

**GROWTH AND CHANGE IN THE INDONESIAN ECONOMY:  
THE ROLE OF THE AGRICULTURAL SECTOR**

By

ARIEF DARYANTO

Ir, Bogor Agricultural University

DipAgEc, MEc, University of New England

A Thesis Submitted for the Degree of  
Doctor of Philosophy

School of Economic Studies  
University of New England  
Armidale, NSW 2351, Australia

August 1999

## Dedication

---

To Heny, Didiet, Nina and Raka Daryanto,  
and my parents

## Abstract

---

The objectives of this research are threefold. The first objective is to analyse the patterns of output and employment change in Indonesian agriculture compared to other sectors. The second is to utilise a CGE model of the Indonesian economy to analyse macroeconomic agricultural linkages and evaluate sectoral effects of changes in the external shocks and changes in domestic policies on agricultural development performance in Indonesia. The third is to analyse existing agricultural development policies in response to the external shocks with a view to finding policies that generate the highest rates of economic growth and equal income distribution.

By using the input-output framework this study analyses growth and structural change in the Indonesian economy with special reference to the agricultural sector. Growth and structural changes are examined in terms of how changes in a sector's output and employment can be apportioned between changes in (1) domestic final demand, (2) export demand, (3) import substitution, and (4) technological change. Results indicate that the growth and structural change in output and employment of agricultural sectors and other sectors in the Indonesian economy during the periods of 1971-1985 and 1985-1995 are heavily dependent on domestic demand. It is found that the contribution of exports to output growth became relatively stronger in the process of economic development, especially in the manufacturing sectors. The agriculture sector always records positive net effects due to trade. It is also found that the most important sources of growth in employment in agriculture are changes in domestic final demand and labour productivity. Changes in technology have significant impact on structural change in agriculture.

A multisectoral computable general equilibrium model is used to evaluate negative external shocks to the Indonesian economy and the ability of agricultural demand-led industrialisation (ADLI) to mitigate the effect of these external shocks. Among other findings, the ADLI simulation results suggest that policies which are successful in raising agricultural production and real income, also lead to a significant improvement in non-agricultural performance. However, an ADLI policy is likely to benefit rural households less than urban households, owing to the deterioration in the agricultural terms of trade. The challenge for policy makers is to devise ways that will ensure farmers a greater share of gains from implementation of ADLI strategy. The results of counterfactual experiments also indicate that the implementation of ADLI successfully mitigates the adverse terms-of-trade shocks in the economy. The contractions due to the negative shocks in the economy are reversed by more than proportionate expansion that resulted from the boom in agricultural production and exports.

# Contents

---

Declaration .....	ii
Dedication .....	iii
Abstract .....	iv
List of Tables .....	viii
List of Figures .....	x
Acknowledgements .....	xi
Abbreviations .....	xiii
<b>Chapter 1: Introduction</b>	
1.1 Background .....	1
1.2 Research Problem .....	2
1.3 Objectives .....	7
1.4 Hypotheses .....	7
1.5 Organisation of the Study .....	8
<b>Chapter 2: Structural Change and the Role of Agriculture in Economic Development</b>	
2.1 Introduction .....	9
2.2 Structural Change and Development Patterns .....	9
2.2.1 Approaches to Study of Structural Change .....	9
2.2.2 Structural Change and Patterns of Development .....	10
2.2.3 Stages of Structural Transformation .....	14
2.3 Current Evidence: Patterns of Structural Change in the World Economy .....	16
2.4 Reasons for Agriculture's Relative Decline .....	19
2.5 External Economic and Domestic Policy Environments of Agriculture .....	22
2.5.1 The Long-run Decline of Real Primary Commodity Prices .....	22
2.5.2 Oil Price Shocks .....	25
2.5.3 The Effects of World Agricultural Trade Liberalisation .....	27
2.5.4 Domestic Policy Environment of Agriculture .....	28
2.6 Agriculture in Theories of Economic Development .....	29
2.6.1 The Neglect of Agriculture .....	29
2.6.2 The Role of Agriculture in Economic Development .....	31
2.6.3 Empirical Evidence .....	35
2.6.4 Agricultural Demand-Led Industrialisation (ADLI) .....	37
2.7 Summary .....	40
<b>Chapter 3: The Indonesian Economy and Agricultural Sector</b>	
3.1 Introduction .....	41
3.2 Overview of the Indonesian Economy .....	41
3.2.1 Growth and Structural Change .....	43
3.2.2 External Trade .....	49
3.2.3 Poverty and Income Distribution .....	51
3.2.4 Government Policies .....	53
3.2.5 The Current Financial Crisis .....	58
3.3 The Role of Agriculture in National Economy .....	59
3.4 External and Domestic Macroeconomic Environments of Agriculture .....	66
3.4.1 External Environment of Agriculture .....	66
3.4.2 Domestic Macroeconomic Environment of Agriculture .....	71
3.5 Summary .....	74

