CHAPTER 6

Methodology

Abstract This chapter introduces the book's empirical investigation of the role that agricultural growth has played in aggregate economic growth in Ethiopia in the twenty-first century. This chapter describes the main method and data used for empirical investigation. It describes both the data contained in the three Social Accounting Matrices (SAMs) that form the book's main empirical data source, as well as the methodological proceedings of the Semi-Input-Output multiplier model that the book applies.

Keywords Social Accounting Matrix (SAM) • Semi-Input-Output (SIO) multipliers • Growth linkages

To explore the role of agriculture in Ethiopia's economic growth, this section quantitatively evaluates the country's changing agricultural growth linkages. It uses a Social Accounting Matrix (SAM)-based economic multiplier model to calculate the agricultural sector's growth linkages and compare them to the manufacturing sector. Along with econometric studies (Bravo-Ortega & Lederman, 2005; Tiffin & Irz, 2006; Self & Grabowski, 2007) and growth accounting studies (Martin & Mitra, 2001; Gulati et al., 2005; Bosworth & Collins, 2008), multiplier analysis is one of the main methods for assessing the role of agriculture in economic growth. The choice to use this method in the present study is made in light of the recognized limitations of growth accounting, which provides

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only a decomposition of the proximate sources of growth, and the difficulty of establishing convincing causal links through econometric studies (as discussed by Tsakok & Gardner, 2007).

The economic multiplier method allows us to address two specific questions: how large are the growth linkages of agriculture and manufacturing, and has their size changed over time relative to each other? Through these questions, the method can explore which sector was the best growth option at three snapshots during Ethiopia's economic growth in 2002, 2006, and 2010. This approach also allows us to get closer to the counterfactual question of which sector was the strongest growth engine at these points and therefore would have been the most appropriate sector to invest in. Given the historical record, we know that both the agricultural sector and the economy grew over the period of investigation. However, the economic multiplier method allows for a greater understanding of whether Ethiopia's agricultural growth was the main engine of its economic growth or whether the same (or higher) aggregate growth would have been generated had there been similar growth in the manufacturing sector instead. The method also tries to uncover whether the size of the growth linkages of agriculture and manufacturing have changed over time. Although 2002–2010 is a short time frame to observe significant economic change, it was a transformative period in the Ethiopian economy, representing a break toward higher economic growth than in previous periods. If successful industrialization was occurring in this period of economic growth—as theory and previous development experiences would suggest—then the multiplier analysis would show that the growth linkages from the manufacturing sector strengthened over time, while the agricultural growth linkages would shrink.

Data

To calculate growth linkages in an economy, information on the economy's production technologies and consumption patterns is needed. This information can be obtained via the construction of a SAM. A SAM is a summary table for a given period (often a year) that provides a coherent, detailed database on the production, incomes, consumption, investment, external trade, and other flows in the economy, revealing a country's economic structure. There is a large literature on the construction, usefulness, and application of SAMs (Pyatt & Round, 1979; Defourny & Thorbecke, 1984; Keuning & de Ruijter, 1988; Sadoulet & de Janvry, 1995;

Thorbecke, 2000; Round, 2003; Breisinger et al., 2009). Several studies have employed SAM-based multiplier analysis to examine how an income injection in one part of an economic system affects the economy (Hayden & Round, 1982; Bell & Hazell, 1980; Thorbecke et al., 1992; Powell & Round, 2000; Tarp et al., 2002). SAMs are usually studied for one year at a time due to the extensive work and data collection that is required to construct them. While the use of multiple SAMs is therefore somewhat uncommon, previous studies using SAMs for multiple years include Cohen (1989), Hewings et al. (1998), Lima et al. (2004), and Llop (2007); other studies have used SAMs for multiple countries, including Vogel (1994) and Arndt et al. (2012). The multiple SAMs available for Ethiopia during this period offer a unique opportunity to provide a detailed understanding of the relationship between agricultural and economic growth in a low-income country.

A SAM is an accounting framework represented as a square matrix in which each cell represents a flow of funds from a column account to a row account. A basic SAM structures the economy into seven types of accounts: activities, commodities, factors of production, households, government, savings and investment (S-I), and rest of the world (RoW) (Breisinger et al., 2009). In this structure, “activities” are the entities that produce goods and services, and “commodities” are the goods and services that activities produce. In most SAMs, including the SAM used here, the values in the activity accounts are measured in producer prices. Therefore, the SAM structure used also includes an eighth account for “margins,” which include the marketing and transportation costs associated with commodity flows.

