THE ANALYSIS OF CIRCULAR CAUSATION ON PRODUCTIVE SECTORS IN INDONESIA (1984 – 2004)

A THESIS

Presented as Partial Fulfillment of the Requirements to Obtain the Bachelor Degree in Economics Department

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بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

Assalamualaikum Wr. Wb.

Thanks to Allah SWT who made it possible for me to accomplished this thesis. Without Him, nothing in this world would be possible, not to mention this research.

The academic writing is composed as partial fulfillment to obtain bachelor degree in International Program, Economics Department, Faculty of Economics, Universitas Islam Indonesia. Furthermore, the researcher chooses **"THE ANALYSIS OF CIRCULAR CAUSATION ON PRODUCTIVE SECTORS IN INDONESIA (1984 – 2004)"** as the title of the thesis.

The aim of this paper is to investigate the availability of circular causation on productive sectors. Since a strong intersectoral linkage is very important to create a better rate of economic growth that is why the researcher is interested in developing this issue. A strong intersectoral linkage eventually will boost the output of GDP sectors and the level of employment. It also examines the sectoral output and total employment changes as a result of different economic condition (before and after financial crisis) occurred in Indonesia. The learning process during those two different situations is going to investigate as well.

Moreover, the researcher (also) thankful and dedicated this thesis to the following people:

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A human being always has weakness and also this thesis (as a creation of a person) is not ideal. Perfection belongs to Allah SWT as the main creator of the universe and its contents. Furthermore, the researcher apologizes for the people whom do not remember to mention and imperfection of this paper.

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Ariana Mitayani

STATEMENT FREE OF PLAGIARISM

Herein I declare the originality of this thesis; there is no other work which has ever presented to obtain any university degree, and in my concern there is neither one else's opinion nor published written work, except acknowledged quotation relevant to the topic of this thesis which have been stated or listed on the thesis bibliography.

If in the future this statement is not proven as it supposed to be, I am willing to accept any sanction complying to the determinated for its consequences.

Yogyakarta, March 2, 2007

Ariana Mitayani

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ABSTRACT

Economic growth is usually measured by Gross Domestic Product (GDP). Based on output approach, the total output of GDP comprises of economic sectoral output. Among those economic sectors interdependency might occur. This might happen because economic sectors can not produce in isolation, they need to cooperate with each other. Example of this cooperation among sectors is that an output from a sector could be an input to another sector. This research observes the existence of intersectoral relationship among GDP sectors and investigates the connection between those sectors to overall employment. This research also examines the change happen to productive sectors due to different economic situation (before and after economic crisis) occurred in Indonesia. Productive sector is similar with real sector.

This research uses statistical and econometrical approach. The simple log linear model is used to exercise the model.

This research has managed to find out that not all sectors have correlation to other sectors. There are some sectors that do not correlate with other sectors and the contribution does not always imply positive, there is also negative effect. Afterward, there is one GDP sector which has correlation to employment sector. And finally, after economic crisis there is only one sector which feels better learning process.

ABSTRAKSI

Pertumbuhan ekonomi biasa diukur dengan Produk Domestik Bruto (PDB). Berdasarkan pendekatan pengeluaran, output total dari PDB terdiri dari output sektor-sektor ekonomi. Di antara sektor-sektor tersebut, sifat saling ketergantungan dapat terjadi. Hal ini dapat terjadi karena sebuah sektor ekonomi tidak dapat berproduksi sendiri, mereka butuh untuk saling bekerjasama. Contoh dari kerjasama antar sektor ini adalah output dari sebuah sektor dapat menjadi input bagi sektor lain. Riset ini meneliti keberadaan hubungan antar sektor PDB dan menginvestigasi hubungan antar sektor tersebut terhadap ketenagakerjaan secara menyeluruh. Penelitian ini juga membahas perubahan yang terjadi terhadap sektor produktif yang disebabakan oleh perbedaan kondisi ekonomi (sebelum dan setelah krisis ekonomi) yang terjadi di Indonesia. Sektor produktif adalah sector riil.

Penelitian ini menggunakan pendekatan statistika dan ekonometrika. Untuk mengolah modelnya, riset ini menggunakan model simple dari log linier.