**Chapter 4: Input-Output Analysis and Structural Change**

4.1 Introduction .....	76
4.2 Input-Output Structural Decomposition Analysis .....	77
4.3 Methodology .....	81
4.3.1 Material Balance Equation .....	81
4.3.2 The Decomposition of Output Change .....	84
4.3.3 The Decomposition of Output Change Used in the Study .....	87
4.3.4 The Deviation Model of Structural Change in Output .....	89
4.3.5 Decomposition of Employment Change .....	91
4.3.6 Price Adjustment Procedures of Input-Output Tables .....	92
4.4 Industrialisation Strategy and Structural Change .....	93
4.5 Data Sources and Adjustments .....	95
4.6 Summary .....	98

**Chapter 5: An Application of Decomposition Analysis to the Indonesian Economy**

5.1 Introduction .....	99
5.2 Changes in Industrial Structure .....	101
5.3 Decomposition of Output Growth .....	105
5.4 Decompositon of Structural Change .....	110
5.5 Decomposition of Employment Growth .....	113
5.6 Comparison of Sources of Growth with Other Countries .....	116
5.7 Hypotheses Testing .....	118
5.8 Concluding Remarks .....	119

**Chapter 6: Social Accounting Matrix and Computable General Equilibrium**

6.1 Introduction .....	121
6.2 Social Accounting Matrix .....	121
6.2.1 General Features of Social Accounting Matrices .....	121
6.2.2 SAM Multiplier Analysis .....	125
6.2.3 Structural Path Analysis .....	130
6.2.4 Applications and Extensions of the SAM .....	134
6.2.5 Application and Extension of the Indonesian SAM .....	136
6.3 Computable General Equilibrium .....	139
6.3.1 General Features of Computable General Equilibrium (CGE) .....	139
6.3.2 General Equilibrium Theory and CGE Models .....	141
6.3.3 The Great Diversity of CGE Models .....	141
6.3.4 CGE Models Emphasising the Agriculture Sector .....	147
6.3.5 Applied Models of the Indonesian Economy .....	152
6.3.6 Limitations of CGE Models .....	158
6.4 Summary .....	159

**Chapter 7: A Computable General Equilibrium Model for Indonesia**

7.1 Introduction .....	160
7.2 Model Overview .....	160
7.3 Model Equations .....	167
7.3.1 Price Module .....	167
7.3.2 Production Module .....	170
7.3.3 Income Module .....	171
7.3.4 Expenditure Module .....	175
7.3.5 Market-Clearing and Equilibrium Module .....	176
7.4 Equation and Variable Count .....	178
7.5 Model Calibration .....	178
7.6 Model Implementation .....	183
7.7 The Benchmark Equilibrium .....	184
7.8 Policy Simulations .....	188
7.9 Summary .....	190

**Chapter 8: An Application of Computable General Equilibrium to the Indonesian Economy with Special Reference to the Agricultural Sector**

8.1 Introduction .....	192
8.2 Structure of the Economy: the Benchmark .....	192
8.3 Results of Model Simulations .....	195
8.3.1 EXP1: Decline in Oil Price .....	196
8.3.2 EXP2: Decline in Agricultural Export Price .....	197
8.3.3 EXP3: Agricultural Demand-Led Industrialisation (ADLI) .....	198
8.3.4 EXP4: Reduction in Agricultural Export and Indirect Taxes .....	199
8.3.5 EXP5: Combination of EXP1 and EXP3 .....	200
8.3.6 EXP6: Combination of EXP2 and EXP3 .....	201
8.4 Sensitivity Analysis .....	201
8.5 Hypotheses Testing .....	205
8.6 Concluding Remarks .....	206

**Chapter 9: Indonesia's Crisis and the Agricultural Sector**

9.1 Introduction .....	208
9.2 Social Effects of the Crisis .....	209
9.3 Impact on Agriculture .....	211
9.4 Crisis-induced Agricultural Policy Responses .....	213
9.5 The Relevance of Agricultural Demand-Led Industrialisation .....	215
9.6 Conclusion .....	218

**Chapter 10: Conclusions**

10.1 Introduction .....	220
10.2 Summary and Conclusions of the Dissertation .....	220
10.3 Directions for Future Research .....	225

