structure in 1996 to 5 percent for raw materials, 15 percent for partly processed goods and consumables, 30 percent for intermediate goods, and 50 percent for finished goods (EIU 1996).

In terms of the overall income effect, standard trade theory shows that both static and dynamic gains result from trade liberalization associated with increased efficiency of resource allocation and use. The chief beneficiaries are export producing sectors, where relative incentives are made more favorable by the lower cost of imported material inputs and higher output prices in domestic currency. In Zimbabwe, the major export producers are in large-scale commercial (LSC) agriculture, mining, and some industrial sectors—owned by the more affluent segment of the population. Employment in these sectors consists of both skilled and unskilled workers, who come from households of differing income levels. The direct employment impact of trade liberalization is likely to be positive, at least in the medium term, given the relative abundance of (unskilled) labor in Zimbabwe. Interindustry relations and the operation of labor markets mediate the indirect employment effect, which also has implications for

income redistribution. On the consumption side, changes in product demand will differ—as will the derived demand for factor services—because various income groups are affected differently by the policy shift. Hence the net effect of trade liberalization on income distribution is not clear-cut.

It is possible that simultaneous changes in other aspects of the policy environment can enhance the effectiveness of trade liberalization in promoting equitable growth in Zimbabwe. As a general definition, a group of policies can be considered complementary when the effect of each policy on a given objective increases as any one of the other policies is jointly implemented. This study specifically addresses the complementarities among trade, fiscal, and land policies toward the improvement of income growth and distribution in Zimbabwe. In addition, it looks at the economywide income and equity effects of price liberalization in the maize and grain milling sectors (also a major component of ESAP). As described earlier, the GMB was the sole buyer of maize in 1991, announced the procurement price before the harvest season, and subsidized the price of maize sold to the millers to keep the consumption price of maize meal low. These pre-reform conditions are reflected in the base model.

It seems clear that redistributing some land from LSC agriculture to smallholder households and restructuring government expenditure toward SH agriculture are pro-equity measures that will affect the distribution of income gains from trade liberalization positively. But will they reduce overall income growth? A relevant consideration is the demand stimulus arising from the increased incomes of low-income households, which will favor labor-intensive, domestically produced goods and services over capital-intensive and imported products, as earlier studies have shown for a number of developing countries. The domestic linkage effects of those two complementary policies may serve to increase the effectiveness of trade liberalization in promoting economic growth with equity. Moreover, the removal of government interventions in the maize and grain milling markets can be expected to further enhance overall income and equity in Zimbabwe.

Trade liberalization is represented in the policy simulations by:

1. Removing nontariff barriers, including import rationing;
2. Eliminating the import surcharge and adjustment of tariffs to a low uniform rate (10 percent); and
3. Dismantling foreign exchange controls and allowing the market to determine the exchange rate.

Distinction is made between the two "liberalized" trade regimes—with and without maize price control. In the latter case, the maize sector is modeled like any other production activity (with market-determined prices), and the price subsidy to grain millers is eliminated. Also, the additional scenario of trade liberalization without maize price control is considered in combination with income tax adjustment to compensate for the decline in government revenue from trade taxes. Specific details follow.

- *Simulation I (trade liberalization alone).* Quantity rationing rates ($qmrat_{cm}$) are set to equal one, and the import tax rates (tm_{cm}) to equal 0.10; the current account balance (FSAV) is fixed exogenously, and the equilibrating variable is the foreign exchange rate.
- *Simulation II (trade liberalization with maize price decontrol).* In addition to Simulation I, the maize price penalty to maize producers (grntax) and the price subsidy to grain millers (gmlsub) are removed.
- *Simulation III (trade liberalization with maize price decontrol and income tax adjustment).* In addition to Simulation II, uniform increases in the income tax rate for enterprises (etax) and the two

affluent household groups ($htax_h$)—namely, the LSC farm owner/manager and high-income urban households—leave government net revenue (GSAV) unchanged.[38]

Next, the complementarity of trade liberalization with land reform is addressed. The base model reflects the existing land ownership structure, lack of land taxation, lack of voluntary land subdivision, and associated under-utilization of LSC farms as discussed in Chapter 5. It has been argued that an efficient means of promoting SH agriculture would be to tax agricultural land, liberalize the land market by permitting voluntary subdivision of LSC farms, and assist newly resettled smallholders (World Bank 1995b). This would likely result in a net addition of SH farms to the extent of the under-utilized LSC land (assumed to be cultivable using SH farm technology) without loss of LSC farm output.

Simultaneous changes in trade, fiscal, and land policies are considered in the following policy simulations, which involve two alternative, highly stylized land redistribution schemes of contemporary relevance in Zimbabwe. The first, called "Land reform A," follows existing policy in prohibiting the subdivision of agricultural land. Fifty percent of whole LSC farms are purchased by the government and redistributed in small portions to SH households. The LSC sector loses half of its cropland area, which is added to the SH sector together with half of the LSC under-utilized arable land (as calculated in Roth 1990). The other redistribution scheme, "Land reform B," allows for subdivision of LSC farmland. Under-utilized arable land in LSC farms is fully transferred to smallholders, but LSC cropland area is unchanged. As part of the land reform package in either scheme, land taxes are levied to finance increases in government expenditure directed toward the resettlement of SH households and improving the productivity of the two most promising crops for increased SH production—cotton and horticulture. Finally, LSC farm owners receive payments from the government and foreign sector as compensation for the transferred land. This was in line with the government's willingness at one time to consider paying LSC farm owners the value of capital improvement on their land as compensation. There has also been some discussion of the British government contributing to the payment for confiscated LSC farmland.

The specific features of the two land reform scenarios are as follows.

- *Simulation IV.* Land reform A provides for a transfer of 250.3 thousand hectares of LSC cropped land plus 557 thousand hectares of LSC under-utilized land (LSC cropped land is reduced by half to 250.3 thousand hectares, and SH cropped land increased to 3,971.6 thousand hectares). Land taxation is Z$30 per hectare on LSC farms and $Z1 per hectare on smallholder farms. Total factor productivity for smallholder cotton and horticulture increases by 20 percent, assumed to result from increased government expenditure financed by the land tax. LSC farm owners are paid for cultivated and under-utilized land transferred to smallholders, with payments shared equally by the government and foreign sector.[39]

[38]"Adjustment of direct taxes" is no doubt better achieved through a more effective tax collection than by increasing legal tax rates.

[39]Payment for transferred land is estimated from published data (CSO 1996b, 4) on "own capital formation" (in 1991 Zimbabwe dollars) by LSC farms over a period of nine years (1983–91). For cultivated land, payment consists of the total value of own capital formation, while for under-utilized land, it is estimated as 10 percent of own capital formation in irrigation work, fencing, and land conservation. The total value of capital improvement is calculated at Z$1,096 million for cultivated land and Z$10 million for under-utilized land.

- *Simulation V.* Land reform B incorporates the same factors as Land reform A, with the exception that only underutilized LSC land—1,114 thousand hectares—is transferred (LSC cropped land remains at 500.6 thousand hectares, and SH cropped land increased to 4,278.3 thousand hectares).
- *Simulations VI and VII.* Two additional policy simulations involving land reform essentially repeat simulations IV and V, respectively, but include trade liberalization with income tax adjustment and maize price decontrol.
- *Simulation VIII and IX.* Finally, two policy simulations relate to the macroeconomic problem of persistent fiscal deficits in Zimbabwe as described in Chapter 3. In simulation VIII, government consumption expenditure is reduced so that the current fiscal deficit is eliminated. The ZimCGE model abstracts from the capital account of the government budget, which in 1991 contributed about 70 percent to the overall budget deficit. Thus, reducing the current fiscal deficit from about Z$500 million to zero in simulation VIII addresses only a part of the larger macroeconomic problem. Simulation IX imposes current fiscal balance in combination with trade liberalization, maize price decontrol, and income tax adjustment.

Results of Model Simulations

Table 6.1 presents the results of the first three policy simulations. Trade liberalization alone (not including the maize sector) leads to an appreciable increase in total GDP (4.4 percent) and an even more significant rise in agricultural GDP (9.0 percent).[40] The exchange rate (in real terms)

Table 6.1 Trade liberalization, maize price decontrol, and income tax adjustment scenarios

	Simulation (percentage change from base)		
Indicator	**S-I**	**S-II**	**S-III**
Gross domestic product at factor cost	4.43	4.47	4.46
Exports	25.56	25.62	25.61
Imports	23.46	23.52	23.52
Exchange rate	7.45	7.56	7.57
Agricultural gross domestic product	8.99	9.11	9.14
Large-scale commercial farms	10.67	10.62	10.65
Smallholder farms	4.42	4.97	5.03
Real disposable household incomes			
Aggregate	3.67	3.70	0.89
Large-scale commercial farm owner/manager	4.18	4.12	0.43
Large-scale commercial farm worker	9.37	10.13	10.16
Smallholder	2.12	2.46	2.61
High-income urban	3.85	3.78	0.51
Low-income urban	2.07	2.59	2.56

Sources: ZimCGE model simulation results.
Notes: S- I Trade liberalization with maize price control.
S- II Trade liberalization and maize price decontrol.
S- III Income tax adjustment added to simulation II.

[40]Not surprisingly, export-oriented sectors such as tobacco, coffee, tea, and mining show relatively larger increases in value-added (12 to 18 percent).

depreciates by 7.4 percent, and both imports and exports expand substantially (by 23.5 and 25.6 percent, respectively). LSC farm production increases much more than SH production, given the greater export orientation of LSC agriculture. Larger income gains understandably accrue to LSC farm households than SH households. High-income urban households benefit more than their low-income counterparts, adding to the negative equity effect of trade liberalization in Zimbabwe. However, the impact on aggregate real disposable income, represented by the sum of gross incomes of all households net of direct taxes deflated by the general CPI, is positive.

Price decontrol in the maize market, effectively completely liberalizing the trade regime, is seen to further increase GDP and aggregate household income (Table 6.1, second column). At the same time incomes of smallholder, LSC farm-worker, and low-income urban households rise, while those of the more affluent LSC-farm owner/manager and high-income urban households fall (relative to the corresponding results of trade liberalization alone); thus, the equity effect of maize price decontrol is positive. Notably, quantitative differences between the outcomes of simulations I and II are in general relatively small, because the price penalty to maize producers (5 percent) and subsidy to grain millers (12 percent) are not large in the base model. Even so, maize price decontrol needs to be viewed as a win-win policy reform measure that improves both overall income and equity in Zimbabwe.

The effect of trade liberalization on government revenue (not shown) is negative, implying that the positive impact of the larger income tax base does not fully offset the reduction in import tax (tariff and surcharge) revenue. Indeed, government "dissaving" (current expenditure minus current revenue) increases significantly from the base value of Z$491 million to Z$1,319 million, which would have worsened an already fragile fiscal situation in 1991 (see GATT 1995). Combining trade liberalization with higher income tax rates for enterprises and the two affluent household groups, leaving the fiscal balance unchanged at the base level (simulation III), does not much alter the GDP effects because incomes are primarily redistributed. However, aggregate household income gains decline significantly, chiefly as a result of the expected negative effect on the two household groups whose income tax rates are raised. Income changes for the poorer household groups are not significantly affected.

The results of four policy simulations involving land reform are summarized in Table 6.2. Simulation IV, including Land reform A (no voluntary farm subdivision), a new land tax, and expanded government expenditure to promote smallholder agriculture leads to unfavorable outcomes in overall GDP, agricultural GDP, and aggregate household income. Not surprisingly, LSC production drastically falls, accompanied by similar decline in exports, while SH farm GDP increases appreciably. LSC farm-worker households suffer from the reduction in labor demand, wage rate, and hence real income. There is, however, an observed rise in LSC farm-owner income, attributable mainly to the land-transfer payments from the government and foreign sector (Z$284 million each). On the other hand the disposable income of smallholder households improves only slightly, despite the significant increase in farm production, resulting in large part from their payment of the new land tax (amounting to Z$7.5 million).

Adoption of Land reform package B in simulation V is seen to result in modest increases in GDP, exports, and agricultural GDP—improving on the negative outcomes of Land reform package A. There is almost no effect on LSC farm production or the incomes of the two LSC household groups. Notably, the income gain for SH households is even smaller than in simulation IV (in part because of the larger land

Table 6.2 Alternative land reform scenarios

Indicator	Simulation (percentage changes from base)			
	S-IV	S-V	S-VI	S-VII
Gross domestic product at factor cost	–1.60	0.24	3.06	5.02
Exports	–7.71	1.26	20.97	25.72
Imports	–0.11	0.02	23.27	23.82
Agricultural gross domestic product	–5.75	0.28	2.43	10.01
Large-scale commercial farms	–9.17	–0.04	–1.35	9.46
Smallholder farms	3.57	1.17	12.77	11.51
Real disposable household incomes				
Aggregate	0.64	0.22	0.65	1.43
Large-scale commercial farm owner/manager	3.85	0.18	2.40	0.47
Large-scale commercial farm-worker	–12.61	0.00	–5.43	9.31
Smallholder	0.24	0.10	4.52	4.89
High-income urban	–1.26	0.13	–1.65	0.82
Low-income urban	–1.02	0.86	2.47	4.68

Sources: ZimCGE model simulation results.

Notes: S-IV Land reform package A.
S-V Land reform package B.
S-VI Simulation III plus land reform package A.
S-VII Simulation III plus land reform package B.

tax payment), while the income gain of low-income urban households improves appreciably. Thus, neither of the two land reform packages can be considered to simultaneously promote overall income growth and equity.

The last two columns of Table 6.2 give the corresponding results of policy simulations combining each of the two land reform packages with trade liberalization, maize market decontrol, and income tax adjustment. They indicate drastically improved outcomes in GDP, foreign trade, agricultural production (in both LSC and SH farms), and aggregate income, relative to the two preceding experiments. Moreover, there is a clear improvement in equity: income gains for the poorer (LSC farmworker, SH, and low-income urban) households increase, while those for the two affluent household groups decline. Significant synergy effects are revealed, as income gains exceed the sum of corresponding gains from the separate experiments, indicating policy complementarity between the land reform and trade liberalization packages.

The comparative results of simulations VI and VII on GDP, exports, agricultural production, and each of the real disposable household income indicators point to the general superiority of Land reform B over Land reform A when implemented jointly with the other policies. Indeed, the policy reform package represented in simulation VII provides a win-win strategy in promoting overall income growth and equity in Zimbabwe.

The sustainability of trade liberalization depends, according to some analysts (Gunning 1996, for example), on whether the perennially large fiscal deficits can be reduced significantly. The ZimCGE model can only address the current fiscal account, which in 1991 contributed about 30 percent of the overall fiscal deficit. The results of two model simulations assuming zero current fiscal deficit are summarized in

Table 6.3 Removal of current fiscal deficit scenarios

	Simulation (percentage change from base)	
Indicator	**S-VIII**	**S-IX**
Gross domestic product at factor cost	–0.14	4.46
Exports	–0.15	25.60
Imports	0.82	23.51
Agricultural gross domestic product	1.12	9.16
Large-scale commercial farms	1.03	10.66
Smallholder farms	1.37	5.07
Real disposable household incomes		
Aggregate	0.30	–0.75
Large-scale commercial farm owner/manager	1.22	–1.71
Large-scale commercial farm worker	1.36	10.19
Smallholder	0.57	2.71
High-income urban	–0.39	–1.40
Low-income urban	0.02	2.55

Sources: ZimCGE model simulation results.
Notes: S-VIII Government consumption expenditure reduced to eliminate the current fiscal deficit.
S-IX Simulation VIII plus simulation III.

Table 6.3. By itself, cutting government consumption expenditure to eliminate the current fiscal deficit (simulation VIII) leads to slight declines in GDP and exports (by less than 0.2 percent). However, agricultural production, especially among SH farms, increases (by more than 1 percent), suggesting an anti-agricultural bias of fiscal policy in 1991. Not surprisingly, income gains accrue mostly to rural households. Simultaneously implementing trade liberalization, maize price decontrol, and income tax adjustment (simulation IX) results in much more favorable outcomes in GDP, foreign trade, and household income distribution relative to the scenario of zero fiscal deficit only. Thus, the "real" effects of a contractionary fiscal policy are effectively swamped by the economywide impact of the trade liberalization package. Comparison with the results of simulation III (Table 6.1), involving only the trade liberalization package, shows identical GDP effects but a more favorable equity impact and a negative outcome for aggregate household income in simulation VII.

These comparative results from counterfactual simulations based on the ZimCGE model illuminate the greater effectiveness of trade policy reform in promoting overall growth of the Zimbabwean economy, and of fiscal policy and sectoral reforms in improving income equity among the five household groups. The significant improvements in aggregate household income and its distribution, accompanied by large increases in agricultural GDP, are indicative of the central role of agriculture in achieving equitable growth in Zimbabwe.

These results are consistent with the strong linkages observed in the SAM analysis, which suggested that the distribution of income would benefit from agricultural growth and overall GDP growth from stimulating smallholder production.

CHAPTER 7

Conclusions

Following independence in 1980, rapid improvement in racial and income equity became a major—if not the overriding—development policy objective in Zimbabwe. Priority in government expenditure was therefore given to human resource investment and support for smallholder agriculture. It resulted in much improved social indicators, exemplified by the significant reduction between 1980 and 1990 in child malnutrition and infant mortality, as well as in the dramatic increases in primary and secondary enrollment rates (World Bank 1995a). Also, as described above, growth of smallholder farm production accelerated markedly during the first half of the 1980s.

Such success in human resource development and smallholder agriculture should have been accompanied by rapid overall growth of the Zimbabwean economy, considering the widely held view of supply constraints presented by underdeveloped human capital and low productivity agriculture in Sub-Saharan Africa. In fact, economic growth in Zimbabwe during the 1980s was relatively modest (though not stagnant) and was far from satisfactory given the expectations for raising living standards. Employment growth was not able to match the increases in the labor force, which would have had a negative equity effect. Moreover, the rapid growth of smallholder agriculture during the first half of the decade was not sustained, and the chief beneficiaries of the rising world commodity prices from the mid-1980s to the early 1990s were the large-scale commercial farm owners.

Macroeconomic Policy and Agricultural Performance

Some links between macroeconomic policy and agricultural performance, with implications for income growth and equity, can be discerned from Zimbabwe's development experience in the 1980s. The substantial expansion in government spending for smallholder agriculture during the first half of the decade (and for social investment, while expenditure for defense remained high) was made possible by an expansionary fiscal policy characterized by a burgeoning budget deficit. The latter resulted from the continuing failure to generate revenue in pace with the rising government expenditure, which in turn was related to the country's slow economic growth and expansion of the public revenue base. Under conditions of severe budgetary constraints during the mid-to-late 1980s, the heavy public spending in support of smallholder agriculture (among other budget items) could not be sustained. In the absence of alternative funding sources, government budget cuts reduced the effectiveness of public agricultural services (research, extension, veterinary) and the availability of institutional credit to smallholder farmers. Moreover, since 1985, the implementation of post-independence land reform and resettlement slowed considerably as government expenditure for land acquisition and development was scaled back.

Thus, at a time when international commodity prices were increasing, the dramatic deceleration of smallholder farm production in the second half of the 1980s did not advance the government objective of achieving equitable growth. In the immediate post-independence period, despite the uncertainty of government policy, sale of farmland, and reduction of cropped area, large-scale commercial farmers resumed rapid growth in farm production by shifting toward export and other noncontrolled commodities and therefore remained the primary beneficiaries of existing income opportunities. LSC farms were not significantly affected by the decline in public agricultural services during 1986-91 because they had already established a network of research and extension facilities.

In the following decade, despite intentions of substantially reducing the budget deficit, as expressed in the ESAP and ZIMPREST, the government failed to do so (see Chapter 3). Under the repressive financial regime in the 1980s, the large fiscal deficits resulted in artificially low interest rates that contributed to low domestic savings in Zimbabwe (Bautista 1996). By contrast, under the more liberalized regime in the 1990s, the deficits led to high lending rates that hindered domestic investment and weakened the supply response to the deregulated policy environment and improved incentive structure. Especially in a developing country context, a low budget deficit is a necessary component of good macroeconomic policy.

The ZimCGE model used in this study deals only with the current fiscal account; a reduction in government consumption expenditure to remove the current fiscal deficit is shown to lead to a slight decline in GDP and to increases in agricultural production and rural incomes. This model simulation result suggests that fiscal policy in Zimbabwe had an anti-agriculture bias in the benchmark year (1991) and that doing away with the current fiscal deficit would have required only a small tradeoff in GDP but would have had a favorable equity effect.

Foreign Trade Regime, Rural Incomes, and Equitable Growth

It is now generally agreed that the most important reason for the failure of increased social investment and support for smallholder agriculture to promote equitable growth in Zimbabwe during the 1980s was the preservation of pre-independence policies and institutions that involved widespread government regulation and administered resource allocation in the national economy. In particular, the foreign trade and payments regime was characterized by restrictive import licensing and quotas, high import tariffs and surcharges, discretionary foreign exchange allocation, and administered setting of the foreign exchange rate. In agriculture, the inherited system of commodity market controls was reinforced by the mandatory sale of controlled crops to marketing boards at pre-announced procurement prices, government controls on consumer prices of food staples, and trade restrictions on agricultural commodities. Industrial production was hampered, especially in small-scale enterprises, by investment licensing, pervasive price controls, import quotas, and foreign exchange allocation.

Zimbabwe began to move toward more market-oriented policies in 1991 with the adoption of ESAP, which during its implementation through 1995 proved successful in substantially reforming the trade and payments regime. Quantitative restrictions on foreign trade were removed, import tariffs and surcharges were reduced to a significant extent, and the foreign exchange market was liberalized. The government also dismantled the foreign exchange allocation system, allowing market forces to determine the foreign exchange rate. In later years, however, signs of policy reversal were apparent in tariff rate adjustments and exchange rate management.

Historical analysis and economic modeling in this study show a general

improvement in agricultural and export incentives arising from trade liberalization. The results of ZimCGE model simulation also indicate, not surprisingly, a marked expansion of foreign trade and significant increases in agricultural income, rural household incomes, and GDP. However, trade liberalization by itself leads to two unfavorable outcomes. First, disproportionately larger income gains accrue to LSC farms relative to smallholder farms, which is understandable given the much greater export orientation of LSC farm output. Thus, while the overall income effect of a liberalized trade regime is favorable (both in terms of GDP and aggregate household income), its equity impact is negative based on the relative changes in the income levels of the five household groups distinguished in the study. Second, the induced fall in import tax collection exceeds the positive effect of a larger income tax base, so that the government budget deficit increases significantly. This would have compounded an already severe fiscal account imbalance observed in Zimbabwe not only in the base period (1991) but also in later years. Hence the need to protect government income arises with trade policy reform.

In another model simulation, an additional policy measure that raises the income tax rates for enterprises and the two most affluent household groups is assumed to be simultaneously implemented to offset the decline in import tax revenue from trade liberalization. The results essentially indicate an income transfer to the government at the expense of the two high-income household groups, resulting in a positive equity impact, with the effects on GDP and foreign trade remaining constant. Thus, combining trade liberalization with a change in fiscal (tax) policy can help promote economic growth with equity in Zimbabwe.