Riset ini telah berhasil mencari tahu bahwa tidak semua sektor saling berkorelasi dengan sektor lain. Terdapat beberapa sektor yang tidak mempunyai hubungan dan korelasi antar sektor tidak selalau berdampak positif, dapat juga memberikan kontribusi negatif. Kemudian ada satu sektor PDB yang mempunyai hubungan dengan ketenagakerjaan. Setelah krisis ekonomi, pada akhirnya hanya ada satu sektor yang merasakan proses belajar ke arah lebih baik.

CHAPTER I

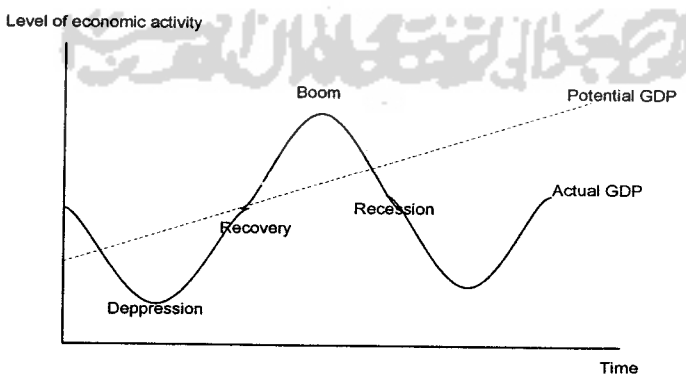
INTRODUCTION

1.1. Background of the Study

This research tries to investigate the presence of circular causation on productive sectors in Indonesia. It discusses the availability of intersectoral relationship among GDP sectors and employment. The productive sectors are similar with real economic sectors.

Economic growth can be used to measure the stability of macroeconomic condition and the prosperity of a nation. In time to time, economies tend to experience up and down growth like business cycle. The example of this fluctuation can be described with this situation, if consumer feels the diminishing levels of consumption as the effect of reduced income then the producer will lower its production and as the result the industry eliminates its worker and make unemployment level even worse, vice versa.

Figure 1.1: Business Cycle



Source: Collins Dictionary of Economics

a) Depression

This situation indicates with low output, small price, and massive unemployment.

b) Recovery

Recovery situation happens when output, price as well as sales start to rise and make unemployment reduced.

c) Boom

This is the peak of the business cycle. The production grows rapidly and exceeds the potential GDP. Full employment and inflation reached.

d) Recession

When the boom situation starts to end (identify by falling in output and employment), it is followed by recession. If this situation becomes worse then the economy will down to depression.

Economic growth can be measured by calculating GDP. There are three ways to measure GDP, they are: income approach, expenditure approach, and output approach. The researcher uses GDP based on production approach. Based on output approach, GDP comprises into several sectors. Before 1994, GDP consist of 11 sectors, namely:

1. Agriculture, livestock, forestry, and fishery
2. Mining and quarrying
3. Manufacturing industry
4. Electricity, gas, and water supply
5. Construction

6. Trade, hotel, and restaurant
7. Transportation and communication
8. Banking and other financial intermediaries
9. Ownership of dwellings
10. Public administration and defense
11. Services

However since 1994, the sectors of GDP become compacted into 9 industrial origins[1], namely:

1. Agriculture, livestock, forestry, and fishery
2. Mining and quarrying
3. Manufacturing industry
4. Electricity, gas, and water supply
5. Construction
6. Trade, hotel, and restaurant
7. Transport and communication
8. Financial, ownership, and business services
9. Services

Each economic sector can not produce in isolation; it needs support from other industry. Then as a consequence, among them it might appear intersectoral linkages. Intersectoral linkages take place in a situation where production process of a sector correlates with other industry production. One example is mining produces the raw material and energy inputs required to manufacture chemical

[1] The 9 sectors come up from several changes. The banking and other financial intermediaries, and ownership of dwellings were become one sector (namely financial, ownership, and business services). Likewise, public administration and defense was included to services sector.