Three national Ethiopian SAMs are available from previous research, for 2002 (EDRI, 2008), 2006 (EDRI, 2009), and 2010 (Aragie, 2014).[1] As two of the previous SAMs were constructed by the Ethiopian Development Research Institute (EDRI), and the third is an updated version of the 2006 SAM, the SAMs share a similar structure and are suitable for comparison. The rich and detailed data contained in the SAMs are sourced from both macro and micro sources. The main data sources for

[1] A small SAM by Taffesse and Ferede (2004) for 1999/2000 and village-level SAMs by Ferede (2008) and Taye (1993) also exists but are not included, as they would not be comparable to the large SAMs in this study. A national 2011 SAM is also under construction under the Nexus Project. However, this study chose to use the 2010 SAM to keep the time intervals consistent between each SAM.

the 2002 SAM are national accounts statistics (MOFED, 2006), supply-use tables (MOFED, 2007), industry surveys (CSA, 2003a, 2003b, 2003c), agricultural census data (CACC, 2003), labor force survey data (CSA, 2006a), balance-of-payments statistics (CSA, 2004), and household survey data (CSA, 2001), as well as internal government revenue, government expenditure, and customs data files (EDRI, 2008). These were constructed as a square matrix of 133 × 133 cells in Excel containing information about 42 production activities, 61 commodity groups, five primary factors, two household groups, and 17 tax instruments, as well as aggregate accounts for trade margins, transport margins, government, investment, and RoW. The 2006 SAM is an extended version of the 2002 SAM that uses similar data sources, but is updated if available (EDRI, 2009). Updates include industry survey data (CSA, 2006b, 2006c, 2006d), agricultural census data (CACC, 2007a, 2007b), balance-of-payments statistics (CSA, 2006e), and household survey data (CSA, 2006f). The SAM is a square matrix of 255 × 255 cells containing information on 99 production activities, 91 commodity groups, five factors of production, 14 household groups, 17 tax instruments, and aggregate accounts for trade margins, transport margins, government, investment, and RoW. The 2010 SAM is an updated version of the 2006 SAM constructed by Aragie (2014). It updates the 2006 SAM with a new Household Consumption and Expenditure survey for 2011 and national accounts for 2011 and includes finer disaggregation between home production and marketed production. It is a square matrix of 236 × 236 cells containing information on 50 production activities, 39 commodity groups, 36 primary factors, 27 household groups, five tax instruments, and aggregate accounts for trade margins, transport margins, government, investment, and RoW (Aragie, 2014).

To make the three SAMs comparable, they were recoded into the same structure of eight activities, eight commodity groups, two factors of production, two household types, and aggregate accounts for margins, government, S-I, and RoW, as summarized in Table 6.1.[2] As such, the research is based on three SAMs, each structured into a 24 × 24 square matrix. The high level of aggregation into eight activities and commodities is implemented in order for the three SAMs to be comparable over time.

[2] Corporate enterprises are excluded from the SAMs for simplicity. As such, profits (gross operating surplus) are assumed to be paid directly to households (i.e., households' direct taxes include corporate taxes).