Complementary Policies Toward Equitable Growth

The preceding discussion points to the importance of finding significant complementarities within the overall policy environment that can contribute to the achievement of equitable growth in Zimbabwe. It is not only the effects of trade liberalization or any policy reform measure that need to be investigated but also the corresponding effects when other policies are simultaneously changed. How would the overall income and equity effects of macroeconomic policy reforms, for example, be modified by the concurrent implementation of agricultural land redistribution and other sector-specific policies? The ZimCGE model provides an appropriate framework for addressing such questions because it lends itself well to simultaneous policy changes and their economywide effects. Counterfactual model simulations, such as those described above, relate to specific macroeconomic reform measures including foreign exchange market liberalization, lowering of trade barriers, changes in fiscal policy (public expenditure and taxation) with or without concurrent changes in maize pricing and marketing, alternative land reform measures, and increased support for smallholder agriculture.

Based on the results of policy experiments performed using the ZimCGE model, doing away with the existing land policy prohibiting land subdivision is critical to a land reform program that will contribute positively to economic growth with equity in Zimbabwe. A large portion of LSC farmland is under-utilized (uncultivated) and could be transferred to smallholder households and put to productive use via labor-intensive farm technology. The effectiveness of such market-based and decentralized land redistribution to promote equitable growth is shown to increase when combined with trade liberalization, tax policy changes, and government expenditure

restructuring to improve productivity in smallholder farms. This result is not surprising because induced income gains from the lowering of trade barriers are shared more widely as land is transferred to smallholder households, as the more affluent household groups assume a heavier tax burden, and as smallholder agriculture gains increased public support.

It is also notable that the economywide income and equity effects of jointly implementing effective land reform and trade liberalization far outweigh those arising from a reduction in the fiscal deficit. Thus, eliminating the current fiscal imbalance in 1991 would have contributed to macroeconomic stabilization without critically affecting the government's longer-run development objectives. Also with respect to the assignment of policy instruments, the results of ZimCGE model simulations indicate the comparative advantage of trade liberalization in promoting overall income growth and of fiscal policy reform (changes in government expenditure and taxation) and land redistribution in improving equity.

The country-specific nature of policy complementarities bears emphasis. Changes in agricultural sector policies in the simulations significantly enhance the ability of trade policy reform to promote equitable growth in Zimbabwe, reflecting the importance of agriculture to the national economy. In fact, the extreme dualism of Zimbabwean agriculture, the preponderance of poverty in the SH farm sector, and the dominant share of LSC farm output in the country's agricultural export earnings virtually preclude a favorable income distribution outcome to smallholder households from trade liberalization. To offset the negative equity effect of a liberalized trade regime in Zimbabwe, complementary policies that directly improve the relative income of smallholder households need to be simultaneously implemented. It helps that the intersectoral linkage effects of income growth for smallholder households and for their production activities are relatively strong, evidenced by the comparative values of sectoral income multipliers as calculated above. Piecemeal or partial reforms would obviously be inferior to more comprehensive reforms incorporating policy complementarities.

In other developing countries, the structure of production in the national economy might be such that trade liberalization would need to be complemented by industrial sector reforms (addressing, for example, barriers to entry and exit) to achieve equitable growth. It is also possible that trade policy reform might not require a tradeoff between overall income growth and equity. The latter has been the case in some East Asian economies that have a comparative advantage in labor-intensive manufacturing and have implemented effective land reform earlier. Under such circumstances, the income benefits from an open trade regime are shared widely, promoting the objective of equitable growth. Clearly, complementary policies need to be identified and analyzed for their effects on aggregate income and equity in the context of individual countries.

The Lessons Learned and The Way Forward to Equitable Growth

The return to the rule of law and a return to broad societal acceptance of the legitimacy and efficacy of government are essential before Zimbabwe will recover. Once this is achieved, reducing the government budget deficit is widely acknowledged as the single most important factor affecting economic growth. An important corollary is the direction of government expenditure. There is an urgent need to invest in health, education, infrastructure, and research and extension if equitable growth is to be achieved. These sectors have been seriously undermined in the 1990s which, combined with the effect of AIDS, could have negative long-term consequences from which the economy may not recover. The reduction of military

and political expenditure, the sale of parastatals and increased accountability of government are essential if Zimbabwe is to avoid further deterioration in both the short and long term.

These measures, however, are insufficient on their own to ensure long-term growth. A number of areas remain where institutions restrict resource mobility, discourage innovation, and distort economically rational choices. A number of areas also exist that were initially liberalized but have since been recontrolled, undermining the earlier gains. This includes the reintroduction of high import duties, particularly affecting transport and the potential for private sector response to the liberalization of rural markets. In addition the overvaluation of the Zimbabwe dollar and the numerous restrictions on access to foreign currency have combined with increasing inflation to seriously undermine the competitiveness of Zimbabwean exports.

The simulations presented in Chapter 6 indicate an overall increase in aggregate household income of 4 percent resulting from trade liberalization but with a potential negative impact on equity if implemented alone. The largest gains accrue to the large-scale sector because the smallholder sector is not heavily involved in exports. However, this has been changing since 1995, and although the majority of the smallholders remain fairly isolated from international markets, a growing number of emergent farmers are increasingly being affected. This can be seen in the higher rainfall areas, with increased production of cotton, horticulture (especially paprika), groundnuts for export, and tobacco. These emerging smallholder commercial farmers are being negatively affected by the control of the exchange rate and by the sharply appreciating real exchange rate.

The decontrol of agricultural markets had many positive impacts for both the large- and small-scale farmers and for poor urban households. However, many barriers to entry still remain, and transaction costs are particularly high in rural areas with poor communications. The reintroduction of prices set well below import parity negatively affected farmers' bargaining power with the private sector. In addition, the introduction of maize meal price controls negatively affected the informal milling sector, especially when they could not easily access the subsidized grain sold by the GMB. It also translated into shortages of the subsidized maize in deficit rural areas, the poorest sector of the economy. Market liberalization must be consistent or risks will deter new entrants. Urban health regulations need to be rationalized, and incentives should be established to encourage competition in both the rural trading and industrial milling sectors.

A number of reforms occurred in the agricultural inputs sector, but they were late in being established (fertilizer was a duopoly and heavily controlled until 1995). Regulations still favor established operators, and industry concentration in fertilizer, seed, and pesticides remains high, undermining competition and resulting in inefficiencies and high prices. Several regulations are still in place, needing reassessment, and new entrants need to be actively encouraged. Transforming the economy from a highly regulated system to a free market requires active steps to promote competition and allow prices to effectively allocate resources. Lower transaction costs, lower interest rates, and access to vehicles and processing equipment appropriate for small enterprises are essential to the successful transformation of Zimbabwean agriculture.

Current institutions that continue the prevailing pattern of dualistic and rigid land allocation and tenure systems need to be changed. Until systems are developed to adapt to changing economic and social needs, it is unlikely that Zimbabwe will be able to undergo satisfactory economic transformation. Evidence from throughout Africa is accumulating to highlight the essential role of secure property rights in

ensuring both sustainable development and good governance. While the state has the power to allocate key resources, people are unable to demand accountability. Rukuni (1998) has shown that successful tenure is not predicated upon the type of tenure but on the security of the basket of rights. It is important for Zimbabwe that property rights are transferred from the state to the communal and resettlement households and that in the large-scale sector, land subdivision is actively encouraged. The simulations in Chapter 6 show that taxing land and encouraging subdivision results in significant increases for both growth and equity. A new constitution may be able to enforce freedom of movement for land to reduce the use of this vital resource as a means of attaining political and economic rents.

Growth in Zimbabwe can only be achieved in an environment that encourages investment. Institutions that encourage competition and new investment urgently need to be developed. The strong multiplier effects from smallholder growth would encourage equitable growth through investment in infrastructure, research, and training in this sector. The positive dynamic effects from the structural changes include growing participation in political and economic decisionmaking as individuals perceive opportunities to control their own destinies. This is a self-reinforcing cycle that can only be achieved through open structures that are accountable and encourage resource mobility and adaptation to new technologies and opportunities. The negative dynamic impacts of a centrally controlled economy are considerable, and the energy and time required to circumvent socially unaccepted regulations, together with the loss of human and social capital, needs to be taken into account.

Postscript

Events in Zimbabwe have shown the significance of institutional and political factors in the implementation of sustainable adjustment programs. They have also underscored the findings of this study, showing complementarity between liberalization and a country's underlying institutional structure.

The performance of the formal sector in the first phase of structural adjustment was adversely affected by both external shocks (1992 and 1995 droughts in particular) and the lack of commitment to the structural changes by the political elite. The latter resulted in conflicting policies and signals, and was reflected in government expenditure patterns, retention of control over key resources including land and telecommunications, and the effects of the inherited distortions arising from concentrated industries.

The lack of emphasis on changing institutions and norms to reflect the new policies contributed to a slow response to those changes that were implemented, few measures encouraged the emergence of competitive forces, and communications remained poor. The increasing transaction costs and insecurity created by a political hierarchy without a clear commitment to either the poor or to market forces, reduced both growth and equity.

Despite these inadequacies, the trade deficit dropped in 1996, and real GDP grew by 6 percent. Although poorly documented, the positive response from the informal sector to the trade and market deregulation in the early 1990s was significant. In 1996, for the first time ever, farm workers challenged their employers over salaries and conditions, reflecting the increasing opportunities available to them through the informal sector. Increased economic activity, specialization in rural areas, and increased links between rural and urban areas reflected a strong, positive response to market deregulation. The recovery was short-lived and the last two years of the decade saw a reversal of these gains and even greater erosion in real incomes, opportunities, and confidence.

In 1997, political support for the government was sharply eroded by revelations of the misuse of a pension fund for war veterans and by Zimbabwe's involvement in the war in the Democratic Republic of the Congo (DRC). War-related defense spending and unbudgeted payments to veterans led to increasing budget deficits, inflation, a crisis of confidence and the crash of the Zimbabwe dollar in November of 1997. To reduce the deficit, the government reduced productive expenditure on health, schools, and research and extension. Support for institutions providing services to the handicapped no longer exists, schools must pay for all expenses except teachers, and equipment and funding for medicine and equipment were cut at government hospitals and clinics. This, together with the decline in doctor-patient ratio and the AIDS pandemic, has undermined the gains in the health sector in the 1980s.[41]

GDP growth dropped to 2 percent in 1997, just over 1 percent in 1998, -1.8 percent in 1999, and an estimated -5 percent in 2000. High negative rates variously predicted at -8 to -20 percent in 2001, are resulting in the emigration of both black and white skilled professionals and an attendant loss of human and social capital. The current account deficit in 2000 was some US$210 million, although imports declined by 10 percent, and the balance of payments deficit reached US$610 million. Inflation rates remained at almost 60 percent in 2001 and increasing overvaluation of the Zimbabwe dollar continues to discourage investment and exports (32–82 percent relative to the black market rate in early 2001).[42]

Foreign payment arrears were estimated at over US$500 million at the end of 2000. The gains from market and trade liberalization in rural areas and in the informal urban economy were eroded and anecdotal evidence indicates a sharp decline in the early 21st century. Agriculture's share of expenditure fell to 1.6 percent in 2000 and 2001 (including the budget for land redistribution). The deterioration in infrastructure is beginning to affect productivity in most sectors and there is little investment in research and development.

The crisis of confidence in government management capacity and the decline of confidence in property rights are escalating the flight of capital. The controlled exchange rate and insecure property rights all negatively affect tourism, mining, agriculture, and industry. Foreign investors and donors have withdrawn. Domestic investment is crowded out by government borrowing to finance its participation in the DRC war along with payments to supporters, to loss-making parastatals, and to the debt burden.

Zimbabwe has good natural and human capital and reasonable infrastructure, but the Government of Zimbabwe has undermined the structural adjustment process through its fiscal policies, lack of policy consistency, rhetoric and poor legislation, and by ignoring the role of confidence in the underlying economic and political system in the achievement of successful structural transformation.

The government encouraged illegal settlement on farms by war veterans in 2000 and 2001 to obtain political capital and to avoid funding the settlement exercise.

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[41]Similar to the early 1990s—and to many other developing countries—Zimbabwe continued to allocate more funds to recurrent defense expenditure in the 2000 budget—more than to health, for example, which faces a severe challenge from the AIDS pandemic.

[42]The most significant gains during the early 1990s were the elimination of the black market for foreign currency and the liberalization of agricultural markets. By 2000 the black market had re-emerged and by early 2001, the official exchange rate was Z$55:US$1, the semi-official parallel market 85:1 and the black market ranged from 75:1–100:1 depending on the source, amount, and routes of transfer.

State-sponsored farm invasions contributed to an already unraveling economy and resulted in widespread human rights abuses as the incumbent government fought to retain political control. The uncertainty created over the acquisition, together with the disruptions caused by the invaders, led to significantly reduced planting for the 2001 harvest by the large farm sector. The invaders had few resources, little training, and no support, and although they planted some of the occupied land, their output was low, leading to a sharp decline in real agricultural output. Given the strong multiplier effects within the economy this has added to the negative impacts of the depressed mining and industrial sectors. The current exchange rate policy, lack of access to foreign currency for inputs, and lack of fuel continue to affect all sectors.

The use of land as their focus could have been avoided if land had been easily subdivisible and taxed as shown by the results of this study.[43] It suited the government to restrict subdivision thus controlling access to land and obtaining political rents. It suited the landowners to avoid major changes in the structure for as long as possible, so they did not lobby for effective land reform. Some of the land available for resettlement is instead used for political patronage causing increasing resentment and pressure for land. The inherited dualistic land structure will continue until subdivision in the large-scale sector is actively encouraged. The draft Land Tax Bill (1999) will not achieve this objective because it adds another layer of bureaucracy in the process of obtaining permission for subdivision. The proposed graduated tax system will only achieve its goal if land redistribution, rather than fiscal revenue generation, remains the principal focus.

Land is an emotive issue. Political rhetoric and invasions of farms have created conditions that undermine freehold tenure security, the collateral value of land, and confidence in the legal system, reducing local and foreign investment. The targets of the National Land Policy remain mostly unmet, not because of a lack of land for resettlement but because of limited resources for policy implementation.

Thus, the analysis in this report shows the possible economic gains from a program of trade liberalization and land market reform, but the current government in Zimbabwe seemingly prefers administrative controls over land redistribution, presumably to maximize political benefits.[44] This approach has achieved neither economic growth nor increased political support.

[43]The large-scale farmers believed that they could continue the status quo whereby a few farms at the margin would be taken from time to time for resettlement; they did not press for the necessary changes. The government often threatened, but never implemented, large-scale appropriations. It was more concerned with allocating land to the politically well connected than with rural resettlement, and had historically allocated only 0.01–0.02 percent of the budget to resettlement. It suited the government to restrict subdivision and make access to land the preserve of the very wealthy except through political fiat.

[44]A positive outcome of the invasions may be to reduce the rigidities in the land market in future. Flexibility in the land market is essential. While labor is abundant and land scarce, small, low-income farms are likely to be economically efficient; as the economy becomes more industrialized, land again needs to be consolidated into larger allotments.

APPENDIX A

Zimbabwe Micro-SAM: Documentation and Data Sources

This appendix presents a disaggregation of each non-empty data cell of the Zimbabwe macro-SAM into a vector or submatrix.

Activities and Commodities

Zimbabwe has 15 agricultural subsectors. For 9 of them—maize, other grains, horticulture, groundnuts, cotton, other crops, cattle, other livestock, and forestry—the micro-SAM distinguishes between smallholder and large-scale production farms. In 1991, smallholders also produced wheat, tobacco, and coffee, but each crop's share of total smallholder production was insignificant (less than 1 percent).

The production schedule for agricultural crops, livestock, fishery, and forestry, as well as the value of intermediate inputs used in the production process, are derived from the agricultural production account (CSO 1996a and 1996b). The latter's detailed commodity list is aggregated to conform to the micro-SAM classification. Each input commodity is distributed among the output commodity groups according to their production shares. In the case of fertilizer, usage by crop is based on the Policy Analysis Matrix budgets estimated by Masters (1994, Table B.6). Once completed, the agricultural production matrix is scaled to reconcile with the aggregate value of gross output and intermediate demand of agriculture and forestry. Value-added in each agricultural activity is a residual obtained by netting out intermediate demand (generated by the intermediate input matrix) from gross output.

The 12 nonagricultural sectors include mining; light manufacturing sectors (grain milling, food processing, textiles, and other light manufacturing); heavy manufacturing sectors (fertilizer and other manufacturing); electricity and water; construction; and service sectors (trade and transport, public services, and private services). The matrix of intermediate demand is derived from the Inputs and Final Demand Table, the Import Matrix Table, the Transport Margin Matrix, and the Distribution Margin Matrix of the 1980 Input-Output Table (CSO 1988). An import tax matrix is constructed by applying the average tax rates to the corresponding imported intermediate inputs. It is then combined with the other matrices to yield a matrix of average coefficients relative to total output. The average coefficients derived above are applied to the value of the 1991 production by sector to compute 1991 flows of intermediate input use.

Value-Added

The micro-SAM has nine factor categories: four labor groups, three capital categories, and two land categories.

Six different labor classes are identified for Zimbabwe: (1) LSC-farm unskilled labor; (2) smallholder farm labor; (3) nonagricultural unskilled informal labor; (4) nonagricultural unskilled formal labor; (5) LSC farm skilled labor (owners and manager); and (6) nonagricultural skilled labor. In the SAM, these categories are integrated into four labor markets: The LSC farm unskilled workers are landless and, for historical and institutional reasons, isolated (Masters 1994, 9–10). The informal unskilled labor market includes smallholder farmers and nonagricultural informal labor.[45] The skilled labor market includes both agricultural (LSC) and nonagricultural skilled labor.

There are three categories of capital, distinguished by activity: LSC-farm capital, smallholder-farm capital, and nonagricultural capital. Land is considered a factor of production only for crops, differentiating between LSC-farm and smallholder-farm land.

Table A.1 summarizes the allocation of labor value-added to LSC and smallholder farms and their reconciliation with the national accounts aggregates on labor and capital incomes. Labor value-added in smallholder farms is allocated to one labor category, while that in LSC farms is split between LSC unskilled workers and agricultural skilled workers. Within each factor category, the distribution among agricultural activities is based on their relative shares of production.

Land value-added is derived from estimates of the shares of the value of crop output for LSC and SH farms by Masters (1994, Appendix B). Capital income is a residual of total value added, after both labor and land have been netted out, and is distributed among the three types of production groups according to the production source: smallholder farm capital, LSC farm capital, and nonagricultural capital.

For nonagricultural activities, labor is distributed according to employment earnings (CSO 1998a, Table 7.7) and within manufacturing according to wages and salaries by ISIC code given in the Census of Industrial Production. Sixty and 40 percent shares of formal labor are distributed between the skilled and unskilled labor categories, respectively.

The informal value added accrues predominantly to unskilled informal labor based on the distribution in the revised national accounts (CSO 1997, 2), which allocates 19 percent to agriculture, hunting, fishing, and forestry (already accounted for in SH production), 19 percent to manufacturing, 2 percent to construction, 2 percent to transport and communication, and 58 percent to private services. A small percentage is attributed to nonagricultural capital value-added: in textiles, other light manufacturing, and trade and transport; the split

Table A.1 Distribution of value-added in the agricultural sector, 1991

Category	Value (Z$ million)
Gross domestic product at factor cost	26,284
Nonagricultural value-added	22,271
Agricultural value-added	4,013
Large-scale commercial farm value-added	2,918
Large-scale commercial farm wages and salaries	847
Large-scale commercial farm nonlabor value added	2,071
Smallholder farm value added	1,095

Sources: Calculated by authors based on CSO 1998a (national accounts) and CSO 1996a and 1996b (agricultural production accounts).

[45]Smallholder farm workers and informal nonagricultural workers are linked to the formal, nonagricultural, unskilled labor market. The scarcity of formal sector jobs forces many unskilled laborers to work in the lower-paying, informal, nonfarm sector and on smallholder farms.

is 86 percent for labor and 14 percent for capital; in construction the split is 95 percent for labor and 5 percent for capital; and in private services, labor receives 100 percent.

Income Distribution

Factor incomes generated in agriculture are distributed directly to the producing rural household groups: labor, capital, and land incomes from smallholder production accrue to SH households; skilled-labor, capital, and land incomes generated in LSC farm production are allocated to LSC upper-income households; and the unskilled-labor income from LSC farm production accrues to low-income LSC households.

In nonagricultural activities, income of unskilled workers in the formal and informal sectors goes to low-income urban households, while that of skilled workers accrues to high-income urban households.

Nonagricultural capital income is paid to the enterprise account. Net earnings of enterprises are computed as total enterprise income (in this case, capital income plus transfer from the government) less corporate taxes, corporate saving, and any factor payment to the ROW. Net earnings are distributed to the high-income LSC and urban household groups.

Nongovernment institutions receive, in addition to factor incomes, income transfers from other institutions. Government transfers are distributed to households based on the household survey finding that government transfers account for five and 40 percent of the cash income of LSC farm and smallholder households, respectively (CSO 1994, Tables 3.1 and 3.3). The balance from total government transfers is allocated to urban households so that 2 percent of the total earnings of high-income households come from government transfers and the rest is transferred to the low-income urban household group. Transfers from urban households to smallholder households are assumed to be 26 percent of SH cash income (CSO 1994, Tables 3.1 and 3.3).

Household Expenditures

Households are classified into five groups in the micro-SAM, which are linked (but do not exactly correspond) to the classification used in the ICES.

As a first approximation, similar consumption patterns for the three low-income household groups are assumed based on the consumption schedules in the household survey (CSO 1994, Table 3.5a). Some adjustments are made to reconcile with the National Accounts aggregates on private consumption and to meet the constraints on total household incomes. The schedule of home consumption by smallholder households is based on the production accounts for communal farmers (CSO 1996a).

Household income tax rates are derived from the ICES results. They range from 4 percent for smallholder households to 17 percent for high-income urban households. LSC farm-labor households are assumed to pay no taxes in view of their extremely low per capita income.

Household saving rates are estimated from the ICES by computing the share of income left after consumption expenditures are removed from total income (cash and in-kind). They range from 2 percent for LSC farm-labor households to 16 percent for high-income urban households.

Imports and Exports

The sectoral trade flows are derived from the *Quarterly Digest of Statistics* (CSO 1998b); commodity trade flows are derived from Tables 10.4 and 10.5 of the Balance of Payments account, while those of private services are from Table 9.0. Adjustments are made to reconcile with National Accounts aggregates on imports and exports.

Import taxes for commodities are calculated from the average most favored nation (MFN) tariff and surcharge rates for

corresponding commodity groups (GATT 1995, Table AV.1).

Other External Transactions

Transfers to the ROW are factor incomes received from nongovernmental enterprises. Current transfers net of grants to the government are in the form of remittances to households. Finally, foreign saving is the difference between external income and expenditure, which reflects the country's current account deficit.

Investment

Investment expenditures and change in stocks are based on published data on gross capital formation by type of assets (CSO 1998a, Table 4.1(a)). They are mainly directed to the manufacturing and construction sectors.

Government Budget

The government budget (central and local) is derived from national accounts data (CSO 1998a, Tables 7.9(b), 7.9(d), 7.10 (a) and 7.10(b)). Capital expenditure and income are left out of the government budget. They are assumed to be part of gross capital formation. The tables are summarized to generate a government budget conforming to the micro-SAM classification.