<b>References</b> .....	<b>228</b>
-------------------------	------------

<b>Appendices</b> .....	<b>259</b>
-------------------------	------------

## List of Tables

---

	Page
Table 2.1: Normal variation in economic structure with level of development .....	12
Table 2.2: Structure of the economy: production (percentage of GDP) .....	17
Table 2.4: Structure of the economy: labour (percentage of GDP) .....	17
Table 3.1: Sectoral contribution to GDP growth rate in the Indonesian economy, 1960-1992 (percentage) .....	45
Table 3.2: Regression results in structural change in the Indonesian economy, 1963- 1990 .....	47
Table 3.3: Changes in poverty incidence, 1970-1993 (percentage) .....	52
Table 3.4: Changes in income inequality, 1970-1990 (Gini ratios) .....	53
Table 3.5: Adjustment policies initiated in Indonesia, 1983-1988 .....	56
Table 3.6: Changing importance in agriculture and its subsector to GDP in Indonesia, 1973-1993 (at 1983 constant prices) .....	60
Table 3.7: Distribution of agricultural GDP by subsectors in Indonesia, 1973-1993 (at 1983 constant prices) .....	61
Table 3.8: Growth rates of GDP by sectors, 1973-1993 (at 1983 constant prices) ...	61
Table 3.9: Agricultural balance of trade, 1974-1990 (US\$ 000) .....	65
Table 3.10: Comparative performance of Indonesia and other oil exporting countries ..	68
Table 3.11: Nominal and effective rate of protection estimations by broad sectors in Indonesia, 1984-1994 .....	73
Table 3.12: Percentage of output protected by non-tariff barriers by broad sectors in Indonesia, 1986-1995 .....	74
Table 4.1: Sources of structural change: demand-side composition .....	80
Table 4.2: The 26 sector classification for the Indonesian Input-Output Tables .....	97
Table 4.3: The sectoral re-classification for the Indonesian Input-Output Tables .....	98
Table 5.1: Value added by industrial origin at 1995 constant prices (percentage share) .....	101
Table 5.2: Export by industrial origin at 1995 constant prices (percentage share) ...	102
Table 5.3: Import by industrial origin at 1995 constant prices (percentage share) ...	102
Table 5.4: Export ratio and import ratio in 1971 (billion rupiahs at 1995 constant prices) .....	103
Table 5.5: Export ratio and import ratio in 1985 (billion rupiahs at 1995 constant prices) .....	103
Table 5.6: Export ratio and import ratio in 1995 (billion rupiahs) .....	103
Table 5.7: The sources of economic growth: 1971-1985 .....	105
Table 5.8: The sources of economic growth: 1985-1995 .....	106
Table 5.9: Primary sources of change in total output growth of the Indonesian manufacturing sectors .....	109
Table 5.10: Deviation from balanced growth: 1971-1985 .....	111
Table 5.11: Deviation from balanced growth: 1985-1995 .....	111
Table 5.12: The sources of employment growth: 1971-1985 .....	114
Table 5.13: The sources of employment growth: 1985-1995 .....	115
Table 5.14: Comparison of sources of output growth .....	117
Table 6.1: Structure of a representative social accounting matrix .....	123

Table 6.2:	Schematic representation of endogenous and exogenous accounts in Social Accounting Matrix .....	126
Table 7.1:	SAM disaggregation of activities, commodities, factors and institutions accounts .....	164
Table 7.2:	Aggregation scheme for the GEMINA sectoral data .....	165
Table 7.3:	Household categories used in the GEMINA model .....	166
Table 7.4:	Price module .....	169
Table 7.5:	Production module .....	171
Table 7.6:	Income module .....	173
Table 7.7:	Expenditure module .....	176
Table 7.8:	Market clearing and equilibrium module .....	177
Table 7.9:	An aggregate SAM for Indonesia, 1985 (figures in billion rupiahs).....	181
Table 7.10:	Elasticity values for the Indonesian CGE model .....	182
Table 7.11:	Social Accounting Matrix from solution (in billion rupiahs) .....	185
Table 7.12:	Summary of the solution report of the GEMINA (Direction: Maximise RGDP) .....	186
Table 7.13:	Summary of the solution report of the GEMINA model (Direction: Minimise RGDP) .....	187
Table 7.14:	A set of six simulations used in the study .....	188
Table 8.1:	Structure of the Indonesian economy, 1985, the base year for the model (all figures in percentages) .....	193
Table 8.2:	Characteristics of household groups in base year .....	194
Table 8.3:	Aggregate economy-wide effects of external shocks and changes in domestic policies (percentage change from base year value) .....	195
Table 8.4:	Aggregate economy-wide effects of sensitivity with respect to elasticities of substitution between domestic and imported goods in oil sectors on experiment 1 (percentage change from base year value) .....	203
Table 8.5:	Aggregate economy-wide effects of sensitivity with respect to the substitution elasticities in production between domestic and exported goods in farm nonfood crops on experiment 2 (percentage change from base year value) .....	204
Table 9.1:	Food imports, 1990-1998 ('000mt) .....	213
Table 9.2:	Growth rates of the agricultural sector .....	213
Table 9.3:	Public expenditures on agricultural sector, 1984-1988 average .....	216
Table 9.4:	Income multipliers by household group .....	218