Table 6.1 Structure (accounts) of the 2002, 2006, and 2010 SAMs

	Account	*Code*	*Main sub-sectors included*
Activities	Agriculture	aagr	Production of cereals, cash crops, livestock, forestry, fishing.
	Food-processing	afpr	Production of meat, vegetable, dairy, sugar and sugar confectionery, animal feed, beverages (incl. alcohol) and tobacco, milling service activity, other food-processing.
	Manufacturing incl. mining	aman	Production of textiles, leather products, wood products, fertilizers, chemicals, mineral products, metals and metal products, motor vehicles, machinery and equipment, other manufacture, other mining products.
	Utility	auti	Fuel, electricity, water.
	Construction	acon	Construction.
	Trade and transport	atrad	Trade and repair services, hotels and restaurants, transport services, communication.
	Public services	apubs	Public administration, defense, education, health.
	Private services	aprvs	Financial services, recreation and other services, real estate and renting services.
Commodities	Agriculture	cagr	Cereals, cash crops, livestock, forestry and fishing products.
	Food-processing	cfpr	Meat, vegetable, dairy, sugar and sugar confectionery, grain mill, other food products, animal feeds, beverages (incl. alcohol) and tobacco products.
	Manufacturing incl. mining	cman	Textiles, leather products, wood products, fertilizers, chemicals, mineral products, metals and metal products, motor vehicles, machinery and equipment, other manufacture, other mining products.
	Utility	cuti	Fuel, electricity, water.
	Construction	ccon	Construction.
	Trade and transport	ctrad	Trade and repair services, hotels and restaurants, transport services, communication.
	Public services	cpubs	Public administration, defense, education, health.
	Private services	cprvs	Financial services, recreation and other services, real estate and renting services.
Margins	Margins	mar	Transport margins, trade margins.
factors	Labor	lab	Unskilled workers, skilled workers.

(*continued*)

Table 6.1 (continued)

	Account	*Code*	*Main sub-sectors included*
	Capital	cap	Agriculture capital and land, livestock capital, nonagricultural capital and land.
Households	Urban households	hurb	Urban poor households, urban non-poor households.
	Rural households	hrur	Rural poor households, rural non-poor households.
Institutions	Government	gov	Government, direct taxes, indirect taxes.
	Savings and investments	s-i	Savings, stock change.
	Rest of the world	row	Rest of the world.

Note: Following Arndt et al. (2012), the recoding was facilitated by standard industry/product classifications so that each account includes as similar information as possible. However, the mining sector is included in the manufacturing sector account because in the 2010 SAM to which this study has access, the mining and manufacturing sectors are grouped. As the mining sector is small in resource-poor Ethiopia, this is not expected to affect the overall results. In the 2002 SAM, the total supply of the mining sector was 765 million *birr* compared to the total supply in the manufacturing sector of 33,981 million *birr*; in 2006, it was 1023 million *birr* of a total of 62,734 million *birr*

Method

To capture the size and change of economic linkages in Ethiopia, the study calculates Semi-Input-Output (SIO) multipliers based on the three SAMs. SIO multiplier analysis is an economic model that assumes that all relationships in each SAM are linear and prices are fixed (in the short run). The work follows the guidelines for SIO multiplier analysis as outlined in Breisinger et al. (2009).

SIO multiplier analysis indicates the size of a sector's contribution to aggregate growth through its linkages with other sectors. It shows how much the overall economy would grow if one sector grows. This is estimated by calculating how much the overall economy would grow if one sector experienced an exogenous demand-side shock—for example, due to increased export demand, public spending, or aid—considering both the direct and indirect effects. The indirect effects are also called "demand linkages" and include backward and forward production linkages as well as consumption linkages. Together, the direct and indirect effects make up the total multiplier effect. The total size of a sector's growth linkages depends on the interdependencies among an economy's sectors in terms of production technologies and household consumption patterns.

To calculate the multiplier effect, the SAM accounts are divided into endogenous and exogenous accounts such that a change in the latter influences the former. In the model, the government, capital (S-I), and RoW accounts are treated as exogenous. As such, the model only considers two sets of agents (activities and households) interacting through two sets of markets (commodities and factors). The model also requires the classification of sectors into those with perfectly elastic supply and those that are supply-constrained. If demand for a supply-unconstrained sector increases, domestic output increases to match the increased demand. However, if demand for a supply-constrained sector increases, it is satisfied by imports. The degree of supply responsiveness in a sector depends on technological and resource constraints and the capacity to utilize available technologies and resources. In this study, two scenarios are modeled: one where agriculture is supply-unconstrained and another where agriculture is supply-constrained.[3] In both scenarios, the public service sector is treated as supply-constrained, which is consistent with the literature. All other sectors are treated as supply-unconstrained.[4]

The SIO multiplier analysis is used to simulate the insertion of equivalent investments leading to equal-sized demand increases in either the agricultural sector or the manufacturing sector for each of the three years. The exogenous injection represents increased demand from any of the exogenous accounts, such as increased public spending, increased investment demand

[3] It is a strong assumption to model the agricultural sector as supply-unconstrained given the numerous constraints on agricultural production in low-income countries, such as shortage of land, rainfall, input supply, and marketing infrastructure, as well as seasonal labor bottlenecks, limited soil fertility, and agro-climate constraints (Abrar et al., 2004; Ferede, 2008). However, while strong, it is not unreasonable to assume that agriculture in Ethiopia is not supply-constrained given its rapid growth during the period of investigation. To avoid biasing the results upwards by modeling the agricultural sector as only supply-unconstrained (as discussed by Haggblade et al., 1991), both specifications are included in the study.