Tax income is composed of income taxes paid by households and enterprises, including tax on property paid by enterprises. Other government income includes indirect taxes (tariffs and indirect taxes on activities) and foreign grants from ROW.

Government consumption expenditures are the current expenditures on final demand (CSO 1998a, Table 7.8) aggregated into food processing (1 percent), light manufacturing (2 percent), other manufacturing (4 percent), trade and transport (4 percent) and private services (29 percent). The largest share in expenditure is compensation to employees (60 percent), which represents the consumption of public services.

Income transfer to enterprises includes interest payments on the domestic debt and subsidies to parastatals; transfer to households includes net lending; and transfers to ROW are property and entrepreneurial income paid to ROW.

Data sources used in the derivation of the micro-SAM entries are contained in Table A.2.

Table A.2 Data sources for the Zimbabwe micro-SAM

Source documents	Data extracted	SAM Entries
National accounts 1985–96 (CSO 1997)		
♦ Table 7.4 GDP by kind of activity and ownership	♦ This is the breakdown between public and private activity by industry. It is used to aggregate services into public and private services.	♦ Control total for total value-added for the service sectors
♦ Tables 7.7 Quarterly employment survey	♦ Annual earnings	♦ Annual earnings per sector provides the basis for formal labor value-added by industry. When netted out of GDP f.c., the residual is nonlabor value-added by industry (inclusive of land for the agriculture sector).
♦ Table 7.9 (b) Revenue and grants of central government	♦ Income tax revenue from individuals	♦ Total household income tax
	♦ Corporate income tax + other unallocable + tax on property	♦ Enterprise income tax
♦ Table 7.9 (d) Central government expenditures and net lending by economic group	♦ Domestic tax on goods less subsidies	♦ Total indirect tax on domestic production
♦ Table 7.10 (a) Local government revenue	♦ Taxes—International trade and transactions	♦ Total Import tariff
♦ Table 7.10 (c) Expenditures and net lending by economic group—local government	♦ Grants from abroad	♦ Transfer from world to government
	♦ Expenditure on goods and services	♦ Government consumption expenditure
	♦ Interest payments and transfers to non Profit organizations	♦ Transfer from government to enterprise and world
	♦ Total lending minus repayment	♦ Transfer from government to households
Production account of agriculture, forestry and fishing (CSO 1996b)		
♦ Table 2 Details of output	♦ Output of primary products	♦ Aggregated when appropriate into output for maize, wheat, other grains (shorghum, rice, mhunga, rapoko, barley and other), horticulture (sunflower, dry beans, potatoes, vegetables, garden plants, and fruit), coffee, tea, groundnuts, cotton, sugar, tobacco, other crops (seeds, fodder crops, soya beans), cattle, other livestock (dairy products, poultry, other livestock, game products), fisheries, and forestry.

(continued)

Table A.2—Continued

Source documents	Data extracted	SAM Entries
Production account of agriculture, forestry, and fishing (CSO 1996b) continued		
♦ Table 3 Details of inputs	♦ Direct for crops, livestock, and fisheries ♦ General such as fuel, electricity, and water	♦ When the input is not linked to a specific commodity group, it is distributed among commodities according to their relative shares of production. ♦ Distributed among the agricultural commodities according to their relative shares of production.
Production account of agriculture: Communal lands, including resettlement areas (CSO 1996a)		
♦ Table 1.5 Production account of Agriculture: Communal lands including resettlement areas	♦ Sale of crops	♦ Aggregated when appropriate into output for maize, wheat, other grains (sorghum), horticulture (sunflower), coffee, groundnuts, cotton, tobacco, other crops (soybeans, other).
	♦ Livestock	♦ Aggregated into cattle , other livestock (dairy products, pigs, sheep, goats)
	♦ Production for own consumption	♦ Aggregated into maize, groundnuts, other grains, horticulture (beans, fruits and vegetables), other crops (other), cattle (meat), livestock (milk), forestry (firewood).
	♦ Inputs	♦ When the input is not linked to a specific commodity group, it is distributed among commodities according to their relative shares of production.

(continued)

Table A.2—Continued

Source documents	Data extracted	SAM Entries
Census of industrial production 1993/94 report (CSO 1995)		
• Table 2 Summary of operations by industry	• Gross output excluding sales of goods not produced on premises • Total Purchases excluding goods purchased for resale • Wages and salaries	• Gross output of goods aggregated into micro-SAM sectors • Total intermediate demand by commodity aggregated into micro-SAM sectors • Value-added labor for these sectors used the three distributions of gross output, intermediate demand, and value-added to disaggregate the manufacturing sector item in the national accounts into the micro-SAM's six manufacturing sectors
• Table 4 Analysis of purchases and changes in stocks	• Purchases of electricity and water	• Intermediate demand for electricity and water
The quarterly digest of statistics (CSO 1997)		
• Table 10.4 Domestic exports classified by SITC sections and principal commodities within sections	• Export distribution by SITC classification	• Aggregated into the commodity classification of the micro-SAM; the difference with the national account is attributed to export of private services (tourism)
• Table 10.5 Domestic imports classified by SITC sections and principal commodities within sections	• Import distribution by SITC classification	• Aggregated into the commodity classification of the micro-SAM; the difference with the national account is attributed to import of private services
Income consumption and expenditure survey report 1990/91 (CSO 1994)		
• Table 3.1(a) Average annual household cash income by type of Income and sector	• The schedule of income sources and tax payments for large-scale commercial, small-scale commercial, communal, resettlement, and urban households	• Sources of income (wages, capital, transfer) and tax rate are identified for three household groups: large-scale commercial farms, small-scale farms (including communal and resettlement), and urban households
• Table 3.3(a) Average annual income in kind by type of income and sector	• The schedule of income sources in kind for large-scale commercial, small-scale commercial, communal, resettlement, and urban households	• This table is combined with Table 3.1(a) to estimate the share of noncash income (associated with informal activities) in total income

(continued)

Table A.2—Continued

Source documents	Data extracted	SAM Entries
Income consumption and expenditure survey report 1990/91 (CSO 1994) continued		
♦ Table 3.5(a) Average annual household consumption expenditure by commodity group and sector	♦ The schedule of consumption expenditure for large-scale commercial, small-scale commercial, communal, resettlement, and urban households	♦ A schedule of consumption expenditure for the three household groups (large-scale commercial farms, small-scale commercial farms, and urban households is derived, then aggregated, to reconcile as closely as possible with the micro-SAM classification
The input-output structure of the economy of Zimbabwe 1980 (CSO 1988)		
♦ Table 2 Inputs and final demand table for Zimbabwe	♦ Input coefficients for the nonagriculture sectors	♦ Intermediate input schedule for the nonagriculture sector
♦ Table 3 Import matrix (use of import)	♦ The distribution of indirect taxes	♦ The distribution of indirect taxes
♦ Table 4 Transport margins table for Zimbabwe	♦ The marketing margins distribution per commodity	♦ Basis for marketing margins distribution, adjusted for agriculture and split between export, import and domestic marketing margins
♦ Table 5 Distribution margins table for Zimbabwe		

Sources: Calculated by authors based on CSO 1998a (national accounts) and CSO 1996a and 1996b (agricultural production accounts).

APPENDIX B

1991 Zimbabwe Micro-SAM

Table B.1 1991 Zimbabwe micro-SAM: Transactions matrix in million Zimbabwe dollars

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Maize-LC	AMZLC													
Maize-SH	AMZSH													
Wheat	AWT													
Other grains-LC	AOGRNLC													
Other grains-SH	AOGRNSH													
Horticulture-LC	AHORTLC													
Horticulture-SH	AHORTSH													
Coffee	ACOF													
Tea	ATEA													
Groundnuts-LC	AGRNTLC													
Groundnuts-SH	AGRNTSH													
Cotton-LC	ACOTLC													
Cotton-SH	ACOTSH													
Sugar	ASUG													
Tobacco	ATOB													
Other crops-LC	AOCRPLC													
Other crops-SH	AOCRPSH													
Cattle-LC	ACATLC													
Cattle-SH	ACATSH													
Other livestock-LC	AOLVKLC													
Other livestock-SH	AOLVKSH													
Fisheries	AFISH													
Forestry-LC	AFORLC													
Forestry-SH	AFORSH													
Mining	AMIN													
Grain milling	AGRMIL													
Other food processing	AOFDP													
Textiles	ATEXT													
Other light manufacturing	AOLGT													
Fertilizer	AFERT													
Other manufacturing	AOMAN													
Electricity and water	AELWA													
Construction	ACONS													
Trade and transport	ATDTP													
Public services	APUB													
Private services	APRIV													
Maize	CMZ													
Wheat	CWT													
Other grains	COGRN													
Horticulture	CHORT													
Coffee	CCOF													
Tea	CTEA													
Groundnuts	CGRNT													
Cotton	CCOT													
Sugar	CSUG													

(continued)

Table B.1 Continued

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Tobacco	CTOB													
Other crops	COCRP													
Cattle	CCAT													
Other livestock	COLVK													
Fisheries	CFISH													
Forestry	CFOR								1.57	1.40			1.40	
Mining	CMIN													
Grain milling	CGRMIL													
Other food processing	COFDP	3.63	4.36	4.13	0.53	1.84	2.73	5.59	3.88	3.04	0.62	9.97	4.44	1.10
Textiles	CTEXT													
Other light manufacturing	COLGT	4.63	25.90	5.36	0.69	13.41	5.74		0.28	0.21	0.04		11.57	0.73
Fertilizer	CFERT	45.02	49.77	30.65	2.97	0.43	40.00	5.03	10.91	8.25	1.74	0.59	24.18	35.23
Other manufacturing	COMAN	0.54		0.46	0.05		0.48		0.31	0.24	0.05		0.49	
Electricity and water	CELWA	2.94		3.34	0.45		2.22		3.66	2.90	0.52		4.13	
Construction	CCONS													
Trade and transport	CTDTP	2.03	4.57	1.68	0.21	1.96	1.24	4.90	1.82	1.38	0.28	6.58	1.89	1.65
Trade and transport-Export	CTDTP-E													
Trade and transport-Import	CTDTP-M													
Trade and transport-Domestic	CTDTP-D													
Public services	CPUB		1.01											
Private services	CPRIV	13.82	1.87	14.62	1.73	0.19	9.80	0.30	13.16	9.86	2.18	0.22	20.56	1.06
LC-unskilled labor	LABUSKLS	5.81		4.86	0.55		4.59		3.11	2.34	0.51		4.54	
Formal unskilled labor	LABUSKF													
Informal unskilled labor	LABUSKIF		156.67			33.41		37.07			40.12		79.06	
Skilled labor	LABSK	19.81		16.45	1.79		15.44		15.33	10.96	1.69		22.70	
LC-Capital	CAPLSC	83.66		49.66	7.65		65.52		42.33	32.17	7.37		61.66	
SH-Capital	CAPSH		62.26			11.94		12.34			13.92		21.61	
Other Capital	CAPOT													
LC-Crop land	LANDLS	28.15		43.36	2.58		21.52		11.48	8.73	2.08		16.75	
SH-Crop land	LANDSH		47.91			9.11		11.19			12.43		50.39	
Enterprises	ENT													
LC-Owner/Manager households	HLSUPP													
LC-Workers households	HLSLOW													
SH-households	HSHHLD													
Urban high-income households	HURBUPP													
Urban low-income households	HURBLOW													
Government	GOV													
Direct taxes	DTAX													
Indirect taxes	ITAX	–1,2.23	–18.27	–50.05	1.59	4.89	43.53	7.37	6.70	5.09	1.79	6.47	9.58	9.73
Import taxes	IMPTAR													
Saving and investment	SAVINV													
Change of stocks	DSTOCK													
Rest of the world	ROW													
Total	**TOTAL**	**197.80**	**336.06**	**124.53**	**20.80**	**77.16**	**212.81**	**83.80**	**114.55**	**86.56**	**18.87**	**90.29**	**183.89**	**200.55**

(continued)

Table B.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ													57.69	15.13	
CWT													150.16	19.38	
COGRN															
CHORT													3.76		
CCOF														54.19	
CTEA														58.27	
CGRNT													5.60	9.73	
CCOT													2.44		282.21
CSUG													1.31	210.47	
CTOB															

(continued)

Table B.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
COCRP					40.31	5.05	49.29	1.49					13.61	54.97	
CCAT					81.04								1.86	530.84	
COLVK							64.38						1.59	224.16	
CFISH															
CFOR	1.94				1.35		1.22								
CMIN												92.01	1.87	37.58	12.67
CGRMIL													5.23	20.31	
COFDP	9.30	39.94	8.70	2.68	144.14	4.43	171.10	1.37	9.96				16.42	223.65	4.46
CTEXT												15.79	8.31	68.67	509.85
COLGT	0.64	8.22	0.59									16.26	2.80	60.17	16.27
CFERT	25.22	345.11	23.54	2.40	60.67							19.16	1.90	4.37	23.81
COMAN	0.72	6.91	0.67		29.86		36.38			5.65		527.55	14.66	293.61	51.81
CELWA	8.42	17.96	6.83		10.60		12.08					47.65	3.29	13.45	15.52
CCONS													1.06	8.15	
CTDTP	4.22	18.93	3.84	2.35		7.04						22.33	6.29	43.63	23.94
CTDTP-E															
CTDTP-M															
CTDTP-D															
CPUB		5.52											1.05	7.98	4.43
CPRIV	33.00	434.18	29.69	0.14	22.22	25.26	28.50					6.25	3.52	27.62	6.02
LABUSKLS	6.95	47.56	6.65		3.02		6.79		0.92	1.47					
LABUSKF												35.56	5.98	23.83	26.69
LABUSKIF				17.55		216.61		74.39			29.31				106.13
LABSK	35.46	440.24	22.93		12.21		33.89		2.87	3.91		327.04	45.58	200.87	234.44
CAPLSC	97.09	982.02	96.88		38.60		109.29		15.96	29.22					
CAPSH				5.68		88.75		40.67			2.87				
CAPOT												821.40	97.25	1,581.32	417.89
LANDLS	26.33	264.81	31.74												
LANDSH				5.77											
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX	14.43	52.00	13.64	3.17	22.40	20.33	33.58	7.53	29.98	4.12	2.14	88.88	–8.03	–36.20	65.55
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL	**263.73**	**2,663.39**	**245.71**	**39.75**	**466.43**	**367.46**	**546.51**	**125.45**	**59.69**	**44.36**	**34.32**	**2,019.88**	**445.20**	**3,756.14**	**1,801.70**

(continued)

Table B.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
AMZLC									197.80						
AMZSH									131.90						
AWT										124.53					
AOGRNLC											20.80				
AOGRNSH											4.49				
AHORTLC												212.81			
AHORTSH												10.87			
ACOF													114.55		
ATEA														86.56	
AGRNTLC															18.87
AGRNTSH															12.17
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT			6.51				3.93	2.49							
CCOT															
CSUG															
CTOB	849.99														

(continued)

Table B.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
COCRP			66.33				24.62	22.65							
CCAT	12.40		40.71				10.94	22.81							
COLVK	7.25		16.22				9.85								
CFISH															
CFOR															
CMIN	12.36	38.92	905.71	40.83	270.25	84.68	11.72	21.79							
CGRMIL	1.42						3.92								
COFDP	5.24	1.32	27.45			32.63	36.19	83.47							
CTEXT	190.95	1.33	66.53	2.85	26.74	185.44	186.18	127.27							
COLGT	140.93	3.21	54.45	6.28	17.37	115.21	35.09	110.90							
CFERT	3.34	176.50	20.59	7.05	3.41	7.86	2.73								
COMAN	92.30	44.65	2,022.75	42.25	1,548.60	2,648.70	483.93	550.25							
CELWA	7.46	38.06	14.24	186.66	10.15	14.82	8.70	10.84							
CCONS	5.14	1.24	12.63		109.81	96.71	34.87	131.33							
CTDTP	20.87	9.64	49.26	21.99	56.11	182.64	35.77	167.90							
CTDTP-E									12.14			3.18	16.39	8.98	1.75
CTDTP-M										3.10	1.82	0.94			
CTDTP-D									33.86	22.21	4.54	48.93	6.76	8.49	4.38
CPUB	5.09	1.23	12.38		160.41	278.45	64.40	917.26							
CPRIV	6.65	5.47	25.54	3.09	9.15	30.87	12.67	25.53							
LABUSKLS															
LABUSKF	52.98	6.18	76.42	24.79	51.16	129.13	205.84	1,13.73							
LABUSKIF	252.14				53.74	503.41		577.89							
LABSK	528.90	47.05	965.89	217.76	513.04	1,814.44	2,591.15	1,679.41							
CAPLSC															
CAPSH															
CAPOT	733.12	75.62	1,659.72	457.46	195.06	1,949.68	897.68	1,973.64							
LANDLS															
LANDSH															
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX	148.65	25.15	240.35	58.28	159.65	188.47	203.30	124.46							
IMPTAR										3.03	1.96	1.08			
SAVINV															
DSTOCK															
ROW										16.67	11.02	4.76			
TOTAL	**3,077.18**	**475.57**	**6,283.68**	**1,069.28**	**3,184.65**	**8,263.14**	**4,863.47**	**6,663.62**	**375.70**	**169.54**	**44.64**	**282.57**	**137.71**	**104.04**	**37.18**

(continued)

Table B.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC	183.89														
ACOTSH	200.55														
ASUG		263.73													
ATOB			2,663.39												
AOCRPLC				245.71											
AOCRPSH				39.75											
ACATLC					466.43										
ACATSH					266.23										
AOLVKLC						546.51									
AOLVKSH						3.54									
AFISH							59.69								
AFORLC								44.36							
AFORSH								0.34							
AMIN									2,019.88						
AGRMIL										445.20					
AOFDP											3,756.14				
ATEXT												1,801.70			
AOLGT													3,077.18		
AFERT														475.57	
AOMAN															6,283.68
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT															
CCOT															
CSUG															
CTOB															

(continued)

Table B.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
COCRP															
CCAT															
COLVK															
CFISH															
CFOR															
CMIN															
CGRMIL															
COFDP															
CTEXT															
COLGT															
CFERT															
COMAN															
CELWA															
CCONS															
CTDTP															
CTDTP-E	32.68	20.17	479.36			5.38			137.91		44.27	18.70	22.44	1.45	181.20
CTDTP-M			3.06						14.49		32.71	55.14	43.94	50.14	1,483.96
CTDTP-D	34.03	30.62	127.27	55.49	149.76	112.07	11.39	6.85	123.47	320.80	830.08	273.49	368.54	136.23	735.08
CPUB															
CPRIV															
LABUSKLS															
LABUSKF															
LABUSKIF															
LABSK															
CAPLSC															
CAPSH															
CAPOT															
LANDLS															
LANDSH															
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX															
IMPTAR			3.64						24.47		38.34	82.52	139.02	48.53	1,466.93
SAVINV															
DSTOCK															
ROW			15.57						100.16		158.32	296.54	425.32	323.57	6,245.71
TOTAL	**451.15**	**314.52**	**3,292.29**	**340.96**	**882.41**	**667.51**	**71.08**	**51.56**	**2,420.37**	**766.00**	**4,859.87**	**2,528.08**	**4,076.43**	**1,035.49**	**16,396.55**

(continued)

Table B.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA	1,069.28														
ACONS		3,184.65													
ATDTP			8,263.14												
APUB							4,863.47								
APRIV								6,663.62							
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT															
CCOT															
CSUG															
CTOB															

(continued)

Table B.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
COCRP															
CCAT															
COLVK															
CFISH															
CFOR															
CMIN															
CGRMIL															
COFDP															
CTEXT															
COLGT															
CFERT															
COMAN															
CELWA															
CCONS															
CTDTP				985.99	1,689.28	3,444.37									
CTDTP-E															
CTDTP-M															
CTDTP-D															
CPUB															
CPRIV															
LABUSKLS															
LABUSKF															
LABUSKIF															
LABSK															
CAPLSC															
CAPSH															
CAPOT															
LANDLS															
LANDSH															
ENT															10,733.12
HLSUPP												810.45	1,719.07		
HLSLOW									99.67						
HSHHLD											694.73			260.05	
HURBUPP												8,984.79			
HURBLOW											752.29	1,482.78			
GOV															
DTAX															
ITAX															
IMPTAR								51.48							
SAVINV															
DSTOCK															
ROW								450.37				26.00			
TOTAL	**1,069.28**	**3,184.65**	**8,263.14**	**985.99**	**1,689.28**	**3,444.37**	**4,863.47**	**7,165.48**	**99.67**	**752.29**	**2,177.51**	**9821.24**	**1,719.07**	**260.05**	**1,0859.83**

(continued)

Table B.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW	TOTAL
AMZLC																197.80
AMZSH						204.15										336.06
AWT																124.53
AOGRNLC																20.80
AOGRNSH						72.67										77.16
AHORTLC																212.81
AHORTSH						72.93										83.80
ACOF																114.55
ATEA																86.56
AGRNTLC																18.87
AGRNTSH						78.12										90.29
ACOTLC																183.89
ACOTSH																200.55
ASUG																263.73
ATOB																2,663.39
AOCRPLC																245.71
AOCRPSH																39.75
ACATLC																466.43
ACATSH						101.24										367.46
AOLVKLC																546.51
AOLVKSH						121.91										125.45
AFISH																59.69
AFORLC																44.36
AFORSH						33.98										34.32
AMIN																2,019.88
AGRMIL																445.20
AOFDP																3,756.14
ATEXT																1,801.70
AOLGT																3,077.18
AFERT																475.57
AOMAN																6,283.68
AELWA																1,069.28
ACONS																3,184.65
ATDTP																8,263.14
APUB																4,863.47
APRIV																6,663.62
CMZ					12.79	37.76		178.91							73.42	375.70
CWT																169.54
COGRN				14.45	2.22	6.37	21.59									44.64
CHORT				45.55	6.34	7.89	111.95	90.89							16.20	282.57
CCOF															83.52	137.71
CTEA															45.77	104.04
CGRNT															8.92	37.18
CCOT															166.49	451.15
CSUG															102.75	314.52
CTOB															2,442.30	3,292.29

(continued)

Table B.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW	TOTAL
COCRP					3.01	13.12		46.52								340.96
CCAT				167.65	2.00	25.36								–13.20		882.41
COLVK				160.82	7.79	49.16		118.59						–17.11	24.80	667.51
CFISH				24.60	0.55	6.56	29.67	9.70								71.08
CFOR				9.34		12.53	20.81									51.56
CMIN															889.99	2,420.37
CGRMIL				306.77	11.76	60.63	175.29	180.68								766.00
COFDP				1,468.30	11.21	192.42	1,895.54	371.62	39.75					–165.86	178.57	4,859.87
CTEXT				405.29	3.02	38.19	500.18	70.84							120.65	2,528.08
COLGT				1,271.07	23.71	277.28	1,375.64	488.55	66.85					–228.43	144.80	4,076.43
CFERT							43.73								9.34	1,035.49
COMAN				1,081.59	4.90	80.24	1,968.59	185.27	203.82				3,399.00	–100.11	1,169.35	16,396.55
CELWA				114.11	0.83	10.49	406.83	70.50	19.58							1,069.28
CCONS													2,783.70			3,184.65
CTDTP				542.58	3.01	59.69	591.97	69.94	169.38							8,263.14
CTDTP-E																985.99
CTDTP-M																1,689.28
CTDTP-D																3,444.37
CPUB				219.44	3.48	84.37	163.98	48.48	2,884.52							4,863.47
CPRIV				1,387.40	1.14	91.68	1,704.71	166.58	1,391.09						1,598.12	7,165.48
LABUSKLS																99.67
LABUSKF																752.29
LABUSKIF																2,177.51
LABSK																9821.24
CAPLSC																1,719.07
CAPSH																260.05
CAPOT																10,859.83
LANDLS																457.53
LANDSH																136.80
ENT									1,209.00							11,942.12
HLSUPP	457.53		5,526.10						635.19						102.00	9,250.34
HLSLOW																99.67
HSHHLD		136.80					79.10	180.35	477.92							1,828.94
HURBUPP			3,306.03						106.73							12,397.55
HURBLOW									239.16							2,600.94
GOV										3,727.00	1,478.00	1,861.00			291.00	7,357.00
DTAX			1,667.00	687.89		20.95	1,239.89	111.27								3,727.00
ITAX																1,478.00
IMPTAR																1,861.00
SAVINV			908.00	1343.49	1.93	69.26	2,068.07	212.25	–504.00						1,559.00	5,658.00
DSTOCK													–524.71			–524.71
ROW			535.00						418.00							9,027.00
TOTAL	**457.53**	**136.80**	**11,942.12**	**9,250.34**	**99.67**	**1,828.94**	**12,397.55**	**2,600.94**	**7,357.00**	**3,727.00**	**1,478.00**	**1,861.00**	**5,658.00**	**–524.71**	**9,027.00**	**211,466.15**

Source: Calculated by authors using the sources described in Appendix Table A.2.