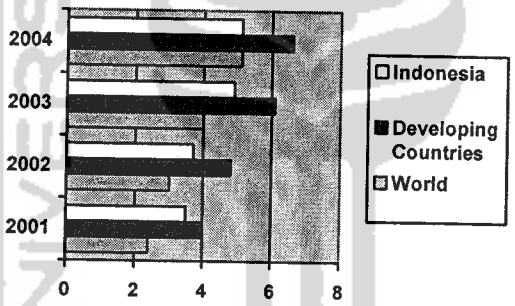
fertilizers and agricultural machinery (Dorian, 1994). Another example is in agriculture sector, its output can be used in lumber industry or for trade sector (as agricultural export), when there is an increasing demand from trade sector, it will force agriculture sector to increase their production, trade also experience higher output (due to increasing demand). The actual interdependency between productive sectors depends on the extent to which demand for inputs is met by domestic production or by imports (Poot, Kuyvenhoven, and Jansen, 1990). However if the needs of inputs are mainly fulfilled by local industrial output other than by imported goods then it would appear a strong intersectoral linkage (in that nation). However, a strong intersectoral linkage will result to a decent rate of economic development. This is possible because the development of economic sectors when results from high interdependency among (domestic) sectors will stimulate the growth of those sectors and make them feel a higher production (output).

Input-output table is used to study the link between industrial sectors. The input-output model at the same time examines the degree of intersectoral dependency. From the analysis of input-output model, it can be found economic impact. There are results of economic impact, they are backward or forward linkage. For examples there are two sectors in the economy (industry A and B), backward linkage is when industry B uses inputs from industry A and forward linkage is when sector A uses input from sector B.

By a good economic growth hopefully the country will achieve a good social indicator as well, such as: low unemployment level (as the increase of

investment, infrastructure, and job creation), better health and education level (in line with better welfare), and other. Then it can be concluded that welfare and growth are positively correlated, a growing production is expected to lead to more employment and more income, and thus welfare will increase. However, this is not always true, between growth and employment does not necessarily imply positive relationship. Hans Opschoor emphasized that more growth can be defined as more consumption but it does not mean more jobs available. On the other hand, when a country experienced less growth, it means consumption is reduced as well as employment.

Figure 1.2: World Economic Growth (%)/a



Source: IMF, World Economic Outlook

From the graph above, Indonesia's economic growth is improving from year to year. However it is still below the average economic growth of developing countries.

Table 1.1: Indicators of education

Selected Indicators	2001	2002	2003	2004
School enrolment (%)				
a. Population aged 7-12 years	95.65	96.1	96.42	96.77
b. Population aged 13-15 years	79.39	79.21	81.01	83.49
c. Population aged 16-18 years	49.38	49.76	50.97	53.48
Educational attainment of population aged 10 years and over (%)				
a. No schooling	10.3	8.64	8.5	8.98
b. Some elementary school	24.11	22.63	21.87	15.31
c. Elementary school	32.66	33.3	33.42	31.87
d. Junior high school	14.87	15.92	16.65	20.12
e. At least senior high school	18.06	19.53	19.56	23.72
Proportion of population 10 years of age and over who were literate	89.2	90.71	90.93	91.47

Source: BPS

Table 1.2: Unemployment by educational attainment

No.	Educational Attainment	2001	2002	2003	2004
1.	Under primary school	851,426	868,308	1,036,048	1,004,296
2.	Primary school	1,893,565	2,353,330	2,452,805	2,275,281
3.	Junior high school	178,6317	2,146,495	2,426,393	2,690,912
4.	Senior high school	2,933,490	3,244,130	3,456,099	3,695,504
5.	Diploma I/II	-	86,567	79,583	92,788
6.	Academy/Diploma III	251,134 *)	163,859	123,226	144,463
7.	University	289,099	269,415	245,857	348,107
	Total	**8,005,031**	**9,132,104**	**9,820,011**	**10,251,351**

Note: Unemployment in here means people who are looking for work, establishing a new business/firm, hopeless of job, and have a job in future start.

*) Diploma I/II, Academy/Diploma III

Source: BPS

From the combination of table 1.1 and 1.2 with figure 1.2, from 2001 to 2003 Indonesian people seem to have better welfare. From 2001 until 2003, the number of people who were educated is increasing. The government "nine-year compulsory studies programmed" appears success. However, in 2004, the number of people who were educated was decreasing. It doesn't in line with the increasing level of economic growth. The same thing happens in the number of

unemployment. In the year of 2001 until 2003, people who unemployed were better off. Nevertheless, the reversed action happens in 2004.

The table above indicates the higher economic growth does not in line with higher welfare (consider in higher educated people). Moreover, well educated people will have a better future in getting job.

Labor is one of factors of production. By adding more workers and/or by increasing productivity of workers can boost production within industries. Adding more workers is by absorbing more labor. Whereas, increasing labor productivity is possible by improving education and giving more training to labor.