[4] In regard to the manufacturing sector specifically, it may not always be appropriate to model it as supply-unconstrained in low-income settings given the common constraints of shortages of skilled labor, foreign exchange, and fixed capital (Diao et al., 2010). However, much literature highlights the special importance of the manufacturing sector as an appropriate growth engine in low-income countries due to its often relatively low capital and technology intensity and heavy use of low-skilled labor (Rodrik, 2016). In addition, previous studies have indicated that capacity utilization in Ethiopian manufacturing is low and that there exist slack resources that could be pulled into production (Diao et al., 2007). To avoid underestimating the potential growth linkages of the manufacturing sector in Ethiopia, the sector is modeled as supply unconstrained.

from either domestic or international capital, or foreign aid.[5] The resulting multiplier effect reveals how much the economy would grow—given its production technologies and consumption patterns in the year described by the SAM—if one sector experienced such an exogenous demand-side shock. It does not attempt to explain why such a demand-side shock would occur, nor why some sectors respond more or less than others. Instead, it gives a numerical description of how an exogenous inflow into one sector would affect the other sectors in the economy once the structural (demand and supply) interconnections are fully taken into account. To calculate the total multiplier effects, the SIO model uses matrix algebra. The equations are detailed below, and the equation legend is provided in Table 6.2. The equations are developed based on the guidelines in Breisinger et al. (2009).

Table 6.2 Equation legend, values and shares

Values		*Shares*	
X	Gross output of each activity	a	Technical coefficients
Z	Total demand for each commodity	b	Share of domestic output in total demand
V	Total factor income	v	Share of value added or factor income in gross output
Y	Total household income	l	Share of value of total demand from imports/ commodity taxes
E	Exogenous components of demand	c	Household consumption expenditure shares
		s	Household savings rate

$$\begin{aligned} Z_1 &= a_{11}X_1 + a_{12}X_2 + c_1 Y + E_1 \\ Z_2 &= a_{21}X_1 + a_{22}X_2 + c_2 Y + E_2 \end{aligned} \quad (1)$$

$$\begin{aligned} Z_1 &= a_{11}b_1 Z_1 + a_{12}b_2 Z_2 + c_1\left(v_1 b_1 Z_1 + v_2 b_2 Z_2\right) + E_1 \\ Z_2 &= a_{21}b_1 Z_1 + a_{22}b_2 Z_2 + c_2\left(v_1 b_1 Z_1 + v_2 b_2 Z_2\right) + E_2 \end{aligned} \quad (2)$$

[5] While financing channel is likely to influence the real-world effects of demand increases (Rocchi et al., 2013), it is not possible to distinguish the exogenous account from which the increased demand originates in the SIO multiplier analysis. In this study, the increased demand is treated conceptually as originating from increased public spending; the study assumes that the increased demand originates from government spending under a chosen development strategy. Furthermore, as discussed, for example, by Thorbecke (2018), even if one accepts that the formulation of economic policy is largely endogenous rather than exogenous in the real world (influenced by the political balance of power and existing institutions, etc.), this type of analysis can still play an important role in informing strategic planning.

$$Z_1 - a_{11}b_1Z_1 - c_1v_1b_1Z_1 - a_{12}b_2Z_2 - c_1v_2b_2Z_2 = E_1$$
$$-a_{21}b_1Z_1 - c_2v_1b_1Z_1 + Z_2 - a_{22}b_2Z_2 - c_2v_2b_2Z_2 = E_2 \quad (2)$$

$$(1 - a_{11}b_1 - c_1v_1b_1)Z_1 + (-a_{12}b_2 - c_1v_2b_2)Z_2 = E_1$$
$$(-a_{21}b_1 - c_2v_1b_1)Z_1 + (1 - a_{22}b_2 - c_2v_2b_2)Z_2 = E_2 \quad (3)$$