APPENDIX C

Coefficient Matrix for the 1991 Zimbabwe Micro-SAM

Table C.1 Coefficient matrix for the 1991 Zimbabwe micro-SAM

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Maize-LC	AMZLC													
Maize-SH	AMZSH													
Wheat	AWT													
Other grains-LC	AOGRNLC													
Other grains-SH	AOGRNSH													
Horticulture-LC	AHORTLC													
Horthiculture-SH	AHORTSH													
Coffee	ACOF													
Tea	ATEA													
Groundnuts-LC	AGRNTLC													
Groundnuts-SH	AGRNTSH													
Cotton-LC	ACOTLC													
Cotton-SH	ACOTSH													
Sugar	ASUG													
Tobacco	ATOB													
Other crops-LC	AOCRPLC													
Other crops-SH	AOCRPSH													
Cattle-LC	ACATLC													
Cattle-SH	ACATSH													
Other livestock-LC	AOLVKLC													
Other livestock-SH	AOLVKSH													
Fisheries	AFISH													
Forestry-LC	AFORLC													
Forestry-SH	AFORSH													
Mining	AMIN													
Grain milling	AGRMIL													
Other food processing	AOFDP													
Textiles	ATEXT													
Other light manufacturing	AOLGT													
Fertilizer	AFERT													
Other manufacturing	AOMAN													
Electricity and water	AELWA													
Construction	ACONS													
Trade and transport	ATDTP													
Public services	APUB													
Private services	APRIV													
Maize	CMZ													
Wheat	CWT													
Other grains	COGRN													
Horticulture	CHORT													
Coffee	CCOF													
Tea	CTEA													
Groundnuts	CGRNT													
Cotton	CCOT													
Sugar	CSUG													

(continued)

Table C.1—Continued

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Tobacco	CTOB													
Other crops	COCRP													
Cattle	CCAT													
Other livestock	COLVK													
Fisheries	CFISH													
Forestry	CFOR								0.01	0.02			0.01	
Mining	CMIN													
Grain milling	CGRMIL													
Other food processing	COFDP	0.02	0.01	0.03	0.03	0.02	0.01	0.07	0.03	0.04	0.03	0.11	0.02	0.01
Textiles	CTEXT													
Other light manufacturing	COLGT	0.02	0.08	0.04	0.03	0.17	0.03		0.00	0.00	0.00		0.06	0.00
Fertilizer	CFERT	0.23	0.15	0.25	0.14	0.01	0.19	0.06	0.10	0.10	0.09	0.01	0.13	0.18
Other manufacturing	COMAN	0.00		0.00	0.00		0.00		0.00	0.00	0.00		0.00	
Electricity and water	CELWA	0.01		0.03	0.02		0.01		0.03	0.03	0.03		0.02	
Construction	CCONS													
Trade and transport	CTDTP	0.01	0.01	0.01	0.01	0.03	0.01	0.06	0.02	0.02	0.01	0.07	0.01	0.01
Trade and transport-Exports	CTDTP-E													
Trade and transport-Imports	CTDTP-M													
Trade and transport-Domestic	CTDTP-D													
Public services	CPUB		0.00											
Private services	CPRIV	0.07	0.01	0.12	0.08	0.00	0.05	0.00	0.11	0.11	0.12	0.00	0.11	0.01
LC-unskilled labor	LABUSKLS	0.03		0.04	0.03		0.02		0.03	0.03	0.03		0.02	
Formal unskilled labor	LABUSKF													
Informal unskilled labor	LABUSKIF		0.47			0.43		0.44				0.44		0.39
Skilled labor	LABSK	0.10		0.13	0.09		0.07		0.13	0.13	0.09		0.12	
LC-Capital	CAPLSC	0.42		0.40	0.37		0.31		0.37	0.37	0.39		0.34	
SH-Capital	CAPSH		0.19			0.15		0.15				0.15		0.11
Other Capital	CAPOT													
LC-Crop land	LANDLS	0.14		0.35	0.12		0.10		0.10	0.10	0.11		0.09	
SH-Crop land	LANDSH		0.14			0.12		0.13				0.14		0.25
Enterprises	ENT													
LC-Owner/Manager households	HLSUPP													
LC-Workers households	HLSLOW													
SH-households	HSHHLD													
Urban high-income households	HURBUPP													
Urban low-income households	HURBLOW													
Government	GOV													
Direct taxes	DTAX													
Indirect taxes	ITAX	–0.06	–0.05	–0.40	0.08	0.06	0.20	0.09	0.06	0.06	0.09	0.07	0.05	0.05
Import taxes	IMPTAR													
Saving and investment	SAVINV													
Change of stocks	DSTOCK													
Rest of the world	ROW													
Total	**TOTAL**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

(continued)

Table C.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ													0.13	0.00	
CWT													0.34	0.01	
COGRN															
CHORT													0.01		
CCOF														0.01	
CTEA														0.02	
CGRNT													0.01	0.00	
CCOT													0.01		0.16
CSUG													0.00	0.06	
CTOB															

(continued)

Table C.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
COCRP					0.09	0.01	0.09	0.01					0.03	0.01	
CCAT					0.17								0.00	0.14	
COLVK							0.12						0.00	0.06	
CFISH															
CFOR	0.01				0.00		0.00								
CMIN												0.05	0.00	0.01	0.01
CGRMIL													0.01	0.01	
COFDP	0.04	0.01	0.04	0.07	0.31	0.01	0.31	0.01	0.17				0.04	0.06	0.00
CTEXT												0.01	0.02	0.02	0.28
COLGT	0.00	0.00	0.00									0.01	0.01	0.02	0.01
CFERT	0.10	0.13	0.10	0.06	0.13							0.01	0.00	0.00	0.01
COMAN	0.00	0.00	0.00		0.06		0.07			0.13		0.26	0.03	0.08	0.03
CELWA	0.03	0.01	0.03		0.02		0.02					0.02	0.01	0.00	0.01
CCONS													0.00	0.00	
CTDTP	0.02	0.01	0.02	0.06		0.02						0.01	0.01	0.01	0.01
CTDTP-E															
CTDTP-M															
CTDTP-D															
CPUB		0.00											0.00	0.00	0.00
CPRIV	0.13	0.16	0.12	0.00	0.05	0.07	0.05					0.00	0.01	0.01	0.00
LABUSKLS	0.03	0.02	0.03		0.01		0.01		0.02	0.03					
LABUSKF												0.02	0.01	0.01	0.01
LABUSKIF				0.44		0.59		0.59			0.85				0.06
LABSK	0.13	0.17	0.09		0.03		0.06		0.05	0.09		0.16	0.10	0.05	0.13
CAPLSC	0.37	0.37	0.39		0.08		0.20		0.27	0.66					
CAPSH				0.14		0.24		0.32			0.08				
CAPOT												0.41	0.22	0.42	0.23
LANDLS	0.10	0.10	0.13												
LANDSH				0.15											
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX	0.05	0.02	0.06	0.08	0.05	0.06	0.06	0.06	0.50	0.09	0.06	0.04	-0.02	-0.01	0.04
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

(continued)

Table C.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
AMZLC									0.53						
AMZSH									0.35						
AWT										0.73					
AOGRNLC											0.47				
AOGRNSH											0.10				
AHORTLC												0.75			
AHORTSH												0.04			
ACOF													0.83		
ATEA														0.83	
AGRNTLC															0.51
AGRNTSH															0.33
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT			0.00				0.00	0.00							
CCOT															

(continued)

Table C.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
CSUG															
CTOB	0.28														
COCRP			0.01				0.01	0.00							
CCAT	0.00		0.01				0.00	0.00							
COLVK	0.00		0.00				0.00								
CFISH															
CFOR															
CMIN	0.00	0.08	0.14	0.04	0.08	0.01	0.00	0.00							
CGRMIL	0.00						0.00								
COFDP	0.00	0.00	0.00			0.00	0.01	0.01							
CTEXT	0.06	0.00	0.01	0.00	0.01	0.02	0.04	0.02							
COLGT	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.02							
CFERT	0.00	0.37	0.00	0.01	0.00	0.00	0.00								
COMAN	0.03	0.09	0.32	0.04	0.49	0.32	0.10	0.08							
CELWA	0.00	0.08	0.00	0.17	0.00	0.00	0.00	0.00							
CCONS	0.00	0.00	0.00		0.03	0.01	0.01	0.02							
CTDTP	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.03							
CTDTP-E									0.03			0.01	0.12	0.09	0.05
CTDTP-M										0.02	0.04	0.00			
CTDTP-D									0.09	0.13	0.10	0.17	0.05	0.08	0.12
CPUB	0.00	0.00	0.00		0.05	0.03	0.01	0.14							
CPRIV	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00							
LABUSKLS															
LABUSKF	0.02	0.01	0.01	0.02	0.02	0.02	0.04	0.02							
LABUSKIF	0.08				0.02	0.06		0.09							
LABSK	0.17	0.10	0.15	0.20	0.16	0.22	0.53	0.25							
CAPLSC															
CAPSH															
CAPOT	0.24	0.16	0.26	0.43	0.06	0.24	0.18	0.30							
LANDLS															
LANDSH															
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX	0.05	0.05	0.04	0.05	0.05	0.02	0.04	0.02							
IMPTAR										0.02	0.04	0.00			
SAVINV															
DSTOCK															
ROW										0.10	0.25	0.02			
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

(continued)

Table C.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC	0.41														
ACOTSH	0.44														
ASUG		0.84													
ATOB			0.81												
AOCRPLC				0.72											
AOCRPSH				0.12											
ACATLC					0.53										
ACATSH					0.30										
AOLVKLC						0.82									
AOLVKSH						0.01									
AFISH							0.84								
AFORLC								0.86							
AFORSH								0.01							
AMIN									0.83						
AGRMIL										0.58					
AOFDP											0.77				
ATEXT												0.71			
AOLGT													0.75		
AFERT														0.46	
AOMAN															0.38
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT															
CCOT															

(continued)

Table C.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
CSUG															
CTOB															
COCRP															
CCAT															
COLVK															
CFISH															
CFOR															
CMIN															
CGRMIL															
COFDP															
CTEXT															
COLGT															
CFERT															
COMAN															
CELWA															
CCONS															
CTDTP															
CTDTP-E	0.07	0.06	0.15			0.01			0.06		0.01	0.01	0.01	0.00	0.01
CTDTP-M			0.00						0.01		0.01	0.02	0.01	0.05	0.09
CTDTP-D	0.08	0.10	0.04	0.16	0.17	0.17	0.16	0.13	0.05	0.42	0.17	0.11	0.09	0.13	0.04
CPUB															
CPRIV															
LABUSKLS															
LABUSKF															
LABUSKIF															
LABSK															
CAPLSC															
CAPSH															
CAPOT															
LANDLS															
LANDSH															
ENT															
HLSUPP															
HLSLOW															
HSHHLD															
HURBUPP															
HURBLOW															
GOV															
DTAX															
ITAX															
IMPTAR			0.00						0.01		0.01	0.03	0.03	0.05	0.09
SAVINV															
DSTOCK															
ROW			0.00						0.04		0.03	0.12	0.10	0.31	0.38
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

(continued)

Table C.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
AMZLC															
AMZSH															
AWT															
AOGRNLC															
AOGRNSH															
AHORTLC															
AHORTSH															
ACOF															
ATEA															
AGRNTLC															
AGRNTSH															
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH															
AOLVKLC															
AOLVKSH															
AFISH															
AFORLC															
AFORSH															
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA	1.00														
ACONS		1.00													
ATDTP			1.00												
APUB							1.00								
APRIV								0.93							
CMZ															
CWT															
COGRN															
CHORT															
CCOF															
CTEA															
CGRNT															
CCOT															

(continued)

Table C.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
CSUG															
CTOB															
COCRP															
CCAT															
COLVK															
CFISH															
CFOR															
CMIN															
CGRMIL															
COFDP															
CTEXT															
COLGT															
CFERT															
COMAN															
CELWA															
CCONS															
CTDTP				1.00		1.00		1.00							
CTDTP-E															
CTDTP-M															
CTDTP-D															
CPUB															
CPRIV															
LABUSKLS															
LABUSKF															
LABUSKIF															
LABSK															
CAPLSC															
CAPSH															
CAPOT															
LANDLS															
LANDSH															
ENT															0.99
HLSUPP												0.08	1.00		
HLSLOW									1.00						
HSHHLD											0.32			1.00	
HURBUPP												0.91			
HURBLOW										1.00	0.68				0.01
GOV															
DTAX															
ITAX															
IMPTAR								0.01							
SAVINV															
DSTOCK															
ROW								0.06				0.00			
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

(continued)

Table C.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW
AMZLC															
AMZSH						0.11									
AWT															
AOGRNLC															
AOGRNSH						0.04									
AHORTLC															
AHORTSH						0.04									
ACOF															
ATEA															
AGRNTLC															
AGRNTSH						0.04									
ACOTLC															
ACOTSH															
ASUG															
ATOB															
AOCRPLC															
AOCRPSH															
ACATLC															
ACATSH						0.06									
AOLVKLC															
AOLVKSH						0.07									
AFISH															
AFORLC															
AFORSH						0.02									
AMIN															
AGRMIL															
AOFDP															
ATEXT															
AOLGT															
AFERT															
AOMAN															
AELWA															
ACONS															
ATDTP															
APUB															
APRIV															
CMZ					0.13	0.02		0.07							0.01
CWT															
COGRN				0.00	0.02	0.00	0.00								
CHORT				0.00	0.06	0.00	0.01	0.03							0.00
CCOF															0.01
CTEA															0.01
CGRNT															0.00
CCOT															0.02

(continued)

Table C.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW
CSUG															0.01
CTOB															0.27
COCRP					0.03	0.01		0.02							
CCAT				0.02	0.02	0.01								0.03	
COLVK				0.02	0.08	0.03		0.05						0.03	0.00
CFISH				0.00	0.01	0.00	0.00	0.00							
CFOR				0.00		0.01	0.00								
CMIN															0.10
CGRMIL				0.03	0.12	0.03	0.01	0.07							
COFDP				0.16	0.11	0.11	0.15	0.14	0.01					0.32	0.02
CTEXT				0.04	0.03	0.02	0.04	0.03							0.01
COLGT				0.14	0.24	0.15	0.11	0.19	0.01					0.44	0.02
CFERT							0.00								0.00
COMAN				0.12	0.05	0.04	0.16	0.07	0.03				0.60	0.19	0.13
CELWA				0.01	0.01	0.01	0.03	0.03	0.00						
CCONS													0.49		
CTDTP				0.06	0.03	0.03	0.05	0.03	0.02						
CTDTP-E															
CTDTP-M															
CTDTP-D															
CPUB				0.02	0.03	0.05	0.01	0.02	0.39						
CPRIV				0.15	0.01	0.05	0.14	0.06	0.19						0.18
LABUSKLS															
LABUSKF															
LABUSKIF															
LABSK															
CAPLSC															
CAPSH															
CAPOT															
LANDLS															
LANDSH															
ENT									0.16						
HLSUPP	1.00		0.46						0.09						0.01
HLSLOW															
HSHHLD		1.00					0.01	0.07	0.06						
HURBUPP			0.28						0.01						
HURBLOW									0.03						
GOV										1.00	1.00	1.00			0.03
DTAX			0.14	0.07		0.01	0.10	0.04							
ITAX															
IMPTAR															
SAVINV			0.08	0.15	0.02	0.04	0.17	0.08	–0.07						0.17
DSTOCK													–0.09		
ROW			0.04						0.06						
TOTAL	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

APPENDIX D

Multiplier Matrix for the 1991 Zimbabwe Micro-SAM

Table D.1 Total multiplier matrix

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Maize-LC	AMZLC	1.0098	0.0310	0.0132	0.0089	0.0284	0.0072	0.0285	0.0092	0.0092	0.0090	0.0292	0.0090	0.0282
Maize-SH	AMZSH	0.0137	1.0973	0.0186	0.0125	0.0862	0.0102	0.0872	0.0130	0.0130	0.0126	0.0897	0.0129	0.0950
Wheat	AWT	0.0089	0.0133	1.0120	0.0080	0.0123	0.0066	0.0123	0.0083	0.0083	0.0081	0.0129	0.0080	0.0121
Other grains-LC	AOGRNLC	0.0016	0.0019	0.0022	1.0014	0.0018	0.0012	0.0017	0.0015	0.0015	0.0015	0.0018	0.0014	0.0018
Other grains-SH	AOGRNSH	0.0029	0.0277	0.0040	0.0026	1.0243	0.0022	0.0247	0.0028	0.0028	0.0027	0.0254	0.0028	0.0275
Horticulture-LC	AHORTLC	0.0125	0.0221	0.0168	0.0112	0.0205	1.0092	0.0202	0.0119	0.0118	0.0114	0.0208	0.0115	0.0197
Horticulture-SH	AHORTSH	0.0032	0.0285	0.0044	0.0029	0.0251	0.0024	1.0254	0.0031	0.0031	0.0030	0.0262	0.0031	0.0282
Coffee	ACOF	0.0031	0.0036	0.0043	0.0029	0.0034	0.0023	0.0038	1.0031	0.0031	0.0030	0.0044	0.0029	0.0032
Tea	ATEA	0.0034	0.0039	0.0046	0.0031	0.0037	0.0025	0.0041	0.0033	1.0033	0.0032	0.0047	0.0031	0.0034
Groundnuts-LC	AGRNTLC	0.0008	0.0009	0.0010	0.0007	0.0009	0.0006	0.0009	0.0007	0.0007	1.0007	0.0010	0.0007	0.0008
Groundnuts-SH	AGRNTSH	0.0032	0.0299	0.0044	0.0030	0.0263	0.0024	0.0267	0.0031	0.0031	0.0030	1.0275	0.0031	0.0297
Cotton-LC	ACOTLC	0.0065	0.0071	0.0088	0.0058	0.0068	0.0048	0.0063	0.0060	0.0060	0.0059	0.0066	1.0060	0.0062
Cotton-SH	ACOTSH	0.0071	0.0077	0.0096	0.0064	0.0074	0.0052	0.0068	0.0066	0.0066	0.0064	0.0071	0.0066	1.0068
Sugar	ASUG	0.0123	0.0142	0.0169	0.0113	0.0136	0.0090	0.0150	0.0122	0.0122	0.0118	0.0172	0.0114	0.0127
Tobacco	ATOB	0.0492	0.0768	0.0680	0.0460	0.0884	0.0379	0.0574	0.0424	0.0424	0.0412	0.0594	0.0516	0.0587
Other crops-LC	AOCRPLC	0.0136	0.0248	0.0184	0.0123	0.0229	0.0100	0.0234	0.0130	0.0130	0.0127	0.0248	0.0125	0.0226
Other crops-SH	AOCRPSH	0.0022	0.0040	0.0030	0.0020	0.0037	0.0016	0.0038	0.0021	0.0021	0.0021	0.0040	0.0020	0.0037
Cattle-LC	ACATLC	0.0343	0.0371	0.0466	0.0312	0.0352	0.0251	0.0371	0.0327	0.0328	0.0321	0.0414	0.0310	0.0335
Cattle-SH	ACATSH	0.0231	0.0592	0.0314	0.0211	0.0534	0.0170	0.0550	0.0221	0.0222	0.0216	0.0584	0.0211	0.0569
Other livestock-LC	AOLVKLC	0.0386	0.0635	0.0522	0.0349	0.0589	0.0283	0.0600	0.0361	0.0362	0.0356	0.0637	0.0345	0.0578
Other livestock-SH	AOLVKSH	0.0046	0.0462	0.0062	0.0041	0.0405	0.0034	0.0411	0.0043	0.0043	0.0042	0.0424	0.0043	0.0459
Fisheries	AFISH	0.0040	0.0058	0.0054	0.0036	0.0053	0.0029	0.0053	0.0037	0.0037	0.0036	0.0054	0.0036	0.0054
Forestry-LC	AFORLC	0.0024	0.0057	0.0033	0.0022	0.0051	0.0018	0.0051	0.0141	0.0162	0.0022	0.0053	0.0088	0.0055
Forestry-SH	AFORSH	0.0012	0.0128	0.0017	0.0011	0.0112	0.0009	0.0114	0.0013	0.0013	0.0011	0.0117	0.0012	0.0127
Mining	AMIN	0.0491	0.0487	0.0637	0.0416	0.0399	0.0372	0.0419	0.0416	0.0417	0.0399	0.0418	0.0423	0.0453
Grain milling	AGRMIL	0.0321	0.0492	0.0431	0.0287	0.0453	0.0236	0.0448	0.0296	0.0296	0.0290	0.0463	0.0285	0.0448
Other food processing	AOFDP	0.2605	0.2998	0.3568	0.2400	0.2868	0.1911	0.3165	0.2572	0.2580	0.2491	0.3627	0.2414	0.2670
Textiles	ATEXT	0.1007	0.1091	0.1359	0.0905	0.1052	0.0746	0.0967	0.0937	0.0936	0.0908	0.1010	0.0933	0.0957
Other light manufacturing	AOLGT	0.2200	0.3438	0.3045	0.2060	0.3958	0.1696	0.2567	0.1899	0.1898	0.1843	0.2658	0.2309	0.2628
Fertilizer	AFERT	0.1436	0.1150	0.1603	0.0950	0.0347	0.1172	0.0627	0.0692	0.0693	0.0669	0.0344	0.0896	0.1269
Other manufacturing	AOMAN	0.2082	0.2134	0.2778	0.1842	0.1956	0.1545	0.1961	0.1926	0.1927	0.1848	0.2050	0.1893	0.1916
Electricity and water	AELWA	0.0856	0.0764	0.1204	0.0835	0.0643	0.0637	0.0654	0.0967	0.0984	0.0887	0.0651	0.0861	0.0703
Construction	ACONS	0.0145	0.0143	0.0198	0.0132	0.0132	0.0107	0.0132	0.0141	0.0141	0.0137	0.0138	0.0140	0.0128
Trade and transport	ATDTP	0.4626	0.5295	0.6108	0.4039	0.4901	0.3455	0.5121	0.4132	0.4139	0.3977	0.5418	0.4121	0.4735
Public services	APUB	0.0986	0.1182	0.1350	0.0903	0.1056	0.0721	0.1044	0.0971	0.0970	0.0949	0.1085	0.0946	0.1058
Private services	APRIV	0.3092	0.2403	0.4369	0.2951	0.2230	0.2228	0.2142	0.3336	0.3325	0.3271	0.2222	0.3243	0.2151
Maize	CMZ	0.0186	0.0589	0.0251	0.0168	0.0540	0.0137	0.0540	0.0175	0.0175	0.0171	0.0554	0.0171	0.0535
Wheat	CWT	0.0122	0.0182	0.0164	0.0109	0.0168	0.0089	0.0168	0.0113	0.0113	0.0111	0.0175	0.0108	0.0165
Other grains	COGRN	0.0035	0.0042	0.0046	0.0031	0.0038	0.0025	0.0037	0.0032	0.0032	0.0031	0.0039	0.0031	0.0039
Horticulture	CHORT	0.0166	0.0294	0.0224	0.0149	0.0273	0.0123	0.0269	0.0158	0.0157	0.0151	0.0276	0.0153	0.0262
Coffee	CCOF	0.0038	0.0043	0.0051	0.0035	0.0041	0.0028	0.0046	0.0037	0.0037	0.0036	0.0052	0.0035	0.0039
Tea	CTEA	0.0040	0.0047	0.0055	0.0037	0.0044	0.0030	0.0049	0.0040	0.0040	0.0039	0.0056	0.0037	0.0041
Groundnuts	CGRNT	0.0015	0.0018	0.0020	0.0014	0.0017	0.0011	0.0018	0.0014	0.0014	0.0014	0.0019	0.0014	0.0016
Cotton	CCOT	0.0160	0.0174	0.0215	0.0143	0.0167	0.0118	0.0154	0.0148	0.0148	0.0144	0.0161	0.0148	0.0152