Employment consider as one of health's indicators. As mentioned earlier, it is closely related to the economy's aggregate output. Unemployment becomes a social problem as well. Then besides being an economic problem, it is also turns as social concerns. A better welfare will achieve by people who were employed. Having job means having income and this is needed for them so they can fulfill their daily (and other) needs. People without regular employment or only part-time jobs are classified among the poor. As well as people who worked full-time and paid regularly in private and public sector are categorized among the middle and upper group. In that case, full employment is desirable within a country. Because when a country experience full employment then that nation is assumed to have a better welfare. A high unemployment level in Indonesia more and less appears because of creation of jobs does not in line with total labor force. Labor market dynamics suggest that Indonesia's human resource problem is not

employment creation per se, but creation of more production jobs (Douglas S. Paauw, 1992).

In 1998, Indonesia experienced economic crisis along with other Asian economies. The economic crisis has forced many industries to shut down because they can not cope with the situation after the crisis hit Indonesia. This research tries to investigate how much output change influenced by economic crisis and by doing this the researcher divided the research into two sections before crisis and after crisis.

1.2. Problem Identification

GDP based on output approach comprises from economic sectors. Economic sectors may not produce in isolation. Production of each sector may have cause and effect to other sector production. An output of an industry could become an input to other industry and then increases production of both industries. Then between them occur interdependency. But is this a true statement. Do sectors have causation or only causality? Does an industry fulfill the needs of their input from local sector or from imported materials or from both?

There are two possible economic impact, they are: backward and forward linkage. This situation may appear under circumstances that intersectoral relationship appears in the given model, if not then between them there is no linkage. What about economic impact in Indonesia? Do economic sectors feel backward or forward linkage?

Indonesia experienced economic crisis as a downturn of its economy. The recession has managed to change the growth of output and employment. Before economic crisis, Indonesia's sectoral output is high but when recession strikes this nation along with its consequences, Indonesian economy start to unstable. After that, a learning process should occur in intersectoral output and employment between these two situations. The learning process could happen in after economic crisis is that the intersectoral output and employment should be worse. But is this true; is there a learning process in the model? If so, do they feel better, worse, or stable learning process?

An economic indicator itself can not fully explain what happen in the society as a whole. A social indicator must be added to the analysis. The relationship between social and economic aspect then will be considered. The researcher uses employment as the social aspect and GDP as the economic aspect. Does the change in GDP sectors have relations with employment? Do they feel causation? At the end, is there a learning process between sectoral GDP and employment? If so, does the learning process is better, worse, or stable? Moreover, is there any difference between GDP sectors output and employment before and after economic crisis?

There are two main factors of production: capital and labor. Both of them have ability to increase output. However, labor is different with capital. In time to time, labor can learn through space. While capital remains static, capital itself can not evolve. Then we can say, labor is more dynamic than capital. But is it true? Does our employment learn as time goes by?

With more than 200 million (and still counting) people in Indonesia, unemployment becomes a major problem in this country. With a large portion of labor force and limited job creation then unemployment become a common problem. This situation may appear because the growth of labor force does not in line with the growth of job creation (development of infrastructure). Then how to overcome this problem? How does a nation provide jobs for its growing labor forces and at the end create full employment?

1.3. Problem Formulation

The researcher has managed to formulate the following problems:

1. Is there any intersectoral relationship among sectoral output?
2. Is there any relationship between the changes in GDP sectoral output (quantity) and employment level?
3. Is there any different on production output because of the economic crisis happen in Indonesia?

1.4. Restriction/Limitation of Research Area

There are some limitations on this research:

1. The research is limited to 21 years (1984 – 2004).
2. The research is limited to measure only output or production.
3. The researcher uses Indonesia's GDP sectors (quantity) and total employment data as the object of analysis.

1.5. Research Objectives

The objectives of the research are:

1. To know the sensitivity of each production sector to another.
2. To know the relationship between the changes in quantity of output sectors and the effect to employment in general.
3. To know the difference between intersectoral linkages, the changes in output before and after economic crisis.

1.6. Research Benefits

This research hopefully will be benefited for other parties. Some of people that will gain advantage are:

- Government, policy maker

  This research can be an input for the Government and to be considered when making conducive policy for Indonesian economy. Government should make policies that will directly have effect in building intersectoral output and employment. If Indonesia feels a strong intersectoral relationship then a better rate of economic development will come in handy.