$$\begin{pmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & 0 \\ -a_{21}b_1 - c_2v_1b_1 & -1 \end{pmatrix}\begin{pmatrix} Z_1 \\ E_2 \end{pmatrix} = \begin{pmatrix} 1 & a_{12}b_2 + c_1v_2b_2 \\ 0 & -1 + a_{22}b_2 + c_2v_2b_2 \end{pmatrix}\begin{pmatrix} E_1 \\ Z_2 \end{pmatrix} \quad (4)$$

$$\begin{pmatrix} 1 - a_{11}b_1 - c_1v_1b_1 & 0 \\ -a_{21}b_1 - c_2v_1b_1 & -1 \end{pmatrix} = I - M^* \quad (4.1)$$

$$\begin{pmatrix} 1 & a_{12}b_2 + c_1v_2b_2 \\ 0 & -1 + a_{22}b_2 + c_2v_2b_2 \end{pmatrix} = B \quad (4.2)$$

$$(I - M^*)\begin{pmatrix} Z_1 \\ E_2 \end{pmatrix} = B\begin{pmatrix} E_1 \\ Z_2 \end{pmatrix} \quad (4.2)$$

$$\begin{pmatrix} Z_1 \\ E_2 \end{pmatrix} = (I - M^*)^{-1} B\begin{pmatrix} E_1 \\ Z_2 \end{pmatrix} \quad (5)$$

The final SIO multiplier equation (5) shows that an exogenous increase in demand for the unconstrained sectors (E_1) leads to a final increase in total demand for these sectors (Z_1), including all of the forward and backward linkages ($(I\text{-}M^*)^{-1}$). However, the exogenous demand for constrained sectors (E_2) is leaked to imports (because the final demand for the supply-constrained sectors (Z_2) is met through increased imports), eliminating any linkages for those sectors. The information regarding linkage effects from the SAM is incorporated into the multiplier model through the coefficient matrix M.

The above equations calculate accounting multipliers based on average patterns, not "fixed-price" multipliers based on marginal responses (despite the name, note that both multipliers are formally "fixed-price," as prices are fixed in the short run). While "fixed price" multipliers may be conceptually closer to the underlying reality, as the marginal responses in the system may be different from the average one, Pyatt and Round (1979) compared computations for both types, and found that numerical differences were very small. As such, accounting multipliers are deemed sufficient for this study.

The SIO model suffers from several shortcomings. These include its assumptions regarding fixed prices and its presentation of the results as if the economic system adjusted immediately to exogenous changes without addressing the institutional barriers that can prevent such adjustment. In addition, while using three SAMs, the SAM methodology is not optimal for the study of structural change, as the model assumes that the structure is fixed in each year (although changing across the SAMs). As such, this study cannot speak to the relationship of agricultural growth to structural change but is limited to exploring the power of agriculture (and manufacturing) to generate growth. In combination with the high level of aggregation of the sectors—specified to make the SAMs comparable across time—this implies that the model specified here cannot plausibly claim to capture the full complexity of the connection between agriculture and the aggregate economy in Ethiopia. As a result, the study is primarily a tool for measuring the broad changes in economic multipliers in Ethiopia over time rather than a tool for detailed policy analysis. Given that the SIO analysis does not include the institutional barriers to linkages, the results are best understood as the upper bounds of economic linkages. The interpretation of the results should therefore focus on comparisons and patterns of change rather than on exact multiplier sizes.

References

Abrar, S., Morrissey, O., & Rayner, T. (2004). Aggregate Agricultural Supply Response in Ethiopia: A Farm-level Analysis. *Journal of International Development, 16*, 605–620.

Aragie, E. (2014). *Climate Change and Semi-subsistence Agricultural Households.* PhD diss., Oxford Brookes University.

Arndt, C., Garcia, A., & Tarp, F. (2012). Poverty Reduction and Economic Structure: Comparative Path Analysis for Mozambique and Vietnam. *Review of Income and Wealth, 58*(4), 742–763.

Bell, C., & Hazell, P. (1980). Measuring the Indirect Effects of an Agricultural Investment Project on its Surrounding Region. *American Journal of Agricultural Economics, 62*, 75–86.

Bosworth, B., & Collins, S. M. (2008). Accounting for Growth: Comparing China and India. *Journal of Economic Perspectives, 22*, 45–66.