(continued)

Table D.1 Continued

Description	Abbreviation	AMZLC	AMZSH	AWT	AOGRNLC	AOGRNSH	AHORTLC	AHORTSH	ACOF	ATEA	AGRNTLC	AGRNTSH	ACOTLC	ACOTSH
Sugar	CSUG	0.0147	0.0169	0.0201	0.0135	0.0162	0.0108	0.0179	0.0145	0.0145	0.0140	0.0205	0.0136	0.0151
Tobacco	CTOB	0.0608	0.0950	0.0841	0.0569	0.1093	0.0468	0.0709	0.0525	0.0524	0.0509	0.0734	0.0638	0.0726
Other crops	COCRP	0.0188	0.0344	0.0256	0.0171	0.0318	0.0139	0.0325	0.0181	0.0181	0.0176	0.0344	0.0174	0.0313
Cattle	CCAT	0.0648	0.0703	0.0881	0.0590	0.0665	0.0476	0.0702	0.0619	0.0621	0.0607	0.0783	0.0586	0.0634
Other livestock	COLVK	0.0471	0.0776	0.0637	0.0426	0.0720	0.0346	0.0733	0.0441	0.0443	0.0434	0.0778	0.0422	0.0707
Fisheries	CFISH	0.0047	0.0069	0.0064	0.0042	0.0064	0.0035	0.0063	0.0044	0.0044	0.0043	0.0065	0.0043	0.0064
Forestry	CFOR	0.0028	0.0066	0.0038	0.0025	0.0059	0.0021	0.0059	0.0164	0.0188	0.0026	0.0062	0.0102	0.0064
Mining	CMIN	0.0588	0.0584	0.0763	0.0498	0.0478	0.0446	0.0502	0.0499	0.0500	0.0478	0.0501	0.0506	0.0542
Grain milling	CGRMIL	0.0552	0.0847	0.0741	0.0493	0.0780	0.0406	0.0772	0.0509	0.0510	0.0500	0.0797	0.0490	0.0770
Other food processing	COFDP	0.3370	0.3879	0.4617	0.3105	0.3711	0.2472	0.4095	0.3328	0.3338	0.3223	0.4693	0.3123	0.3455
Textiles	CTEXT	0.1414	0.1531	0.1907	0.1270	0.1476	0.1046	0.1356	0.1315	0.1314	0.1273	0.1418	0.1309	0.1343
Other light manufacturing	COLGT	0.2915	0.4554	0.4033	0.2729	0.5243	0.2246	0.3401	0.2516	0.2515	0.2442	0.3521	0.3059	0.3481
Fertilizer	CFERT	0.3128	0.2505	0.3489	0.2069	0.0755	0.2552	0.1366	0.1507	0.1508	0.1457	0.0750	0.1950	0.2764
Other manufacturing	COMAN	0.5432	0.5568	0.7249	0.4807	0.5104	0.4032	0.5117	0.5027	0.5028	0.4821	0.5349	0.4941	0.5001
Electricity and water	CELWA	0.0856	0.0764	0.1204	0.0835	0.0643	0.0637	0.0654	0.0967	0.0984	0.0887	0.0651	0.0861	0.0703
Construction	CCONS	0.0145	0.0143	0.0198	0.0132	0.0132	0.0107	0.0132	0.0141	0.0141	0.0137	0.0138	0.0140	0.0128
Trade and transport	CTDTP	0.4626	0.5295	0.6108	0.4039	0.4901	0.3455	0.5121	0.4132	0.4139	0.3977	0.5418	0.4121	0.4735
Trade and transport-exports	CTDTP-E	0.0285	0.0370	0.0385	0.0258	0.0376	0.0215	0.0316	0.0256	0.0256	0.0247	0.0332	0.0272	0.0312
Trade and transport-imports	CTDTP-M	0.0736	0.0744	0.0952	0.0620	0.0622	0.0558	0.0632	0.0614	0.0614	0.0590	0.0630	0.0632	0.0686
Trade and transport-domestic	CTDTP-D	0.2261	0.2735	0.2971	0.1954	0.2450	0.1708	0.2410	0.1952	0.1957	0.1875	0.2504	0.1994	0.2465
Public services	CPUB	0.0986	0.1182	0.1350	0.0903	0.1056	0.0721	0.1044	0.0971	0.0970	0.0949	0.1085	0.0946	0.1058
Private services	CPRIV	0.3325	0.2584	0.4698	0.3173	0.2398	0.2396	0.2303	0.3587	0.3576	0.3518	0.2389	0.3487	0.2313
LC-unskilled labor	LABUSKLS	0.0331	0.0061	0.0441	0.0299	0.0060	0.0244	0.0055	0.0310	0.0310	0.0304	0.0058	0.0284	0.0053
Formal unskilled labor	LABUSKF	0.0315	0.0344	0.0425	0.0283	0.0320	0.0235	0.0302	0.0294	0.0294	0.0284	0.0313	0.0297	0.0304
Informal unskilled labor	LABUSKIF	0.1109	0.7155	0.1514	0.1014	0.6642	0.0822	0.6645	0.1056	0.1056	0.1026	0.6753	0.1074	0.6269
Skilled labor	LABSK	0.4939	0.4353	0.6652	0.4418	0.4088	0.3653	0.3859	0.5062	0.4994	0.4489	0.4015	0.4979	0.3832
LC-capital	CAPLSC	0.4812	0.0959	0.4782	0.4211	0.0953	0.3514	0.0849	0.4311	0.4346	0.4427	0.0896	0.3953	0.0829
SH-capital	CAPSH	0.0122	0.2482	0.0166	0.0111	0.2105	0.0090	0.2040	0.0116	0.0116	0.0113	0.2130	0.0114	0.1693
Other capital	CAPOT	0.5467	0.5901	0.7396	0.4939	0.5522	0.4066	0.5377	0.5170	0.5179	0.4989	0.5686	0.5144	0.5220
LC-crop land	LANDLS	0.1575	0.0253	0.3689	0.1378	0.0252	0.1125	0.0223	0.1142	0.1148	0.1238	0.0234	0.1056	0.0218
SH-crop land	LANDSH	0.0053	0.1702	0.0072	0.0048	0.1426	0.0039	0.1582	0.0050	0.0050	0.0048	0.1631	0.0049	0.2781
Enterprises	ENT	0.5403	0.5832	0.7309	0.4881	0.5458	0.4018	0.5315	0.5110	0.5119	0.4931	0.5619	0.5084	0.5159
LC-owner/manager households	HLSUPP	0.9295	0.4270	1.2402	0.8212	0.4068	0.6799	0.3850	0.8236	0.8275	0.8317	0.4061	0.7772	0.3751
LC-workers households	HLSLOW	0.0331	0.0061	0.0441	0.0299	0.0060	0.0244	0.0055	0.0310	0.0310	0.0304	0.0058	0.0284	0.0053
SH-households	HSHHLD	0.0646	0.6868	0.0879	0.0588	0.6023	0.0478	0.6113	0.0616	0.0616	0.0596	0.6294	0.0619	0.6827
Urban high-income households	HURBUPP	0.6015	0.5597	0.8109	0.5393	0.5250	0.4454	0.5002	0.6046	0.5986	0.5471	0.5228	0.5963	0.4934
Urban low-income households	HURBLOW	0.1134	0.5285	0.1542	0.1031	0.4907	0.0842	0.4890	0.1074	0.1074	0.1041	0.4978	0.1088	0.4634
Government	GOV													
Direct taxes	DTAX													
Indirect taxes	ITAX													
Import taxes	IMPTAR													
Saving and investment	SAVINV													
Change of stocks	DSTOCK													
Rest of the world	ROW													
Total	**TOTAL**													

(continued)

Table D.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
AMZLC	0.0092	0.0087	0.0093	0.0286	0.0097	0.0332	0.0092	0.0349	0.0054	0.0090	0.0387	0.0060	0.0792	0.0111	0.0113
AMZSH	0.0131	0.0129	0.0131	0.0884	0.0178	0.0931	0.0143	0.1056	0.0076	0.0121	0.0884	0.0092	0.0644	0.0173	0.0234
AWT	0.0083	0.0082	0.0085	0.0124	0.0079	0.0137	0.0085	0.0143	0.0052	0.0085	0.0149	0.0056	0.2580	0.0120	0.0073
AOGRNLC	0.0015	0.0014	0.0015	0.0018	0.0011	0.0018	0.0013	0.0020	0.0008	0.0016	0.0017	0.0009	0.0014	0.0012	0.0012
AOGRNSH	0.0028	0.0028	0.0028	0.0250	0.0043	0.0257	0.0032	0.0297	0.0016	0.0025	0.0226	0.0020	0.0044	0.0038	0.0059
AHORTLC	0.0119	0.0118	0.0118	0.0204	0.0104	0.0236	0.0108	0.0242	0.0064	0.0115	0.0276	0.0090	0.0193	0.0108	0.0123
AHORTSH	0.0031	0.0031	0.0031	0.0258	0.0046	0.0266	0.0035	0.0306	0.0017	0.0028	0.0238	0.0023	0.0051	0.0041	0.0063
ACOF	0.0031	0.0030	0.0031	0.0038	0.0057	0.0036	0.0060	0.0037	0.0032	0.0028	0.0036	0.0021	0.0034	0.0155	0.0025
ATEA	0.0033	0.0032	0.0034	0.0041	0.0061	0.0038	0.0064	0.0039	0.0034	0.0030	0.0038	0.0022	0.0036	0.0167	0.0026
AGRNTLC	0.0007	0.0007	0.0007	0.0009	0.0010	0.0009	0.0010	0.0009	0.0006	0.0007	0.0009	0.0006	0.0072	0.0021	0.0006
AGRNTSH	0.0031	0.0032	0.0031	0.0271	0.0050	0.0278	0.0038	0.0321	0.0019	0.0028	0.0245	0.0023	0.0091	0.0051	0.0065
ACOTLC	0.0061	0.0062	0.0061	0.0063	0.0053	0.0068	0.0058	0.0069	0.0034	0.0059	0.0068	0.0050	0.0097	0.0065	0.0852
ACOTSH	0.0066	0.0068	0.0067	0.0069	0.0058	0.0074	0.0063	0.0075	0.0037	0.0064	0.0074	0.0054	0.0106	0.0071	0.0929
ASUG	1.0122	0.0117	0.0123	0.0151	0.0222	0.0141	0.0234	0.0145	0.0125	0.0109	0.0140	0.0081	0.0157	0.0607	0.0097
ATOB	0.0425	1.0433	0.0429	0.0579	0.0354	0.0633	0.0382	0.0661	0.0232	0.0422	0.0656	0.0323	0.0482	0.0403	0.0410
AOCRPLC	0.0131	0.0128	1.0132	0.0236	0.0860	0.0354	0.0893	0.0351	0.0095	0.0126	0.0273	0.0095	0.0367	0.0328	0.0123
AOCRPSH	0.0021	0.0021	0.0021	1.0038	0.0139	0.0057	0.0144	0.0057	0.0015	0.0020	0.0044	0.0015	0.0059	0.0053	0.0020
ACATLC	0.0329	0.0319	0.0335	0.0375	1.1482	0.0363	0.0505	0.0377	0.0283	0.0319	0.0354	0.0212	0.0363	0.1151	0.0248
ACATSH	0.0222	0.0217	0.0226	0.0557	0.0902	1.0559	0.0328	0.0623	0.0181	0.0212	0.0512	0.0147	0.0264	0.0706	0.0220
AOLVKLC	0.0362	0.0351	0.0371	0.0605	0.0439	0.0648	1.1530	0.0682	0.0269	0.0366	0.0696	0.0231	0.0412	0.0885	0.0316
AOLVKSH	0.0044	0.0045	0.0044	0.0418	0.0071	0.0428	0.0058	1.0496	0.0025	0.0039	0.0378	0.0032	0.0072	0.0065	0.0097
AFISH	0.0037	0.0038	0.0038	0.0053	0.0030	0.0058	0.0033	0.0061	1.0020	0.0038	0.0060	0.0028	0.0039	0.0033	0.0034
AFORLC	0.0086	0.0024	0.0023	0.0052	0.0051	0.0053	0.0045	0.0059	0.0014	1.0022	0.0048	0.0018	0.0027	0.0032	0.0030
AFORSH	0.0012	0.0012	0.0012	0.0116	0.0019	0.0119	0.0014	0.0137	0.0007	0.0010	1.0104	0.0009	0.0019	0.0017	0.0027
AMIN	0.0418	0.0429	0.0416	0.0423	0.0494	0.0407	0.0447	0.0403	0.0212	0.0400	0.0400	1.0834	0.0511	0.0504	0.0449
AGRMIL	0.0296	0.0294	0.0302	0.0452	0.0246	0.0507	0.0266	0.0529	0.0169	0.0309	0.0555	0.0199	1.0372	0.0285	0.0264
AOFDP	0.2588	0.2469	0.2608	0.3196	0.4716	0.2976	0.4961	0.3058	0.2647	0.2304	0.2959	0.1719	0.2807	1.2906	0.2051
ATEXT	0.0941	0.0963	0.0947	0.0976	0.0820	0.1045	0.0892	0.1054	0.0523	0.0913	0.1047	0.0774	0.1157	0.1009	1.3333
AOLGT	0.1902	0.1936	0.1922	0.2592	0.1584	0.2831	0.1710	0.2956	0.1040	0.1886	0.2937	0.1447	0.2156	0.1804	0.1835
AFERT	0.0695	0.0881	0.0696	0.0632	0.1015	0.0324	0.0229	0.0342	0.0105	0.0158	0.0327	0.0180	0.0706	0.0293	0.0399
AOMAN	0.1932	0.1974	0.1929	0.1979	0.2210	0.2020	0.2271	0.1998	0.1067	0.2312	0.1984	0.2660	0.2287	0.2211	0.1890
AELWA	0.0969	0.0698	0.0912	0.0659	0.0899	0.0688	0.0848	0.0695	0.0297	0.0494	0.0725	0.0753	0.0836	0.0645	0.0690
ACONS	0.0143	0.0152	0.0143	0.0133	0.0138	0.0145	0.0140	0.0132	0.0070	0.0113	0.0130	0.0094	0.0171	0.0146	0.0114
ATDTP	0.4139	0.4129	0.4153	0.5170	0.5043	0.4835	0.4862	0.4747	0.2437	0.3783	0.4672	0.3388	0.5366	0.4571	0.4370
APUB	0.0986	0.1067	0.0990	0.1055	0.0817	0.1189	0.0866	0.1149	0.0464	0.0825	0.1086	0.0615	0.0978	0.0815	0.0791
APRIV	0.3435	0.3840	0.3415	0.2161	0.2433	0.2931	0.2672	0.2332	0.1266	0.2288	0.2307	0.1737	0.2774	0.2263	0.2021
CMZ	0.0175	0.0165	0.0176	0.0544	0.0185	0.0631	0.0175	0.0663	0.0103	0.0171	0.0735	0.0114	0.1505	0.0210	0.0215
CWT	0.0113	0.0112	0.0115	0.0169	0.0107	0.0186	0.0115	0.0194	0.0071	0.0116	0.0203	0.0076	0.3513	0.0163	0.0100
COGRN	0.0032	0.0031	0.0032	0.0038	0.0024	0.0039	0.0027	0.0042	0.0018	0.0034	0.0036	0.0020	0.0031	0.0025	0.0025
CHORT	0.0158	0.0157	0.0157	0.0270	0.0138	0.0314	0.0143	0.0321	0.0085	0.0152	0.0366	0.0120	0.0257	0.0144	0.0163
CCOF	0.0037	0.0036	0.0038	0.0046	0.0068	0.0043	0.0072	0.0044	0.0038	0.0033	0.0043	0.0025	0.0041	0.0186	0.0030
CTEA	0.0040	0.0038	0.0040	0.0050	0.0073	0.0046	0.0077	0.0047	0.0041	0.0036	0.0046	0.0027	0.0044	0.0200	0.0032
CGRNT	0.0015	0.0014	0.0015	0.0018	0.0019	0.0018	0.0020	0.0018	0.0011	0.0014	0.0018	0.0011	0.0142	0.0041	0.0012
CCOT	0.0149	0.0152	0.0150	0.0155	0.0130	0.0166	0.0141	0.0168	0.0083	0.0145	0.0167	0.0122	0.0238	0.0160	0.2090

(continued)

Table D.1 Continued

Abbreviation	ASUG	ATOB	AOCRPLC	AOCRPSH	ACATLC	ACATSH	AOLVKLC	AOLVKSH	AFISH	AFORLC	AFORSH	AMIN	AGRMIL	AOFDP	ATEXT
CSUG	0.0146	0.0139	0.0147	0.0180	0.0265	0.0168	0.0279	0.0173	0.0149	0.0130	0.0167	0.0097	0.0188	0.0724	0.0116
CTOB	0.0525	0.0535	0.0531	0.0716	0.0438	0.0782	0.0472	0.0816	0.0287	0.0521	0.0811	0.0400	0.0595	0.0498	0.0507
COCRP	0.0181	0.0178	0.0184	0.0328	0.1194	0.0491	0.1239	0.0487	0.0132	0.0175	0.0379	0.0132	0.0510	0.0455	0.0170
CCAT	0.0622	0.0604	0.0634	0.0709	0.2803	0.0687	0.0955	0.0713	0.0535	0.0604	0.0669	0.0401	0.0687	0.2177	0.0468
COLVK	0.0442	0.0429	0.0453	0.0739	0.0536	0.0791	0.1869	0.0833	0.0329	0.0446	0.0850	0.0282	0.0503	0.1081	0.0386
CFISH	0.0044	0.0045	0.0045	0.0063	0.0036	0.0069	0.0039	0.0073	0.0024	0.0045	0.0072	0.0033	0.0047	0.0039	0.0041
CFOR	0.0100	0.0028	0.0027	0.0060	0.0059	0.0062	0.0053	0.0069	0.0016	0.0026	0.0056	0.0021	0.0031	0.0038	0.0035
CMIN	0.0501	0.0514	0.0499	0.0506	0.0592	0.0487	0.0535	0.0483	0.0255	0.0479	0.0479	0.1000	0.0612	0.0603	0.0537
CGRMIL	0.0509	0.0506	0.0520	0.0778	0.0423	0.0872	0.0458	0.0911	0.0290	0.0532	0.0955	0.0342	0.0641	0.0491	0.0455
COFDP	0.3348	0.3195	0.3375	0.4135	0.6102	0.3850	0.6418	0.3957	0.3425	0.2980	0.3828	0.2224	0.3632	0.3760	0.2653
CTEXT	0.1320	0.1351	0.1329	0.1369	0.1151	0.1467	0.1251	0.1480	0.0733	0.1282	0.1470	0.1086	0.1624	0.1416	0.4677
COLGT	0.2520	0.2565	0.2546	0.3433	0.2098	0.3750	0.2265	0.3916	0.1377	0.2499	0.3891	0.1916	0.2855	0.2389	0.2431
CFERT	0.1513	0.1919	0.1516	0.1376	0.2211	0.0705	0.0499	0.0746	0.0229	0.0343	0.0712	0.0393	0.1537	0.0637	0.0868
COMAN	0.5042	0.5150	0.5032	0.5165	0.5767	0.5272	0.5927	0.5214	0.2784	0.6032	0.5178	0.6940	0.5969	0.5769	0.4931
CELWA	0.0969	0.0698	0.0912	0.0659	0.0899	0.0688	0.0848	0.0695	0.0297	0.0494	0.0725	0.0753	0.0836	0.0645	0.0690
CCONS	0.0143	0.0152	0.0143	0.0133	0.0138	0.0145	0.0140	0.0132	0.0070	0.0113	0.0130	0.0094	0.0171	0.0146	0.0114
CTDTP	0.4139	0.4129	0.4153	0.5170	0.5043	0.4835	0.4862	0.4747	0.2437	0.3783	0.4672	0.3388	0.5366	0.4571	0.4370
CTDTP-E	0.0257	0.0259	0.0258	0.0319	0.0293	0.0331	0.0312	0.0339	0.0163	0.0258	0.0338	0.0259	0.0351	0.0346	0.0410
CTDTP-M	0.0615	0.0645	0.0615	0.0638	0.0725	0.0619	0.0663	0.0619	0.0321	0.0645	0.0613	0.0715	0.0776	0.0643	0.0641
CTDTP-D	0.1950	0.1972	0.1958	0.2432	0.3008	0.2430	0.2804	0.2503	0.1325	0.1763	0.2480	0.1455	0.2844	0.2426	0.2173
CPUB	0.0986	0.1067	0.0990	0.1055	0.0817	0.1189	0.0866	0.1149	0.0464	0.0825	0.1086	0.0615	0.0978	0.0815	0.0791
CPRIV	0.3694	0.4129	0.3673	0.2324	0.2616	0.3152	0.2873	0.2508	0.1362	0.2461	0.2481	0.1868	0.2983	0.2434	0.2173
LABUSKLS	0.0300	0.0213	0.0306	0.0055	0.0131	0.0062	0.0199	0.0065	0.0177	0.0366	0.0064	0.0024	0.0166	0.0074	0.0052
LABUSKF	0.0297	0.0304	0.0296	0.0305	0.0299	0.0320	0.0296	0.0310	0.0150	0.0248	0.0305	0.0403	0.0452	0.0333	0.0436
LABUSKIF	0.1067	0.1104	0.1071	0.6664	0.1517	0.8265	0.1164	0.8460	0.0582	0.0923	1.0719	0.0737	0.1480	0.1343	0.2156
LABSK	0.5102	0.5522	0.4682	0.3895	0.4091	0.4142	0.4509	0.3988	0.2389	0.4057	0.3924	0.4449	0.5472	0.4130	0.4904
CAPLSC	0.4262	0.4220	0.4488	0.0857	0.1805	0.0963	0.3145	0.0999	0.3039	0.7112	0.0986	0.0383	0.2037	0.1085	0.0774
CAPSH	0.0117	0.0116	0.0118	0.2005	0.0323	0.3010	0.0169	0.3917	0.0081	0.0109	0.1376	0.0082	0.0256	0.0260	0.0262
CAPOT	0.5216	0.5241	0.5204	0.5428	0.6007	0.5563	0.6049	0.5426	0.3072	0.4438	0.5352	0.8183	0.7791	0.9179	0.7273
LANDLS	0.1138	0.1133	0.1434	0.0225	0.0239	0.0258	0.0251	0.0267	0.0091	0.0137	0.0266	0.0100	0.1167	0.0253	0.0205
LANDSH	0.0050	0.0050	0.0050	0.1702	0.0078	0.0264	0.0071	0.0298	0.0029	0.0047	0.0243	0.0038	0.0151	0.0067	0.0294
ENT	0.5155	0.5179	0.5143	0.5364	0.5937	0.5498	0.5978	0.5363	0.3036	0.4386	0.5290	0.8088	0.7700	0.9072	0.7189
HLSUPP	0.8207	0.8206	0.8688	0.3885	0.5129	0.4108	0.6534	0.4077	0.4733	0.9614	0.4023	0.4593	0.7219	0.5877	0.4710
HLSLOW	0.0300	0.0213	0.0306	0.0055	0.0131	0.0062	0.0199	0.0065	0.0177	0.0366	0.0064	0.0024	0.0166	0.0074	0.0052
HSHHLD	0.0621	0.0638	0.0622	0.6205	0.1016	0.6361	0.0728	0.7372	0.0355	0.0546	0.5603	0.0464	0.1033	0.0890	0.1422
HURBUPP	0.6095	0.6485	0.5707	0.5049	0.5386	0.5311	0.5780	0.5133	0.3026	0.4926	0.5054	0.6309	0.7137	0.6290	0.6477
HURBLOW	0.1084	0.1117	0.1086	0.4906	0.1402	0.6013	0.1159	0.6134	0.0583	0.0928	0.7666	0.1000	0.1551	0.1355	0.1988
GOV															
DTAX															
ITAX															
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL															