- Economist, economic student

  The benefit can be taken by economist (or economic student) who has interest in relationship between sectoral GDP and employment. This research can be addition in socio-economic analysis.

- People, common people

Other people may have benefit on this research. They may know the importance of interdependency among sectors and will increase employment level. And if there is not any relationship, they may know what factors will bring them to a better level.

1.7. Organization of Thesis

- Chapter I: Introduction

  In this very first chapter, the researcher gives explanation about the background of the study, identify as well as formulate the problem, give limitation to the research, mention the objectives and benefits of the research and finally reveal the definition of terms. This research discusses intersectoral relationship among GDP sectors and employment. The researcher also investigates the differences of sectoral output and overall employment before and after economic crisis.

- Chapter II: Review of Related Literature

  Literature to be looked for is about causality, circular causation among variables and what already happen and tested regarding GDP sectors and total employment. Writing on Indonesian economy in investigating dynamic of real economic sector before and after economic crisis is also trying to find by the researcher. The discussion of this research will use macroeconomic and development economic theory. From macroeconomic side are national income and

employment. While economic growth is from development economic. There are also theories from economic thought to support hypothesis that the researcher is going to develop.

- Chapter III: Research Method

  In this paper, the researcher uses regression analysis (t test, F statistic, and R squared) to analyze the coefficients, the significance of independent variable to its dependent variable. Afterward, the researcher analyzes the classical assumptions to know the reliability of data. Moreover, the researcher includes dummy variable in the given model to know the difference of intersectoral relationship before and after economic crisis. And finally, the researcher examines the sensitivity analysis between primary sector, secondary sector, tertiary sector, financial sector, employment, and dummy variable. In this thesis, the researcher needs to collect sectoral GDP output and total employment data.

- Chapter IV: Research Finding and Discussion

  After the completion of gathering data, the researcher will construct a set of analysis. About testing, interpret, and analyze the data will be fully-discussed in this chapter. The researcher has responsibility to analyze the data as well as give explanation as understandable as possible. The researcher also have obligation to give assumptions regarding the insignificancy of the model. This chapter is the main core of the research because in here the researcher tries to

answer the problem (proof the hypothesis) arises and gives explanation of what happen.

- Chapter V: Conclusions and Recommendation

The researcher gives conclusion on the last chapter. The conclusion accommodates the summary of research discussion and result through out the paper. The conclusion consists of what is happening on the research. The researcher also mentions some recommendations to overcome the problem. The recommendation includes what should happen on circular causation on productive sectors in Indonesia and suggest what the government or other parties should do.

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1. Literature Review

2.1.1. The Economic Development Landscape Generated by Statistical-Spatial Domain Analysis.

This paper is proposed by Masudul Alam Choudhury and Mohammad Shahadat Hossain.

Trade off between economic and social variables sometimes occur in term of development and growth. For examples economic growth does not necessarily in line with social variable (distributive equity, poverty alleviation, employment creation).

In this paper they distinguished the model into two sub-models. First sub-model, there is circular causation applied to sectoral studies and critical indicators. The sectors are petroleum and gas, manufacturing, construction, utilities, and tertiary services (include finance). These sectors are going to be linked with economic output (sectoral GDP), investment expenditure (government, private, and foreign), and total employment. Second sub-model, it is the dynamic model of input-output relationship. This paper variable is intersectoral GDP, total employment, and intersectoral government capital expenditure.

This paper uses log-linear forms to estimate the elasticity coefficients, database field (the estimated value is compiled into one

table), spatial analysis (the database value is presented in graphical form), and 3-D surface generation (3-D presentation of the model, a more dynamic presentation).

The concept involving economic and social variables has been considered in development planning. The result of this paper is relational epistemology have an impressive result to guide negative partial elasticity coefficients between sectoral GDP and total employment.

2.1.2. Quantitative Estimation of a Dynamic Model for Studying Sectoral Linkages According to the Sable Island Gas Project Off the Province of Nova Scotia, Canada.

This paper is proposed by Masudul Alam Choudhury and Ishaq Bhatti.