Bravo-Ortega, C., & Lederman, D. (2005). *Agriculture and National Welfare around the World: Causality and Heterogeneity since 1960.* Policy Research Working Paper no. 3499. The World Bank, Washington, DC.

Breisinger, C., Thomas, M., & Thurlow, J. (2009). *Social Accounting Matrices and Multiplier Analysis: An Introduction with Exercises*. Food Security in Practice Technical Guide no. 5. International Food Policy Research Institute, Washington, DC.

CACC (Central Agricultural Census Commission). (2003). *Ethiopian Agricultural Sample Enumeration 2001/02 (1994 E.C)*. Federal Democratic Republic of Ethiopia Central Agricultural Census Commission.

CACC (Central Agricultural Census Commission). (2007a). *Agricultural Sample Survey 2005/06 (1998 E.C): Report on Area Production of Meher Season Crops*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CACC (Central Agricultural Census Commission). (2007b). *Agricultural Sample Survey 2005/06 (1998 E.C): Report on Area Production of Belg Season Crops*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

Cohen, S. (1989). Analysis of Social Accounting Multipliers Over Time: The Case of The Netherlands. *Socio-Economic Planning Sciences, 23*(5), 291–302.

CSA (Central Statistical Agency). (2001). *Report on the 1999/2000 Household Income, Consumption and Expenditure Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency: Addis Ababa.

CSA (Central Statistical Agency). (2003a). *Report on Large and Medium Scale Manufacturing and Electricity Industries Survey: April 2002*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2003b). *Report on Small Scale Manufacturing Industries Survey: December 2002*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2003c). *Report on Cottage / Handicraft Manufacturing Industries Survey: November 2002*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2004). *Ethiopia Statistical Abstract 2004*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006a). *Report on the 2005 National Labour Force Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006b). *Report on Large and Medium Scale Manufacturing and Electricity Industries Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006c). *Report on Small Scale Manufacturing Industries Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006d). *Report on Cottage / Handicraft Manufacturing Industries Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006e). *Ethiopia Statistical Abstract 2006*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

CSA (Central Statistical Agency). (2006f). *Report on the 2004/2005 Household Income, Consumption and Expenditure Survey*. Federal Democratic Republic of Ethiopia Central Statistical Agency.

Defourny, J., & Thorbecke, E. (1984). Structural Path Analysis and Multiplier Decomposition Within a Social Accounting Matrix. *Economic Journal, 94*, 111–136.

Diao, X., Fekadu, B., Haggblade, S., Taffesse, A., Wamisho, K., & Yu, B. (2007). *Agricultural Growth Linkages in Ethiopia: Estimates Using Fixed and Flexible Price Models*. Discussion Paper no. 00695. International Food Policy Research Institute, Washington, DC.

Diao, X., Taffesse, A., Yu, B., & Nin Pratt, A. (2010). *Economic Importance of Agriculture for Sustainable Development and Poverty Reduction: The Case Study of Ethiopia*. Paper presented at the Global Forum on Agriculture, OECD Headquarters, Paris.

EDRI (Ethiopian Development Research Institute). (2008). *Social Accounting Matrix for Ethiopia 2001/2002 (EFY 1994): Data Sources and Compilation Process*. Addis Ababa.

EDRI (Ethiopian Development Research Institute). (2009). *A Regionalized Social Accounting Matrix for Ethiopia, 2005/06: Data Sources and Compilation Process*. Addis Ababa.

Ferede, T. (2008). *Growth Linkages and Policy Effects in a Village Economy in Ethiopia: An Analysis of Interactions Using a Social Accounting Matrix (SAM) Framework*. Research Paper no. 2008-07. University of Antwerp.

Gulati, A., Fan, S., & Dafali, S. (2005). *The Dragon and the Elephant*. MTID Discussion Paper no. 87. International Food Policy Research Institute, Washington, DC.

Haggblade, S., Hammer, J., & Hazell, P. (1991). Modeling Agricultural Growth Multiplier. *American Journal of Agricultural Economics, 73*(2), 361–374.

Hayden, C., & Round, J. (1982). Developments in Social Accounting Methods as Applied to the Analysis of Income Distribution and Employment Issues. *World Development, 10*, 451–465.