(continued)

Table D.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
AMZLC	0.0106	0.0055	0.0058	0.0069	0.0061	0.0083	0.0080	0.0103	0.5436	0.0109	0.0082	0.0081	0.0091	0.0091	0.0155
AMZSH	0.0183	0.0085	0.0092	0.0104	0.0097	0.0143	0.0121	0.0179	0.3942	0.0158	0.0165	0.0137	0.0132	0.0132	0.0381
AWT	0.0076	0.0048	0.0053	0.0064	0.0047	0.0061	0.0068	0.0074	0.0101	0.7443	0.0058	0.0066	0.0079	0.0079	0.0093
AOGRNLC	0.0012	0.0008	0.0009	0.0011	0.0008	0.0010	0.0012	0.0012	0.0017	0.0017	0.4670	0.0011	0.0014	0.0014	0.0015
AOGRNSH	0.0043	0.0019	0.0021	0.0023	0.0022	0.0033	0.0027	0.0042	0.0117	0.0034	0.1048	0.0032	0.0029	0.0029	0.0102
AHORTLC	0.0125	0.0079	0.0086	0.0104	0.0083	0.0105	0.0121	0.0127	0.0157	0.0139	0.0088	0.7628	0.0116	0.0116	0.0143
AHORTSH	0.0047	0.0021	0.0023	0.0026	0.0025	0.0037	0.0030	0.0046	0.0122	0.0038	0.0044	0.0419	0.0032	0.0032	0.0107
ACOF	0.0026	0.0018	0.0020	0.0024	0.0017	0.0022	0.0027	0.0027	0.0032	0.0035	0.0020	0.0023	0.8348	0.0029	0.0033
ATEA	0.0028	0.0019	0.0022	0.0025	0.0019	0.0024	0.0029	0.0029	0.0034	0.0037	0.0022	0.0025	0.0032	0.8352	0.0036
AGRNTLC	0.0006	0.0005	0.0011	0.0006	0.0006	0.0006	0.0011	0.0009	0.0008	0.0008	0.0005	0.0006	0.0007	0.0007	0.5084
AGRNTSH	0.0047	0.0022	0.0027	0.0026	0.0025	0.0037	0.0033	0.0048	0.0127	0.0038	0.0046	0.0035	0.0032	0.0032	0.3385
ACOTLC	0.0092	0.0042	0.0050	0.0053	0.0046	0.0061	0.0077	0.0069	0.0067	0.0074	0.0043	0.0050	0.0061	0.0061	0.0061
ACOTSH	0.0100	0.0046	0.0055	0.0057	0.0050	0.0067	0.0084	0.0075	0.0073	0.0080	0.0047	0.0055	0.0066	0.0066	0.0067
ASUG	0.0103	0.0070	0.0079	0.0093	0.0069	0.0087	0.0105	0.0107	0.0125	0.0137	0.0079	0.0090	0.0116	0.0116	0.0130
ATOB	0.2712	0.0282	0.0310	0.0364	0.0278	0.0358	0.0395	0.0425	0.0572	0.0553	0.0355	0.0375	0.0413	0.0413	0.0463
AOCRPLC	0.0126	0.0081	0.0176	0.0099	0.0097	0.0112	0.0150	0.0155	0.0172	0.0152	0.0097	0.0105	0.0127	0.0127	0.0164
AOCRPSH	0.0020	0.0013	0.0028	0.0016	0.0016	0.0018	0.0024	0.0025	0.0028	0.0025	0.0016	0.0017	0.0021	0.0021	0.0027
ACATLC	0.0288	0.0179	0.0243	0.0238	0.0179	0.0221	0.0264	0.0285	0.0338	0.0375	0.0212	0.0245	0.0310	0.0310	0.0335
ACATSH	0.0220	0.0126	0.0165	0.0164	0.0130	0.0170	0.0184	0.0217	0.0350	0.0256	0.0176	0.0181	0.0212	0.0213	0.0329
AOLVKLC	0.0343	0.0198	0.0245	0.0261	0.0200	0.0259	0.0290	0.0314	0.0458	0.0422	0.0259	0.0285	0.0344	0.0345	0.0432
AOLVKSH	0.0069	0.0030	0.0033	0.0036	0.0035	0.0054	0.0042	0.0068	0.0193	0.0054	0.0068	0.0051	0.0045	0.0045	0.0169
AFISH	0.0035	0.0024	0.0026	0.0032	0.0024	0.0030	0.0035	0.0036	0.0045	0.0044	0.0026	0.0030	0.0036	0.0036	0.0041
AFORLC	0.0024	0.0016	0.0018	0.0021	0.0016	0.0020	0.0024	0.0025	0.0035	0.0027	0.0018	0.0019	0.0121	0.0138	0.0032
AFORSH	0.0019	0.0008	0.0009	0.0010	0.0010	0.0015	0.0011	0.0019	0.0053	0.0014	0.0019	0.0014	0.0013	0.0013	0.0047
AMIN	0.0418	0.1240	0.1726	0.0738	0.1316	0.0579	0.0421	0.0442	0.0500	0.0554	0.0317	0.0405	0.0444	0.0444	0.0435
AGRMIL	0.0274	0.0170	0.0187	0.0228	0.0168	0.0219	0.0242	0.0263	0.0369	0.0349	0.0210	0.0236	0.0283	0.0283	0.0335
AOFDP	0.2179	0.1490	0.1681	0.1970	0.1458	0.1842	0.2223	0.2262	0.2649	0.2896	0.1669	0.1907	0.2449	0.2456	0.2756
ATEXT	0.1425	0.0657	0.0781	0.0814	0.0719	0.0952	0.1199	0.1071	0.1030	0.1140	0.0663	0.0777	0.0940	0.0939	0.0949
AOLGT	1.2135	0.1261	0.1388	0.1630	0.1243	0.1600	0.1766	0.1900	0.2561	0.2475	0.1586	0.1676	0.1849	0.1848	0.2070
AFERT	0.0346	1.2172	0.0155	0.0184	0.0127	0.0151	0.0167	0.0173	0.1179	0.1200	0.0499	0.0935	0.0601	0.0602	0.0477
AOMAN	0.1954	0.2017	1.3011	0.1861	0.3686	0.3018	0.2235	0.2230	0.2215	0.2491	0.1485	0.1806	0.2110	0.2110	0.2107
AELWA	0.0617	0.1585	0.0506	1.2641	0.0473	0.0516	0.0627	0.0600	0.0782	0.0961	0.0527	0.0602	0.0891	0.0906	0.0748
ACONS	0.0140	0.0127	0.0116	0.0100	1.0453	0.0225	0.0183	0.0325	0.0154	0.0179	0.0107	0.0128	0.0155	0.0155	0.0152
ATDTP	0.4325	0.3866	0.3578	0.3459	0.3626	1.3759	0.3674	0.3907	0.5979	0.6540	0.4337	0.5382	0.5751	0.5755	0.6062
APUB	0.0842	0.0603	0.0619	0.0686	0.1073	0.1002	1.0871	0.2161	0.1057	0.1141	0.0670	0.0771	0.0977	0.0976	0.1002
APRIV	0.2419	0.1577	0.1667	0.1988	0.1454	0.1788	0.2155	1.2114	0.2691	0.3476	0.1854	0.2096	0.3076	0.3067	0.2683
CMZ	0.0202	0.0105	0.0110	0.0131	0.0115	0.0158	0.0151	0.0195	1.0324	0.0208	0.0155	0.0154	0.0172	0.0172	0.0294
CWT	0.0104	0.0065	0.0072	0.0087	0.0064	0.0083	0.0093	0.0101	0.0138	1.0133	0.0080	0.0089	0.0108	0.0108	0.0127
COGRN	0.0026	0.0017	0.0019	0.0023	0.0017	0.0021	0.0026	0.0026	0.0035	0.0037	1.0021	0.0025	0.0031	0.0031	0.0032
CHORT	0.0166	0.0105	0.0114	0.0139	0.0110	0.0140	0.0161	0.0169	0.0208	0.0185	0.0117	1.0129	0.0155	0.0154	0.0190
CCOF	0.0031	0.0021	0.0024	0.0028	0.0021	0.0027	0.0032	0.0033	0.0038	0.0042	0.0024	0.0028	1.0035	0.0035	0.0040
CTEA	0.0034	0.0023	0.0026	0.0031	0.0023	0.0029	0.0034	0.0035	0.0041	0.0045	0.0026	0.0030	0.0038	1.0038	0.0043
CGRNT	0.0013	0.0009	0.0021	0.0011	0.0011	0.0012	0.0021	0.0018	0.0016	0.0017	0.0010	0.0011	0.0014	0.0014	1.0015
CCOT	0.0225	0.0104	0.0123	0.0129	0.0114	0.0150	0.0189	0.0169	0.0163	0.0181	0.0105	0.0123	0.0149	0.0149	0.0150

(continued)

Table D.1 Continued

Abbreviation	AOLGT	AFERT	AOMAN	AELWA	ACONS	ATDTP	APUB	APRIV	CMZ	CWT	COGRN	CHORT	CCOF	CTEA	CGRNT
CSUG	0.0123	0.0084	0.0095	0.0111	0.0082	0.0104	0.0125	0.0127	0.0150	0.0163	0.0094	0.0108	0.0138	0.0138	0.0155
CTOB	0.3352	0.0348	0.0383	0.0450	0.0343	0.0442	0.0488	0.0525	0.0707	0.0684	0.0438	0.0463	0.0511	0.0511	0.0572
COCRP	0.0176	0.0113	0.0244	0.0138	0.0135	0.0155	0.0208	0.0215	0.0239	0.0211	0.0134	0.0146	0.0176	0.0177	0.0228
CCAT	0.0545	0.0339	0.0460	0.0450	0.0338	0.0419	0.0500	0.0539	0.0639	0.0710	0.0402	0.0464	0.0586	0.0587	0.0633
COLVK	0.0419	0.0242	0.0299	0.0318	0.0244	0.0317	0.0354	0.0383	0.0559	0.0515	0.0316	0.0348	0.0420	0.0422	0.0528
CFISH	0.0042	0.0028	0.0031	0.0038	0.0028	0.0035	0.0041	0.0042	0.0054	0.0052	0.0031	0.0035	0.0043	0.0043	0.0049
CFOR	0.0028	0.0018	0.0021	0.0024	0.0019	0.0024	0.0028	0.0029	0.0041	0.0031	0.0021	0.0022	0.0140	0.0161	0.0037
CMIN	0.0500	0.1486	0.2068	0.0884	0.1577	0.0694	0.0504	0.0530	0.0600	0.0664	0.0379	0.0485	0.0532	0.0532	0.0521
CGRMIL	0.0471	0.0292	0.0322	0.0392	0.0290	0.0377	0.0417	0.0453	0.0634	0.0601	0.0362	0.0406	0.0487	0.0487	0.0577
COFDP	0.2820	0.1927	0.2175	0.2549	0.1886	0.2383	0.2876	0.2926	0.3428	0.3747	0.2160	0.2467	0.3169	0.3177	0.3566
CTEXT	0.1999	0.0921	0.1095	0.1143	0.1009	0.1336	0.1682	0.1503	0.1445	0.1600	0.0931	0.1091	0.1318	0.1318	0.1331
COLGT	0.2828	0.1671	0.1838	0.2159	0.1646	0.2120	0.2339	0.2517	0.3393	0.3279	0.2102	0.2220	0.2449	0.2448	0.2742
CFERT	0.0754	0.4730	0.0338	0.0400	0.0277	0.0329	0.0364	0.0377	0.2566	0.2612	0.1087	0.2036	0.1309	0.1310	0.1039
COMAN	0.5099	0.5262	0.7856	0.4855	0.9618	0.7875	0.5831	0.5819	0.5779	0.6500	0.3876	0.4712	0.5506	0.5506	0.5498
CELWA	0.0617	0.1585	0.0506	0.2641	0.0473	0.0516	0.0627	0.0600	0.0782	0.0961	0.0527	0.0602	0.0891	0.0906	0.0748
CCONS	0.0140	0.0127	0.0116	0.0100	0.0453	0.0225	0.0183	0.0325	0.0154	0.0179	0.0107	0.0128	0.0155	0.0155	0.0152
CTDTP	0.4325	0.3866	0.3578	0.3459	0.3626	0.3759	0.3674	0.3907	0.5979	0.6540	0.4337	0.5382	0.5751	0.5755	0.6062
CTDTP-E	0.0673	0.0258	0.0327	0.0245	0.0306	0.0268	0.0255	0.0263	0.0636	0.0323	0.0196	0.0337	0.1448	0.1121	0.0750
CTDTP-M	0.0601	0.0768	0.0801	0.0533	0.0948	0.0804	0.0633	0.0632	0.0747	0.1002	0.0874	0.0629	0.0646	0.0646	0.0638
CTDTP-D	0.1934	0.1831	0.1549	0.1488	0.1450	0.1586	0.1691	0.1733	0.3246	0.3729	0.2401	0.3409	0.2381	0.2711	0.3212
CPUB	0.0842	0.0603	0.0619	0.0686	0.1073	0.1002	0.0871	0.2161	0.1057	0.1141	0.0670	0.0771	0.0977	0.0976	0.1002
CPRIV	0.2601	0.1696	0.1792	0.2138	0.1563	0.1923	0.2318	0.2273	0.2893	0.3738	0.1994	0.2254	0.3307	0.3298	0.2885
LABUSKLS	0.0075	0.0021	0.0027	0.0027	0.0022	0.0028	0.0032	0.0034	0.0199	0.0328	0.0149	0.0191	0.0262	0.0263	0.0178
LABUSKF	0.0444	0.0399	0.0363	0.0505	0.0419	0.0409	0.0674	0.0482	0.0337	0.0373	0.0222	0.0265	0.0313	0.0313	0.0314
LABUSKIF	0.1935	0.0707	0.0758	0.0804	0.0877	0.1477	0.0913	0.1881	0.3276	0.1333	0.1352	0.1152	0.1127	0.1127	0.2975
LABSK	0.5530	0.4137	0.4536	0.5300	0.4823	0.5385	0.8497	0.6459	0.4788	0.5690	0.3238	0.3911	0.5117	0.5060	0.4481
CAPLSC	0.1377	0.0333	0.0412	0.0431	0.0342	0.0435	0.0501	0.0533	0.2923	0.3578	0.2120	0.2761	0.3659	0.3689	0.2612
CAPSH	0.0146	0.0073	0.0089	0.0091	0.0080	0.0112	0.0108	0.0141	0.0949	0.0139	0.0280	0.0167	0.0116	0.0116	0.0773
CAPOT	0.7105	0.6266	0.7099	0.9223	0.4969	0.6678	0.6267	0.7692	0.5768	0.6429	0.3809	0.4523	0.5424	0.5431	0.5496
LANDLS	0.0366	0.0087	0.0108	0.0113	0.0090	0.0115	0.0132	0.0141	0.0932	0.2727	0.0684	0.0877	0.0969	0.0974	0.0724
LANDSH	0.0072	0.0034	0.0040	0.0041	0.0038	0.0054	0.0054	0.0066	0.0632	0.0061	0.0173	0.0100	0.0051	0.0050	0.0567
ENT	0.7022	0.6193	0.7016	0.9116	0.4911	0.6600	0.6194	0.7602	0.5700	0.6354	0.3765	0.4470	0.5361	0.5367	0.5431
HLSUPP	0.5449	0.3627	0.4141	0.5199	0.3102	0.4048	0.4200	0.4724	0.6888	0.9714	0.4814	0.6029	0.7532	0.7565	0.6220
HLSLOW	0.0075	0.0021	0.0027	0.0027	0.0022	0.0028	0.0032	0.0034	0.0199	0.0328	0.0149	0.0191	0.0262	0.0263	0.0178
HSHHLD	0.1007	0.0434	0.0477	0.0516	0.0510	0.0784	0.0608	0.0987	0.2847	0.0763	0.0992	0.0742	0.0644	0.0644	0.2492
HURBUPP	0.7003	0.5499	0.6092	0.7372	0.5771	0.6753	0.9488	0.8013	0.5958	0.6964	0.4004	0.4815	0.6165	0.6115	0.5603
HURBLOW	0.1845	0.0954	0.0962	0.1160	0.1074	0.1493	0.1369	0.1852	0.2635	0.1356	0.1187	0.1103	0.1144	0.1144	0.2404
GOV															
DTAX															
ITAX															
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL															

(continued)