## List of Figures

---

	Page
Figure 2.1: Sectoral sources of growth .....	14
Figure 2.2: Changes in the supply of and demand for agricultural and non-agricultural products in a growing economy, due to Engel's Law .....	20
Figure 2.3: Changes in the supply of and demand for agricultural and non-agricultural products in a growing economy, due to the different rate of productivity growth .....	21
Figure 2.4: Long-term trend in real international food prices, 1900-1987 .....	23
Figure 3.1: Structural change in Indonesian economy, 1960-1993 .....	46
Figure 3.2: Structural change in Indonesian economy, excluding mining, 1960-1993 .....	46
Figure 3.3: Structural change in Indonesian employment, 1971-1994 .....	48
Figure 3.4: Changes in real non-oil commodity prices, 1980-1993 (per cent) .....	69
Figure 3.5: Changes in prices of Indonesia's major agricultural commodities on the world market, 1980-1993 .....	71
Figure 4.1: Measuring structural change .....	90
Figure 6.1: Simplified interrelationship among principal SAM accounts (production activities, factors and institutions) .....	129
Figure 6.2: An example of the possible linkages between two sectors .....	131
Figure 7.1: A schematic representation of the CGE model of Indonesia .....	162
Figure 7.2: Price system in the GEMINA model .....	168
Figure 7.3: Flowchart of CGE modelling .....	179

## Acknowledgements

---

First and foremost, I would like to express my deep gratitude to my supervisor, Dr Paul Winters, for his academic advice and great patience in guiding me throughout the thesis. His knowledge and experience were invaluable to the production of this thesis. I am especially thankful to my co-supervisor, Dr Phil Simmons, whose assistance during the course of study has been appreciated.

I am deeply indebted to my former supervisors: Associate Professor Roy Powell before his resignation and Dr Euan Fleming prior to his study leave. They were instrumental in initiating this study, and were great sources of inspiration and encouragement.

I am thankful to Professor Brian Hardaker, Professor John Dillon, Dr Oscar Cacho, Dr Mahinda Siriwardana, Dr Erwidodo of CASER Indonesia, Dr Ray Trewin of ANU, and Professor Sherman Robinson of IFPRI who gave me valuable advice concerning the initial model construction.

I would like to express my gratitude to all participants of the Graduate Students Workshops of the UNE Agricultural and Resource Economics, School of Economic Studies who attended my seminar presentations, and various session participants during my presentations of contributed papers to the Australian Agricultural Resource Economics Society Annual Conferences in Perth and Armidale for offering suggestions and comments that enhanced this dissertation.

I am also grateful to the Australian Agency for International Development (AusAID), for financial support which made this study possible.

My appreciation goes to ARE graduate students and staff, and the Indonesian Students in Armidale. Their friendships have made my stay in Armidale memorable. I will never forget Professor Roley Piggott, Associate Professor Jack Sinden, Dr Christie Chang and Dr Paul Winters. Their decision to hire me as tutor for four years provided me with both financial and moral support during those years.

I owe an incalculable debt to Professor Soleh Solahuddin (Minister of Indonesian Agriculture), Professor Syafrida Manuwoto, Dr Syafri Mangkuprawira, Dr Bunasor Sanim, Dr Sri Hartoyo, and Mrs Yayah Wagiono of Bogor Agricultural University,

Indonesia for their steady source of support and encouragement which made my studies at UNE possible.

I owe special appreciation to Dr David Evans for providing editorial assistance whenever it was required, up to the last minute.

The word processing assistance of Ron Coleman is also much appreciated.

I cannot close this incomplete list without expressing my greatest appreciation to my family: my lovely wife Heny and our astounding children Didiet, Nina and Raka for their unrestricted support, patience, unconditional love and understanding over the past four years. They mean far more than I can express here, and so rather than fail in the attempt, I will just thank them.

Finally, I would like to thank the many people in Indonesia who helped me during my field trips there. It is impossible to list them all here. I hope some day I can express my thanks to them directly.

I wish to thank all those mentioned above for their assistance. Any errors contained herein or omissions are the sole of responsibility of the author.

## Abbreviations

---

ADLI	Agricultural Demand-Led Industrialisation
BPS	Biro Pusat Statistik
BULOG	Badan Urusan Logistik (National Logistic Agency)
CGE	Computable General Equilibrium
GDP	Gross Domestic Product
GEMINA	General Equilibrium Model for Indonesian Agriculture
IO	Input-Output Analysis
LDCs	Less Developed Countries
Rp	Rupiah, the basic unit of the Indonesian money. The official exchange rate in 1985 was that one dollar US equalled 1120 rupiah.
SAM	Social Accounting Matrix

Note: Abbreviations and variables names in the CGE model are listed in Appendix 7.1 as well as in the GAMS program listing of the CGE model in Appendix 7.2.