Hewings, G., Sonis, M., Guo, J., Israilevich, P., & Schindler, G. (1998). The Hollowing-Out Process in the Chicago Economy, 1975–2011. *Geographical Analysis, 30*(3), 217–233.

Keuning, S., & De Ruijter, W. (1988). Guidelines to the Construction of a Social Accounting Matrix. *Review of Income and Wealth, 34*(1), 71–100.

Lima, C., Cardenete, A., Hewings, G., & Vallés Ferrer, J. (2004). A Structural Analysis of a Regional Economy Using Social Accounting Matrices: 1990–1999. *Investigaciones Regionales, 5*, 113–138.

Llop, M. (2007). Comparing Multipliers in the Social Accounting Matrix Framework: The Case of Catalonia. *Environment and Planning A: Economy and Space, 39*, 2020–2029.

Martin, W., & Mitra, D. (2001). Productivity Growth and Convergence in Agriculture versus Manufacturing. *Economic Development and Cultural Change, 49*, 403–422.

MOFED (Ministry of Finance and Economic Development). (2006). *National Accounts Statistics of Ethiopia: The 1998 EFY Update Estimates. National Economic Accounts Department (November)*. Federal Democratic Republic of Ethiopia.

MOFED (Ministry of Finance and Economic Development). (2007). *Supply and Use Table 1999/2000*. Federal Democratic Republic of Ethiopia.

Powell, M., & Round, J. (2000). Structure and Linkage in the Economy of Ghana: A SAM Approach. In E. Aryeetey, J. Harrigan, & M. Nissanke (Eds.), *Economic Reforms in Ghana: Miracle or Mirage*. James Currey Press.

Pyatt, G., & Round, J. (1979). Accounting and Fixed Price Multipliers in a SAM Framework. *Economic Journal, 89*, 850–873.

Rocchi, B., Romano, D., & Hamza, R. (2013). Agriculture Reform and Food Crisis in Syria: Impacts on Poverty and Inequality. *Food Policy, 43*, 190–203.

Rodrik, D. (2016). Premature Deindustrialization. *Journal of Economic Growth, 21*, 1–33.

Round, J. (2003). Social Accounting Matrices and SAM-based Multiplier Analysis. In F. Bourguignon & L. Pereira da Silva (Eds.), *The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools*. The World Bank.

Sadoulet, E., & de Janvry, A. (1995). *Quantitative Development Policy Analysis*. The John Hopkins University Press.

Self, S., & Grabowski, R. (2007). Economic Development and the Role of Agricultural Technology. *Agricultural Economics, 36*, 395–404.

Taffesse, A., & Ferede, T. (2004). *The Structure of the Ethiopian Economy – A SAM-based Characterisation*. Report no. 29383–ET. The World Bank, Addis Ababa.

Tarp, F., Roland-Holst, D., & Rand, J. (2002). Trade and Income Growth in Vietnam: Estimates from a New Social Accounting Matrix. *Economic Systems Research, 14*(2), 157–184.

Taye, M. (1993). Social Accounts of three Ethiopian Villages: A Study of Institutions and Policy. In C. Doss & C. Olson (Eds.), *Issues in African Rural Development*. Winrock International Institute for Agricultural Development, Arlington.

Thorbecke, E. (2000). *The Use of Social Accounting Matrices in Modelling*. Proceedings of the 26th General Conference of the International Association for Research in Income and Wealth, Krakow.

Thorbecke, E. (2018). *My Journey Through the History of Development Economics*. WIDER Working Paper 2018/138. United Nations University World Institute for Development Economics Research, Helsinki.

Thorbecke, E. with Downey, R., Keuning, S., Roland-Holst, D., & Berrian, D. (1992). *Adjustment and Equity in Indonesia*. OECD Development Centre.

Tiffin, R., & Irz, X. (2006). Is Agriculture the Engine of Growth? *Agricultural Economics, 35*, 78–89.

Tsakok, I., & Gardner, B. (2007). Agriculture in Economic Development: Primary Engine of Growth or Chicken and Egg? *American Journal of Agricultural Economics, 89*, 1145–1151.

Vogel, S. (1994). Structural Changes in Agriculture: Production Linkages and Agricultural Demand-Led Industrialization. *Oxford Economic Papers, 46*(1), 136–156.