Table D.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
AMZLC	0.0174	0.0091	0.0086	0.0114	0.0166	0.0092	0.0059	0.0091	0.0060	0.0495	0.0101	0.0092	0.0089	0.0041	0.0034
AMZSH	0.0496	0.0133	0.0131	0.0221	0.0400	0.0148	0.0086	0.0129	0.0093	0.0434	0.0160	0.0187	0.0154	0.0065	0.0056
AWT	0.0095	0.0080	0.0078	0.0086	0.0093	0.0081	0.0053	0.0083	0.0054	0.1525	0.0104	0.0061	0.0064	0.0033	0.0029
AOGRNLC	0.0016	0.0014	0.0014	0.0015	0.0013	0.0012	0.0009	0.0015	0.0009	0.0013	0.0011	0.0010	0.0010	0.0005	0.0005
AOGRNSH	0.0139	0.0029	0.0029	0.0055	0.0106	0.0033	0.0019	0.0028	0.0021	0.0040	0.0035	0.0047	0.0036	0.0015	0.0013
AHORTLC	0.0150	0.0117	0.0115	0.0126	0.0144	0.0108	0.0071	0.0115	0.0087	0.0157	0.0104	0.0102	0.0106	0.0056	0.0048
AHORTSH	0.0143	0.0032	0.0032	0.0058	0.0111	0.0036	0.0021	0.0030	0.0023	0.0045	0.0039	0.0050	0.0039	0.0016	0.0014
ACOF	0.0029	0.0030	0.0028	0.0031	0.0044	0.0053	0.0030	0.0027	0.0020	0.0029	0.0124	0.0021	0.0022	0.0012	0.0011
ATEA	0.0032	0.0032	0.0030	0.0033	0.0048	0.0057	0.0033	0.0029	0.0021	0.0031	0.0133	0.0022	0.0024	0.0013	0.0012
AGRNTLC	0.0007	0.0007	0.0007	0.0007	0.0009	0.0010	0.0006	0.0007	0.0005	0.0044	0.0017	0.0005	0.0006	0.0003	0.0005
AGRNTSH	0.0150	0.0032	0.0033	0.0060	0.0116	0.0039	0.0022	0.0031	0.0024	0.0068	0.0047	0.0051	0.0040	0.0017	0.0016
ACOTLC	0.4137	0.0061	0.0062	0.0061	0.0059	0.0058	0.0038	0.0059	0.0049	0.0082	0.0062	0.0615	0.0076	0.0031	0.0028
ACOTSH	0.4512	0.0066	0.0067	0.0067	0.0064	0.0064	0.0042	0.0065	0.0053	0.0090	0.0067	0.0671	0.0083	0.0033	0.0031
ASUG	0.0116	0.8502	0.0111	0.0121	0.0175	0.0207	0.0119	0.0106	0.0078	0.0128	0.0485	0.0081	0.0087	0.0048	0.0043
ATOB	0.0524	0.0414	0.8506	0.0435	0.0439	0.0379	0.0252	0.0415	0.0311	0.0430	0.0378	0.0341	0.2085	0.0194	0.0171
AOCRPLC	0.0168	0.0128	0.0125	0.7348	0.0581	0.0753	0.0098	0.0125	0.0092	0.0260	0.0274	0.0103	0.0107	0.0058	0.0084
AOCRPSH	0.0027	0.0021	0.0020	0.1189	0.0094	0.0122	0.0016	0.0020	0.0015	0.0042	0.0044	0.0017	0.0017	0.0009	0.0014
ACATLC	0.0308	0.0311	0.0299	0.0321	0.6216	0.0454	0.0273	0.0306	0.0202	0.0304	0.0931	0.0207	0.0241	0.0123	0.0126
ACATSH	0.0364	0.0214	0.0207	0.0255	0.3691	0.0302	0.0179	0.0209	0.0142	0.0225	0.0577	0.0180	0.0184	0.0089	0.0088
AOLVKLC	0.0436	0.0345	0.0332	0.0380	0.0471	0.9489	0.0268	0.0354	0.0222	0.0348	0.0732	0.0261	0.0286	0.0138	0.0132
AOLVKSH	0.0230	0.0045	0.0046	0.0089	0.0176	0.0113	0.0030	0.0043	0.0033	0.0064	0.0060	0.0076	0.0058	0.0024	0.0021
AFISH	0.0043	0.0036	0.0036	0.0038	0.0039	0.0033	0.8419	0.0037	0.0026	0.0035	0.0031	0.0029	0.0030	0.0016	0.0014
AFORLC	0.0063	0.0076	0.0023	0.0026	0.0046	0.0041	0.0015	0.8627	0.0018	0.0024	0.0029	0.0024	0.0020	0.0011	0.0010
AFORSH	0.0064	0.0013	0.0012	0.0024	0.0048	0.0015	0.0008	0.0078	0.0009	0.0017	0.0016	0.0021	0.0016	0.0006	0.0006
AMIN	0.0459	0.0444	0.0454	0.0444	0.0482	0.0470	0.0271	0.0424	0.9107	0.0540	0.0497	0.0399	0.0377	0.0675	0.0746
AGRMIL	0.0347	0.0283	0.0279	0.0306	0.0320	0.0259	0.0177	0.0299	0.0191	0.6120	0.0261	0.0218	0.0230	0.0118	0.0104
AOFDP	0.2443	0.2468	0.2339	0.2552	0.3703	0.4402	0.2518	0.2247	0.1644	0.2403	1.0319	0.1715	0.1842	0.1018	0.0914
ATEXT	0.0946	0.0942	0.0955	0.0951	0.0911	0.0903	0.0591	0.0919	0.0755	0.1071	0.0958	0.9633	0.1177	0.0474	0.0438
AOLGT	0.2346	0.1854	0.1863	0.1947	0.1963	0.1697	0.1130	0.1855	0.1390	0.1923	0.1693	0.1527	0.9331	0.0869	0.0766
AFERT	0.0952	0.0607	0.0741	0.0600	0.0660	0.0216	0.0113	0.0158	0.0168	0.0474	0.0254	0.0305	0.0278	0.5618	0.0082
AOMAN	0.2070	0.2108	0.2156	0.2112	0.2290	0.2401	0.1380	0.2403	0.2564	0.2593	0.2272	0.1761	0.1797	0.1474	0.5428
AELWA	0.0740	0.0896	0.0660	0.0818	0.0770	0.0789	0.0332	0.0499	0.0687	0.0702	0.0595	0.0563	0.0521	0.0822	0.0269
ACONS	0.0147	0.0157	0.0165	0.0155	0.0155	0.0155	0.0094	0.0128	0.0104	0.0194	0.0155	0.0112	0.0129	0.0099	0.0077
ATDTP	0.5819	0.5692	0.5888	0.5835	0.6459	0.6427	0.4251	0.5115	0.4395	0.8881	0.6101	0.5005	0.4733	0.4271	0.3385
APUB	0.1004	0.0988	0.1049	0.1000	0.0960	0.0892	0.0550	0.0850	0.0627	0.0988	0.0817	0.0701	0.0742	0.0458	0.0384
APRIV	0.2542	0.3169	0.3438	0.3004	0.2474	0.2515	0.1350	0.2222	0.1654	0.2362	0.2083	0.1686	0.2017	0.1049	0.0901
CMZ	0.0331	0.0172	0.0163	0.0216	0.0315	0.0175	0.0112	0.0173	0.0113	0.0941	0.0192	0.0175	0.0169	0.0077	0.0065
CWT	0.0130	0.0108	0.0106	0.0116	0.0127	0.0110	0.0073	0.0112	0.0073	0.2077	0.0141	0.0083	0.0087	0.0045	0.0040
COGRN	0.0033	0.0031	0.0029	0.0031	0.0028	0.0026	0.0018	0.0032	0.0019	0.0027	0.0023	0.0021	0.0022	0.0012	0.0011
CHORT	0.0199	0.0155	0.0153	0.0167	0.0191	0.0143	0.0094	0.0152	0.0116	0.0208	0.0137	0.0135	0.0140	0.0074	0.0064
CCOF	0.0035	0.0036	0.0034	0.0037	0.0053	0.0064	0.0036	0.0032	0.0024	0.0035	0.0149	0.0025	0.0027	0.0015	0.0013
CTEA	0.0038	0.0038	0.0036	0.0040	0.0057	0.0068	0.0039	0.0035	0.0026	0.0037	0.0160	0.0027	0.0029	0.0016	0.0014
CGRNT	0.0015	0.0014	0.0014	0.0015	0.0018	0.0019	0.0011	0.0014	0.0010	0.0088	0.0034	0.0010	0.0011	0.0006	0.0010
CCOT	1.0150	0.0149	0.0151	0.0151	0.0144	0.0143	0.0094	0.0146	0.0119	0.0201	0.0151	0.1510	0.0186	0.0075	0.0069

(continued)

Table D.1 Continued

Abbreviation	CCOT	CSUG	CTOB	COCRP	CCAT	COLVK	CFISH	CFOR	CMIN	CGRMIL	COFDP	CTEXT	COLGT	CFERT	COMAN
CSUG	0.0138	1.0139	0.0132	0.0144	0.0208	0.0247	0.0142	0.0127	0.0093	0.0153	0.0579	0.0097	0.0104	0.0057	0.0052
CTOB	0.0648	0.0512	1.0514	0.0538	0.0542	0.0469	0.0312	0.0512	0.0384	0.0531	0.0468	0.0422	0.2577	0.0240	0.0212
COCRP	0.0233	0.0177	0.0173	1.0196	0.0806	0.1044	0.0135	0.0174	0.0128	0.0361	0.0381	0.0143	0.0149	0.0080	0.0116
CCAT	0.0583	0.0589	0.0566	0.0608	1.1760	0.0859	0.0516	0.0580	0.0383	0.0575	0.1760	0.0391	0.0456	0.0232	0.0238
COLVK	0.0533	0.0422	0.0406	0.0464	0.0576	1.1590	0.0327	0.0432	0.0271	0.0425	0.0894	0.0319	0.0350	0.0169	0.0161
CFISH	0.0051	0.0043	0.0043	0.0045	0.0046	0.0039	1.0026	0.0044	0.0031	0.0042	0.0037	0.0034	0.0036	0.0019	0.0017
CFOR	0.0073	0.0088	0.0027	0.0030	0.0054	0.0048	0.0017	1.0026	0.0020	0.0028	0.0034	0.0028	0.0024	0.0013	0.0011
CMIN	0.0550	0.0532	0.0544	0.0531	0.0578	0.0563	0.0325	0.0508	1.0913	0.0647	0.0596	0.0478	0.0452	0.0808	0.0894
CGRMIL	0.0598	0.0488	0.0479	0.0527	0.0550	0.0446	0.0304	0.0514	0.0328	1.0530	0.0450	0.0376	0.0396	0.0203	0.0178
COFDP	0.3161	0.3193	0.3026	0.3302	0.4792	0.5695	0.3258	0.2907	0.2128	0.3109	1.3351	0.2218	0.2383	0.1318	0.1183
CTEXT	0.1328	0.1322	0.1341	0.1335	0.1278	0.1267	0.0830	0.1290	0.1059	0.1503	0.1344	1.3517	0.1652	0.0665	0.0615
COLGT	0.3108	0.2455	0.2467	0.2580	0.2600	0.2248	0.1496	0.2458	0.1841	0.2547	0.2242	0.2024	1.2361	0.1152	0.1015
CFERT	0.2072	0.1322	0.1613	0.1306	0.1437	0.0470	0.0245	0.0344	0.0365	0.1031	0.0554	0.0664	0.0604	1.2232	0.0178
COMAN	0.5401	0.5500	0.5625	0.5511	0.5975	0.6266	0.3600	0.6272	0.6690	0.6767	0.5929	0.4596	0.4689	0.3845	1.4164
CELWA	0.0740	0.0896	0.0660	0.0818	0.0770	0.0789	0.0332	0.0499	0.0687	0.0702	0.0595	0.0563	0.0521	0.0822	0.0269
CCONS	0.0147	0.0157	0.0165	0.0155	0.0155	0.0155	0.0094	0.0128	0.0104	0.0194	0.0155	0.0112	0.0129	0.0099	0.0077
CTDTP	0.5819	0.5692	0.5888	0.5835	0.6459	0.6427	0.4251	0.5115	0.4395	0.8881	0.6101	0.5005	0.4733	0.4271	0.3385
CTDTP-E	0.1013	0.0900	0.1715	0.0267	0.0300	0.0385	0.0180	0.0260	0.0817	0.0316	0.0408	0.0403	0.0592	0.0181	0.0275
CTDTP-M	0.0681	0.0646	0.0680	0.0649	0.0707	0.0687	0.0398	0.0666	0.0749	0.0788	0.0715	0.0786	0.0647	0.0983	0.1330
CTDTP-D	0.2897	0.2865	0.2275	0.3580	0.4289	0.4267	0.2970	0.3074	0.1905	0.6505	0.3879	0.2848	0.2533	0.2445	0.1274
CPUB	0.1004	0.0988	0.1049	0.1000	0.0960	0.0892	0.0550	0.0850	0.0627	0.0988	0.0817	0.0701	0.0742	0.0458	0.0384
CPRIV	0.2734	0.3408	0.3696	0.3231	0.2660	0.2704	0.1452	0.2389	0.1778	0.2539	0.2240	0.1813	0.2169	0.1128	0.0968
LABUSKLS	0.0144	0.0256	0.0177	0.0231	0.0093	0.0169	0.0153	0.0319	0.0024	0.0108	0.0062	0.0041	0.0060	0.0015	0.0014
LABUSKF	0.0317	0.0315	0.0322	0.0315	0.0324	0.0316	0.0192	0.0270	0.0383	0.0434	0.0334	0.0367	0.0379	0.0258	0.0199
LABUSKIF	0.3443	0.1133	0.1167	0.1789	0.3546	0.1258	0.0726	0.1061	0.0783	0.1479	0.1314	0.1739	0.1618	0.0593	0.0507
LABSK	0.4529	0.5148	0.5464	0.4704	0.4326	0.4661	0.2869	0.4232	0.4327	0.5435	0.4197	0.4235	0.4749	0.2877	0.2527
CAPLSC	0.2044	0.3644	0.3495	0.3405	0.1318	0.2656	0.2622	0.6184	0.0369	0.1366	0.0920	0.0611	0.1086	0.0232	0.0222
CAPSH	0.0815	0.0116	0.0115	0.0337	0.1098	0.0179	0.0086	0.0118	0.0081	0.0196	0.0222	0.0202	0.0122	0.0054	0.0051
CAPOT	0.5404	0.5452	0.5476	0.5470	0.5987	0.6156	0.3650	0.4742	0.7590	0.7325	0.8341	0.6101	0.6075	0.4089	0.3698
LANDLS	0.0544	0.0973	0.0938	0.1078	0.0224	0.0227	0.0095	0.0135	0.0097	0.0727	0.0217	0.0162	0.0289	0.0061	0.0058
LANDSH	0.1265	0.0051	0.0051	0.0243	0.0130	0.0069	0.0033	0.0049	0.0038	0.0111	0.0062	0.0217	0.0060	0.0025	0.0023
ENT	0.5341	0.5388	0.5412	0.5406	0.5917	0.6084	0.3607	0.4686	0.7502	0.7239	0.8243	0.6030	0.6005	0.4041	0.3655
HLSUPP	0.5434	0.7535	0.7388	0.7373	0.4637	0.6083	0.4623	0.8837	0.4295	0.5891	0.5298	0.3913	0.4545	0.2400	0.2180
HLSLOW	0.0144	0.0256	0.0177	0.0231	0.0093	0.0169	0.0153	0.0319	0.0024	0.0108	0.0062	0.0041	0.0060	0.0015	0.0014
HSHHLD	0.3403	0.0648	0.0661	0.1299	0.2589	0.0773	0.0424	0.0611	0.0477	0.0929	0.0834	0.1121	0.0844	0.0341	0.0298
HURBUPP	0.5622	0.6201	0.6497	0.5800	0.5596	0.5948	0.3624	0.5169	0.6035	0.6976	0.6122	0.5544	0.6007	0.3750	0.3323
HURBLOW	0.2724	0.1150	0.1180	0.1597	0.2809	0.1244	0.0728	0.1048	0.1005	0.1527	0.1326	0.1622	0.1552	0.0709	0.0587
GOV															
DTAX															
ITAX															
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL															

(continued)

Table D.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
AMZLC	0.0069	0.0061	0.0083	0.0083	0.0083	0.0083	0.0080	0.0096	0.0821	0.0486	0.0424	0.0066	0.0080	0.0293	0.0060
AMZSH	0.0104	0.0097	0.0143	0.0143	0.0143	0.0143	0.0121	0.0166	0.0670	0.0512	0.0873	0.0112	0.0124	0.1646	0.0093
AWT	0.0064	0.0047	0.0061	0.0061	0.0061	0.0061	0.0068	0.0069	0.0245	0.0170	0.0160	0.0072	0.0102	0.0140	0.0067
AOGRNLC	0.0011	0.0008	0.0010	0.0010	0.0010	0.0010	0.0012	0.0011	0.0115	0.0011	0.0017	0.0015	0.0015	0.0029	0.0011
AOGRNSH	0.0023	0.0022	0.0033	0.0033	0.0033	0.0033	0.0027	0.0039	0.0069	0.0069	0.0214	0.0028	0.0028	0.0522	0.0021
AHORTLC	0.0104	0.0083	0.0105	0.0105	0.0105	0.0105	0.0121	0.0118	0.0593	0.0364	0.0305	0.0136	0.0117	0.0179	0.0096
AHORTSH	0.0026	0.0025	0.0037	0.0037	0.0037	0.0037	0.0030	0.0043	0.0074	0.0086	0.0227	0.0031	0.0031	0.0527	0.0024
ACOF	0.0024	0.0017	0.0022	0.0022	0.0022	0.0022	0.0027	0.0025	0.0038	0.0037	0.0038	0.0031	0.0034	0.0039	0.0024
ATEA	0.0025	0.0019	0.0024	0.0024	0.0024	0.0024	0.0029	0.0027	0.0041	0.0040	0.0041	0.0033	0.0036	0.0042	0.0026
AGRNTLC	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0011	0.0008	0.0012	0.0010	0.0010	0.0007	0.0008	0.0010	0.0006
AGRNTSH	0.0026	0.0025	0.0037	0.0037	0.0037	0.0037	0.0033	0.0045	0.0055	0.0078	0.0232	0.0031	0.0032	0.0561	0.0024
ACOTLC	0.0053	0.0046	0.0061	0.0061	0.0061	0.0061	0.0077	0.0064	0.0081	0.0072	0.0072	0.0065	0.0071	0.0074	0.0051
ACOTSH	0.0057	0.0050	0.0067	0.0067	0.0067	0.0067	0.0084	0.0070	0.0088	0.0078	0.0079	0.0070	0.0078	0.0081	0.0056
ASUG	0.0093	0.0069	0.0087	0.0087	0.0087	0.0087	0.0105	0.0099	0.0151	0.0148	0.0149	0.0121	0.0133	0.0153	0.0096
ATOB	0.0364	0.0278	0.0358	0.0358	0.0358	0.0358	0.0395	0.0395	0.0798	0.0679	0.0696	0.0440	0.0508	0.0735	0.0359
AOCRPLC	0.0099	0.0097	0.0112	0.0112	0.0112	0.0112	0.0150	0.0144	0.0429	0.0304	0.0293	0.0111	0.0139	0.0269	0.0097
AOCRPSH	0.0016	0.0016	0.0018	0.0018	0.0018	0.0018	0.0024	0.0023	0.0069	0.0049	0.0047	0.0018	0.0022	0.0044	0.0016
ACATLC	0.0238	0.0179	0.0221	0.0221	0.0221	0.0221	0.0264	0.0265	0.0466	0.0338	0.0371	0.0277	0.0400	0.0441	0.0260
ACATSH	0.0164	0.0130	0.0170	0.0170	0.0170	0.0170	0.0184	0.0202	0.0327	0.0286	0.0504	0.0192	0.0263	0.0970	0.0175
AOLVKLC	0.0261	0.0200	0.0259	0.0259	0.0259	0.0259	0.0290	0.0292	0.1076	0.0768	0.0746	0.0269	0.0439	0.0700	0.0279
AOLVKSH	0.0036	0.0035	0.0054	0.0054	0.0054	0.0054	0.0042	0.0063	0.0080	0.0117	0.0357	0.0042	0.0045	0.0870	0.0034
AFISH	0.0032	0.0024	0.0030	0.0030	0.0030	0.0030	0.0035	0.0033	0.0078	0.0061	0.0064	0.0041	0.0045	0.0069	0.0032
AFORLC	0.0021	0.0016	0.0020	0.0020	0.0020	0.0020	0.0024	0.0023	0.0025	0.0026	0.0047	0.0030	0.0026	0.0093	0.0021
AFORSH	0.0010	0.0010	0.0015	0.0015	0.0015	0.0015	0.0011	0.0017	0.0021	0.0031	0.0099	0.0012	0.0012	0.0242	0.0009
AMIN	0.0738	0.1316	0.0579	0.0579	0.0579	0.0579	0.0421	0.0411	0.0459	0.0422	0.0426	0.0384	0.0389	0.0433	0.0288
AGRMIL	0.0228	0.0168	0.0219	0.0219	0.0219	0.0219	0.0242	0.0245	0.0941	0.0639	0.0600	0.0249	0.0368	0.0516	0.0241
AOFDP	0.1970	0.1458	0.1842	0.1842	0.1842	0.1842	0.2223	0.2103	0.3160	0.3107	0.3148	0.2571	0.2818	0.3234	0.2024
ATEXT	0.0814	0.0719	0.0952	0.0952	0.0952	0.0952	0.1199	0.0996	0.1233	0.1098	0.1114	0.1002	0.1106	0.1148	0.0791
AOLGT	0.1630	0.1243	0.1600	0.1600	0.1600	0.1600	0.1766	0.1767	0.3572	0.3037	0.3117	0.1970	0.2273	0.3288	0.1608
AFERT	0.0184	0.0127	0.0151	0.0151	0.0151	0.0151	0.0167	0.0161	0.0448	0.0320	0.0344	0.0172	0.0178	0.0396	0.0132
AOMAN	0.1861	0.3686	0.3018	0.3018	0.3018	0.3018	0.2235	0.2074	0.2254	0.2099	0.2114	0.2075	0.2070	0.2144	0.1541
AELWA	1.2641	0.0473	0.0516	0.0516	0.0516	0.0516	0.0627	0.0558	0.0707	0.0842	0.0784	0.0745	0.0563	0.0660	0.0476
ACONS	0.0100	1.0453	0.0225	0.0225	0.0225	0.0225	0.0183	0.0302	0.0146	0.0135	0.0138	0.0119	0.0133	0.0144	0.0095
ATDTP	0.3459	0.3626	1.3759	1.3759	1.3759	1.3759	0.3674	0.3633	0.5829	0.4889	0.4967	0.3798	0.4289	0.5136	0.3048
APUB	0.0686	0.1073	0.1002	0.1002	0.1002	0.1002	1.0871	0.2010	0.1185	0.1006	0.1133	0.0835	0.1007	0.1406	0.0697
APRIV	0.1988	0.1454	0.1788	0.1788	0.1788	0.1788	0.2155	1.1265	0.2227	0.2421	0.2454	0.2580	0.2843	0.2524	0.2030
CMZ	0.0131	0.0115	0.0158	0.0158	0.0158	0.0158	0.0151	0.0182	0.1560	0.0923	0.0806	0.0126	0.0152	0.0557	0.0114
CWT	0.0087	0.0064	0.0083	0.0083	0.0083	0.0083	0.0093	0.0093	0.0334	0.0231	0.0218	0.0097	0.0139	0.0191	0.0092
COGRN	0.0023	0.0017	0.0021	0.0021	0.0021	0.0021	0.0026	0.0024	0.0247	0.0023	0.0036	0.0032	0.0032	0.0063	0.0024
CHORT	0.0139	0.0110	0.0140	0.0140	0.0140	0.0140	0.0161	0.0157	0.0787	0.0484	0.0406	0.0181	0.0155	0.0238	0.0127
CCOF	0.0028	0.0021	0.0027	0.0027	0.0027	0.0027	0.0032	0.0030	0.0046	0.0045	0.0045	0.0037	0.0041	0.0047	0.0029
CTEA	0.0031	0.0023	0.0029	0.0029	0.0029	0.0029	0.0034	0.0033	0.0049	0.0048	0.0049	0.0040	0.0044	0.0050	0.0031
CGRNT	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0021	0.0017	0.0024	0.0020	0.0020	0.0014	0.0016	0.0019	0.0011
CCOT	0.0129	0.0114	0.0150	0.0150	0.0150	0.0150	0.0189	0.0157	0.0198	0.0175	0.0178	0.0158	0.0175	0.0183	0.0125

(continued)

Table D.1 Continued

Abbreviation	CELWA	CCONS	CTDTP	CTDTP-E	CTDTP-M	CTDTP-D	CPUB	CPRIV	LABUSKLS	LABUSKF	LABUSKIF	LABSK	CAPLSC	CAPSH	CAPOT
CSUG	0.0111	0.0082	0.0104	0.0104	0.0104	0.0104	0.0125	0.0119	0.0180	0.0176	0.0178	0.0145	0.0159	0.0183	0.0114
CTOB	0.0450	0.0343	0.0442	0.0442	0.0442	0.0442	0.0488	0.0488	0.0987	0.0839	0.0861	0.0544	0.0628	0.0908	0.0444
COCRP	0.0138	0.0135	0.0155	0.0155	0.0155	0.0155	0.0208	0.0200	0.0596	0.0422	0.0407	0.0154	0.0193	0.0374	0.0134
CCAT	0.0450	0.0338	0.0419	0.0419	0.0419	0.0419	0.0500	0.0501	0.0882	0.0640	0.0701	0.0524	0.0756	0.0834	0.0491
COLVK	0.0318	0.0244	0.0317	0.0317	0.0317	0.0317	0.0354	0.0356	0.1314	0.0938	0.0911	0.0328	0.0537	0.0855	0.0341
CFISH	0.0038	0.0028	0.0035	0.0035	0.0035	0.0035	0.0041	0.0039	0.0093	0.0073	0.0076	0.0049	0.0054	0.0083	0.0039
CFOR	0.0024	0.0019	0.0024	0.0024	0.0024	0.0024	0.0028	0.0027	0.0029	0.0030	0.0055	0.0034	0.0031	0.0108	0.0024
CMIN	0.0884	0.1577	0.0694	0.0694	0.0694	0.0694	0.0504	0.0493	0.0550	0.0506	0.0510	0.0460	0.0466	0.0519	0.0345
CGRMIL	0.0392	0.0290	0.0377	0.0377	0.0377	0.0377	0.0417	0.0422	0.1620	0.1099	0.1032	0.0429	0.0634	0.0888	0.0415
COFDP	0.2549	0.1886	0.2383	0.2383	0.2383	0.2383	0.2876	0.2721	0.4089	0.4020	0.4072	0.3326	0.3646	0.4185	0.2619
CTEXT	0.1143	0.1009	0.1336	0.1336	0.1336	0.1336	0.1682	0.1398	0.1730	0.1540	0.1563	0.1406	0.1552	0.1611	0.1110
COLGT	0.2159	0.1646	0.2120	0.2120	0.2120	0.2120	0.2339	0.2340	0.4732	0.4023	0.4129	0.2610	0.3011	0.4356	0.2130
CFERT	0.0400	0.0277	0.0329	0.0329	0.0329	0.0329	0.0364	0.0351	0.0976	0.0697	0.0750	0.0373	0.0387	0.0862	0.0287
COMAN	0.4855	0.9618	0.7875	0.7875	0.7875	0.7875	0.5831	0.5412	0.5883	0.5478	0.5515	0.5414	0.5401	0.5594	0.4020
CELWA	1.2641	0.0473	0.0516	0.0516	0.0516	0.0516	0.0627	0.0558	0.0707	0.0842	0.0784	0.0745	0.0563	0.0660	0.0476
CCONS	0.0100	1.0453	0.0225	0.0225	0.0225	0.0225	0.0183	0.0302	0.0146	0.0135	0.0138	0.0119	0.0133	0.0144	0.0095
CTDTP	0.3459	0.3626	1.3759	1.3759	1.3759	1.3759	0.3674	0.3633	0.5829	0.4889	0.4967	0.3798	0.4289	0.5136	0.3048
CTDTP-E	0.0245	0.0306	0.0268	1.0268	0.0268	0.0268	0.0255	0.0244	0.0424	0.0360	0.0361	0.0259	0.0283	0.0362	0.0204
CTDTP-M	0.0533	0.0948	0.0804	0.0804	1.0804	0.0804	0.0633	0.0587	0.0719	0.0644	0.0652	0.0596	0.0606	0.0669	0.0448
CTDTP-D	0.1488	0.1450	0.1586	0.1586	0.1586	1.1586	0.1691	0.1612	0.3324	0.2662	0.2647	0.1745	0.2030	0.2617	0.1431
CPUB	0.0686	0.1073	0.1002	0.1002	0.1002	0.1002	1.0871	0.2010	0.1185	0.1006	0.1133	0.0835	0.1007	0.1406	0.0697
CPRIV	0.2138	0.1563	0.1923	0.1923	0.1923	0.1923	0.2318	1.2114	0.2394	0.2603	0.2639	0.2774	0.3057	0.2714	0.2183
LABUSKLS	0.0027	0.0022	0.0028	0.0028	0.0028	0.0028	0.0032	0.0032	1.0102	0.0071	0.0068	0.0032	0.0039	0.0063	0.0027
LABUSKF	0.0505	0.0419	0.0409	0.0409	0.0409	0.0409	0.0674	0.0448	0.0352	1.0316	0.0324	0.0261	0.0286	0.0340	0.0205
LABUSKIF	0.0804	0.0877	0.1477	0.1477	0.1477	0.1477	0.0913	0.1749	0.1639	0.1482	1.2188	0.0953	0.1093	0.3693	0.0775
LABSK	0.5300	0.4823	0.5385	0.5385	0.5385	0.5385	0.8497	0.6006	0.4611	0.4072	0.4166	1.3302	0.3659	0.4367	0.2618
CAPLSC	0.0431	0.0342	0.0435	0.0435	0.0435	0.0435	0.0501	0.0496	0.1541	0.1086	0.1057	0.0510	1.0611	0.0995	0.0429
CAPSH	0.0091	0.0080	0.0112	0.0112	0.0112	0.0112	0.0108	0.0131	0.0280	0.0255	0.0525	0.0106	0.0128	1.1102	0.0090
CAPOT	0.9223	0.4969	0.6678	0.6678	0.6678	0.6678	0.6267	0.7153	0.6092	0.5628	0.5695	0.4711	0.5087	0.5839	1.3675
LANDLS	0.0113	0.0090	0.0115	0.0115	0.0115	0.0115	0.0132	0.0131	0.0443	0.0303	0.0287	0.0133	0.0157	0.0251	0.0111
LANDSH	0.0041	0.0038	0.0054	0.0054	0.0054	0.0054	0.0054	0.0061	0.0153	0.0130	0.0239	0.0048	0.0053	0.0471	0.0039
ENT	0.9116	0.4911	0.6600	0.6600	0.6600	0.6600	0.6194	0.7070	0.6021	0.5562	0.5629	0.4656	0.5027	0.5771	1.3516
HLSUPP	0.5199	0.3102	0.4048	0.4048	0.4048	0.4048	0.4200	0.4394	0.5151	0.4299	0.4292	0.3895	1.3396	0.4277	0.7011
HLSLOW	0.0027	0.0022	0.0028	0.0028	0.0028	0.0028	0.0032	0.0032	1.0102	0.0071	0.0068	0.0032	0.0039	0.0063	0.0027
HSHHLD	0.0516	0.0510	0.0784	0.0784	0.0784	0.0784	0.0608	0.0917	0.1101	0.1682	0.5289	0.0610	0.0635	1.2989	0.0477
HURBUPP	0.7372	0.5771	0.6753	0.6753	0.6753	0.6753	0.9488	0.7452	0.5885	0.5265	0.5370	1.3458	0.4739	0.5593	0.6137
HURBLOW	0.1160	0.1074	0.1493	0.1493	0.1493	0.1493	0.1369	0.1723	0.1539	1.1391	0.8689	0.0965	0.1089	0.2923	0.0893
GOV															
DTAX															
ITAX															
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL															

(continued)

Table D.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW
AMZLC	0.0080	0.0293	0.0055	0.0080	0.0821	0.0293	0.0065	0.0486							
AMZSH	0.0124	0.1646	0.0088	0.0124	0.0670	0.1646	0.0112	0.0512							
AWT	0.0102	0.0140	0.0066	0.0102	0.0245	0.0140	0.0069	0.0170							
AOGRNLC	0.0015	0.0029	0.0011	0.0015	0.0115	0.0029	0.0015	0.0011							
AOGRNSH	0.0028	0.0522	0.0021	0.0028	0.0069	0.0522	0.0028	0.0069							
AHORTLC	0.0117	0.0179	0.0092	0.0117	0.0593	0.0179	0.0139	0.0364							
AHORTSH	0.0031	0.0527	0.0023	0.0031	0.0074	0.0527	0.0031	0.0086							
ACOF	0.0034	0.0039	0.0024	0.0034	0.0038	0.0039	0.0031	0.0037							
ATEA	0.0036	0.0042	0.0026	0.0036	0.0041	0.0042	0.0033	0.0040							
AGRNTLC	0.0008	0.0010	0.0006	0.0008	0.0012	0.0010	0.0007	0.0010							
AGRNTSH	0.0032	0.0561	0.0023	0.0032	0.0055	0.0561	0.0030	0.0078							
ACOTLC	0.0071	0.0074	0.0051	0.0071	0.0081	0.0074	0.0064	0.0072							
ACOTSH	0.0078	0.0081	0.0055	0.0078	0.0088	0.0081	0.0070	0.0078							
ASUG	0.0133	0.0153	0.0095	0.0133	0.0151	0.0153	0.0121	0.0148							
ATOB	0.0508	0.0735	0.0356	0.0508	0.0798	0.0735	0.0435	0.0679							
AOCRPLC	0.0139	0.0269	0.0094	0.0139	0.0429	0.0269	0.0109	0.0304							
AOCRPSH	0.0022	0.0044	0.0015	0.0022	0.0069	0.0044	0.0018	0.0049							
ACATLC	0.0400	0.0441	0.0259	0.0400	0.0466	0.0441	0.0267	0.0338							
ACATSH	0.0263	0.0970	0.0173	0.0263	0.0327	0.0970	0.0186	0.0286							
AOLVKLC	0.0439	0.0700	0.0274	0.0439	0.1076	0.0700	0.0254	0.0768							
AOLVKSH	0.0045	0.0870	0.0033	0.0045	0.0080	0.0870	0.0042	0.0117							
AFISH	0.0045	0.0069	0.0032	0.0045	0.0078	0.0069	0.0040	0.0061							
AFORLC	0.0026	0.0093	0.0020	0.0026	0.0025	0.0093	0.0030	0.0026							
AFORSH	0.0012	0.0242	0.0009	0.0012	0.0021	0.0242	0.0012	0.0031							
AMIN	0.0389	0.0433	0.0286	0.0389	0.0459	0.0433	0.0385	0.0422							
AGRMIL	0.0368	0.0516	0.0237	0.0368	0.0941	0.0516	0.0239	0.0639							
AOFDP	0.2818	0.3234	0.2011	0.2818	0.3160	0.3234	0.2556	0.3107							
ATEXT	0.1106	0.1148	0.0787	0.1106	0.1233	0.1148	0.0996	0.1098							
AOLGT	0.2273	0.3288	0.1591	0.2273	0.3572	0.3288	0.1949	0.3037							
AFERT	0.0178	0.0396	0.0130	0.0178	0.0448	0.0396	0.0171	0.0320							
AOMAN	0.2070	0.2144	0.1534	0.2070	0.2254	0.2144	0.2081	0.2099							
AELWA	0.0563	0.0660	0.0472	0.0563	0.0707	0.0660	0.0764	0.0842							
ACONS	0.0133	0.0144	0.0095	0.0133	0.0146	0.0144	0.0119	0.0135							
ATDTP	0.4289	0.5136	0.3027	0.4289	0.5829	0.5136	0.3764	0.4889							
APUB	0.1007	0.1406	0.0693	0.1007	0.1185	0.1406	0.0822	0.1006							
APRIV	0.2843	0.2524	0.2025	0.2843	0.2227	0.2524	0.2564	0.2421							
CMZ	0.0152	0.0557	0.0105	0.0152	0.1560	0.0557	0.0124	0.0923							
CWT	0.0139	0.0191	0.0090	0.0139	0.0334	0.0191	0.0094	0.0231							
COGRN	0.0032	0.0063	0.0024	0.0032	0.0247	0.0063	0.0032	0.0023							
CHORT	0.0155	0.0238	0.0123	0.0155	0.0787	0.0238	0.0184	0.0484							
CCOF	0.0041	0.0047	0.0029	0.0041	0.0046	0.0047	0.0037	0.0045							
CTEA	0.0044	0.0050	0.0031	0.0044	0.0049	0.0050	0.0040	0.0048							
CGRNT	0.0016	0.0019	0.0011	0.0016	0.0024	0.0019	0.0013	0.0020							
CCOT	0.0175	0.0183	0.0125	0.0175	0.0198	0.0183	0.0157	0.0175							

(continued)

Table D.1 Continued

Abbreviation	LANDLS	LANDSH	ENT	HLSUPP	HLSLOW	HSHHLD	HURBUPP	HURBLOW	GOV	DTAX	ITAX	IMPTAR	SAVINV	DSTOCK	ROW
CSUG	0.0159	0.0183	0.0113	0.0159	0.0180	0.0183	0.0144	0.0176							
CTOB	0.0628	0.0908	0.0439	0.0628	0.0987	0.0908	0.0538	0.0839							
COCRP	0.0193	0.0374	0.0131	0.0193	0.0596	0.0374	0.0151	0.0422							
CCAT	0.0756	0.0834	0.0490	0.0756	0.0882	0.0834	0.0505	0.0640							
COLVK	0.0537	0.0855	0.0334	0.0537	0.1314	0.0855	0.0310	0.0938							
CFISH	0.0054	0.0083	0.0038	0.0054	0.0093	0.0083	0.0048	0.0073							
CFOR	0.0031	0.0108	0.0024	0.0031	0.0029	0.0108	0.0035	0.0030							
CMIN	0.0466	0.0519	0.0343	0.0466	0.0550	0.0519	0.0461	0.0506							
CGRMIL	0.0634	0.0888	0.0407	0.0634	0.1620	0.0888	0.0412	0.1099							
COFDP	0.3646	0.4185	0.2603	0.3646	0.4089	0.4185	0.3307	0.4020							
CTEXT	0.1552	0.1611	0.1105	0.1552	0.1730	0.1611	0.1397	0.1540							
COLGT	0.3011	0.4356	0.2108	0.3011	0.4732	0.4356	0.2581	0.4023							
CFERT	0.0387	0.0862	0.0283	0.0387	0.0976	0.0862	0.0373	0.0697							
COMAN	0.5401	0.5594	0.4003	0.5401	0.5883	0.5594	0.5431	0.5478							
CELWA	0.0563	0.0660	0.0472	0.0563	0.0707	0.0660	0.0764	0.0842							
CCONS	0.0133	0.0144	0.0095	0.0133	0.0146	0.0144	0.0119	0.0135							
CTDTP	0.4289	0.5136	0.3027	0.4289	0.5829	0.5136	0.3764	0.4889							
CTDTP-E	0.0283	0.0362	0.0202	0.0283	0.0424	0.0362	0.0257	0.0360							
CTDTP-M	0.0606	0.0669	0.0446	0.0606	0.0719	0.0669	0.0597	0.0644							
CTDTP-D	0.2030	0.2617	0.1417	0.2030	0.3324	0.2617	0.1725	0.2662							
CPUB	0.1007	0.1406	0.0693	0.1007	0.1185	0.1406	0.0822	0.1006							
CPRIV	0.3057	0.2714	0.2178	0.3057	0.2394	0.2714	0.2757	0.2603							
LABUSKLS	0.0039	0.0063	0.0027	0.0039	0.0102	0.0063	0.0032	0.0071							
LABUSKF	0.0286	0.0340	0.0204	0.0286	0.0352	0.0340	0.0259	0.0316							
LABUSKIF	0.1093	0.3693	0.0767	0.1093	0.1639	0.3693	0.0943	0.1482							
LABSK	0.3659	0.4367	0.2601	0.3659	0.4611	0.4367	0.3280	0.4072							
CAPLSC	0.0611	0.0995	0.0422	0.0611	0.1541	0.0995	0.0502	0.1086							
CAPSH	0.0128	0.1102	0.0088	0.0128	0.0280	0.1102	0.0104	0.0255							
CAPOT	0.5087	0.5839	0.3652	0.5087	0.6092	0.5839	0.4690	0.5628							
LANDLS	1.0157	0.0251	0.0109	0.0157	0.0443	0.0251	0.0132	0.0303							
LANDSH	0.0053	1.0471	0.0038	0.0053	0.0153	0.0471	0.0048	0.0130							
ENT	0.5027	0.5771	1.3610	0.5027	0.6021	0.5771	0.4635	0.5562							
HLSUPP	1.3396	0.4277	0.7043	1.3396	0.5151	0.4277	0.3050	0.4299							
HLSLOW	0.0039	0.0063	0.0027	0.0039	1.0102	0.0063	0.0032	0.0071							
HSHHLD	0.0635	1.2989	0.0463	0.0635	0.1101	1.2989	0.0610	0.1682							
HURBUPP	0.4739	0.5593	0.6147	0.4739	0.5885	0.5593	1.4284	0.5265							
HURBLOW	0.1089	0.2923	0.0769	0.1089	0.1539	0.2923	0.0956	1.1391							
GOV															
DTAX															
ITAX															
IMPTAR															
SAVINV															
DSTOCK															
ROW															
TOTAL															

(continued)

APPENDIX E

Sensitivity Analysis

Given the parameters in the ZimCGE model have little empirical validation, it is important to see how the simulation results might vary with different values for some key parameters. "High" and "low" values for the factor substitution elasticity, for transformation (CET) function elasticity, and for Armington (CES) function elasticity are specified to represent 50 percent more and 50 percent less than the actual ("central") values used in the simulations in this report (see Table 5.6). The model is then re-calibrated for each new set of elasticity values, and some of the earlier simulations are re-run. The corresponding results for simulations III, VII, and IX are reported in Tables E.1, E.2, and E.3, respectively.

Table E.1 ZimCGE model simulation results under high and low factor substitution elasticities

	Simulation (percentage change from base)					
	S-III		S-VII		S-IX	
Indicator	High	Low	High	Low	High	Low
Gross domestic product at factor cost (GDP f.c.)	4.50	4.43	5.03	5.01	4.49	4.43
Exports	25.61	25.62	25.74	25.67	25.61	25.62
Imports	23.52	23.52	23.86	23.75	23.52	23.51
Agricultural gross domestic product (agricultural GDP)	9.36	8.92	9.88	9.99	9.38	8.94
Large-scale commercial farms	10.94	10.34	10.11	8.75	10.96	10.39
Smallholder farms	5.03	4.96	10.74	13.36	5.07	4.99
Real disposable household incomes						
Aggregate	0.92	0.86	1.44	1.46	–0.71	–0.79
Large-scale commercial farm-owner/manager	0.37	0.49	0.54	0.17	–1.76	–1.66
Large-scale commercial farm-worker	9.99	10.48	9.20	9.66	10.01	10.49
Smallholder	2.78	2.40	5.07	5.07	2.87	2.50
High-income urban	0.47	0.67	0.79	0.85	–1.43	–1.25
Low-income urban	3.11	1.45	4.52	5.72	3.09	1.43

Source: Zim CGE model simulation results.

Notes: S-III Trade liberalization with income tax adjustment and maize price decontrol.
S-VII Add land reform package B to Simulation III.
S-IX Add zero current fiscal deficit to Simulation III.

Table E.2 ZimCGE model simulation results under high and low transformation elasticities

	Simulation (percentage change from base)					
	S-III		S-VII		S-IX	
Indicator	High	Low	High	Low	High	Low
Gross domestic product at factor cost (GDP f.c.)	4.57	4.30	5.11	0.89	4.56	4.30
Exports	26.29	24.45	26.34	24.68	26.29	24.44
Imports	23.98	22.78	24.23	23.19	23.98	22.77
Agricultural gross domestic product(agricultural GDP)	7.52	11.14	9.42	10.77	7.53	11.18
Large-scale commercial farms	8.66	13.11	7.05	11.76	8.67	13.15
Smallholder farms	4.40	5.77	15.90	8.07	4.43	5.82
Real disposable household incomes						
Aggregate	1.00	0.68	1.58	1.21	–0.64	–0.95
Large-scale commercial farm-owner/manager	0.31	0.50	0.16	0.64	–1.83	–1.64
Large-scale commercial farm-worker	8.37	12.42	7.45	11.23	8.38	12.47
Smallholder	2.51	2.77	6.54	3.65	2.60	2.86
High-income urban	0.86	–0.02	0.98	0.50	–1.06	–1.92
Low-income urban	2.68	2.45	5.35	4.20	2.66	2.43
Low-income urban	3.11	1.45	4.52	5.72	3.09	1.43

Source: ZimCGE model simulations results.
Notes: S-III Trade liberalization with income tax adjustment and maize price decontrol.
S-VII Add land reform package B to Simulation III.

Lower values for factor substitution elasticity imply greater difficulty in substituting between factors and lead to smaller production effects from the reform measures (as shown in Table E.1 for GDP and agricultural GDP). It is not surprising that the differences between GDP effects based on the low and high elasticity values are consistently smaller than the differences between agricultural GDP effects given the intersectoral (including labor-market) linkages within the macroeconomy; nonagricultural production sectors can absorb resources released by some agricultural sectors as a response to the assumed policy changes. The effects on total exports and total imports show only minor disparities but those for household incomes generally involve larger proportionate differences and are hence more elasticitysensitive. For all indicators, the qualitative effects are invariant with respect to the size of elasticity. In sum, the effects on overall (GDP and aggregate household) income and equity arising from each of the three policy scenarios are not significantly different based on the high and low (and central) values for factor substitution elasticity.

The same is true for sensitivity analysis of transformation elasticity (Table E.2), despite the corresponding differences being generally larger. A higher transformation elasticity means greater ease for producers to shift between the domestic and export markets, which can increase the impact of policy reforms on overall income—as borne out by the sensitivity results on GDP and aggregate household income. Also as

Table E.3 ZimCGE model simulation results under high and low Armington substitution elasticities

	Simulation (percentage change from base)					
	S-III		S-VII		S-IX	
Indicator	**High**	**Low**	**High**	**Low**	**High**	**Low**
Gross domestic product at factor cost (GDP f.c.)	4.33	4.98	4.88	5.54	4.33	4.97
Exports	27.77	23.18	28.03	23.01	27.76	23.18
Imports	25.47	21.34	25.92	21.40	25.46	21.34
Agricultural gross domestic product(agricultural GDP)	9.38	8.91	10.45	9.49	9.39	8.94
Large-scale commercial farms	11.05	10.19	9.96	8.81	11.06	10.21
Smallholder farms	4.82	5.43	11.78	11.37	4.86	5.48
Real disposable household incomes						
Aggregate	0.82	1.31	1.37	1.85	–0.82	–0.32
Large-scale commercial farm-owner/manager	0.47	0.68	0.50	0.71	–1.68	–1.45
Large-scale commercial farm-worker	10.44	9.97	9.72	8.91	10.46	10.00
Smallholder	2.38	3.17	4.83	5.27	2.47	3.27
High-income urban	0.44	0.98	0.71	1.34	–1.47	–0.93
Low-income urban	2.25	3.28	4.42	5.36	2.23	3.27

Source: Zim CGE model simulation results.

Notes: S-III Trade liberalization with income tax adjustment and maize price decontrol.
S-VII Add land reform package B to Simulation III.
S-IX Add zero current fiscal deficit to Simulation III.

expected, larger effects on total exports and total imports are associated with higher transformation elasticity values. By contrast, the impact on agricultural value added is lower with the higher elasticity. A possible explanation is that the improved capacity to export nonagricultural products leads to output expansion that draws resources away from agriculture.

The final set of sensitivity results, (Table E.3) pertaining to the Armington substitution elasticity, indicates the degree of substitutability between domestic and imported products for each sector. Imports, exports, and agricultural GDP show larger effects with the higher elasticity values, as might be expected from the greater ease of shifting between domestic and imported goods. However, the effects on GDP and aggregate household income are lower, indicating reduced nonagricultural production associated with the high Armington elasticity (evidenced by the markedly smaller effects on urban household incomes). Again, the qualitative impacts of the postulated reforms on the various indicators are invariant to the elasticity size, and the quantitative effects on overall income and equity are fairly robust.

Acronyms and Abbreviations

ATP	Aggregate trade policy
CES	Constant elasticity of substitution
CET	Constant elasticity of transformation
CGE	Computable general equilibrium
CPI	Consumer price index
CSO	Central Statistical Office
DRC	Democratic Republic of Congo
DMB	Dairy Marketing Board
ESAP	Economic Structural Adjustment Program, 1991–95
GAMS	General Algebraic Modeling System
GDP	Gross domestic product
GDP at f.c.	Gross domestic product at factor costs
GDP at m.p.	Gross domestic product at market prices
GFCF	Gross fixed capital formation
GMB	Grain Marketing Board
GNP	Gross national product
ICES	Income consumption and expenditure survey (CSO 1994)
LSC	Large-scale commercial
LES	Linear expenditure systems
Macro-SAM	Macroeconomic social accounting matrix
Micro-SAM	Microeconomic social accounting matrix
NPC	Nominal protection coefficient
NEPC	Net effective protection coefficient
RER	Real exchange rate
ROW	Rest of the world
SAM	Social accounting matrix
SH	Smallholder
SNA	System of National Accounts of the United Nations
UDI	Unilateral Declaration of Independence
Z$	Zimbabwe dollars
ZIMPREST	Zimbabwe Program for Economic and Social Transformation, 1996-2000

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