First functional relation,

$$Q_s = A.\Pi_{s'}Q_{s'}^{as,s'}.\Pi_{s'}E_{s'}^{bs,s'}$$

$$E_s = A.\Pi_{s'}Q_{s'}^{as,s'}.\Pi_{s'}E_{s'}^{bs,s'}$$

Where: Qs, Qs' = GDP in constant 1992 dollars

Es, Es' = employment

as,s' = elasticity coefficients of Qs

bs,s' = elasticity coefficients of employment

s,s' ($s \neq s'$) = G (mining, quarrying, oil wells), M (manufacturing), C (construction)

Second functional relation,

$$Q_s = A.\Pi_{s'}Q_{s'}^{as,s'}$$

$$E_s = B.\Pi_{s'}E_{s'}^{as,s'}$$

The formula of input-output for matrix construction (for output, employment, capital formation variables) is,

$$A\ i,j = [\Delta Var\ i / \Delta Var\ j] * \Delta Var\ j$$

$$[\Delta Var\ i / \Delta Var\ j] = b = [Var\ i = a + b.Var\ j]$$

A i, j. Var j ; means what changes in (j) sector contribute to a percentage of the change in (i) sector, when j sector change by (Δ Var j).

The technique of data analysis in this paper is statistical test (R squared, t-test, F statistic, and Durbin Watson), and Granger causality test.

This paper has found capital expenditure and employment in petroleum/gas, manufacturing, and construction have a little intersectoral linkages, they found to be evolve independently. Moreover, there is a weak relationship between output and employment in those three sectors. In addition, intersectoral output in separate sectors results in negative value of elasticity coefficients. Finally, capital expenditure denoting investment in the petroleum/gas remains independent of the linkages between manufacturing and construction sectors.

2.1.3. Inter-Sectoral Growth Linkages in India: Implications for Policy and Liberalized Reforms.

This paper is proposed by Seema Bathla.

This paper analyses the intersectoral relationship (in agriculture, industry, and services) and their implications to economic growth, employment, and income distribution in the post independence era of India

(1950 – 2001). The study of intersectoral relationship has changed cause by different pattern of growth income of agriculture, industry, and services; this situation is followed by development reforms and liberalization. Agriculture already proved has a positive influence in manufacturing development and overall economy, and services (mostly) act as inputs in agriculture and manufacturing.

This research uses Granger test for testing causality, co-integration tests, and error correction model.

The result of the study of intersectoral relationship are causality occurs in the direction of various services but does not run with tertiary sector, moreover, there is causality from secondary to tertiary sector (one direction), and two directions between secondary sector and various services. Overall, in the long run, the relationship between primary, secondary, and some services shows a strong connection while in the short run, the link is weak.

2.1.4. The Impact of Foreign Direct Investment on Sectoral Employment in Mexico: A Prospective Analysis.

This paper is proposed by Eduardo Loria.

This research realizes the importance of employment and its sectoral composition in development process. He uses macroeconometric model for 1970 – 2002 with three prospective scenarios (forecasted to 2013) on three different FDI behaviors. The FDI sectoral flows have been

oriented mainly to activities with leading development/growth potentials and competitive advantage.

This research uses modern structural econometrics suggestion created a good balance theoretical arguments and data, OLS to test incorrect specification, unit root tests performed for cointegration, and weak exogeneity tests to justify the use of a system. The model uses six sectors (agriculture, mining, manufacturing, construction, electric energy, and services), middle real wages, and FDI.

Since 1940, Mexico has followed the same worldwide pathways in sectoral employment and output but has not reached a suitable sectoral composition that endows economic development (permanent work force surplus in low-skilled activities). Afterward, the FDI's sole dynamics is insufficient to improve the Mexican outlook. This can be seen in pessimistic scenario, the current situation might be even more aggravated. However, in the optimistic scenario, Mexico performs an undesirable economic profile. Furthermore, migration always has been an enhancing factor for development.

2.1.5. Indonesian Economy, Some Important Issues; with the article taken is Agricultural Sector.

This paper is proposed by Tulus T.H. Tambunan.

Agriculture seems to have 4 economic growth and development contributions based on classical analysis by Kuznets, they are: product, market, factors of production, and international reserve contribution. The

researcher will focus on product and factors of production contribution analysis since those contributions in line with the researcher general topic.

Other economic sectors expansion will closely be related to the growth of agriculture output. From demand side, agriculture can be looked as the source of food supply and it keep growing as the population increases. However, from supply side, the enlargement of agriculture output can be derived from the increasing demand of input from other sectors, e.g. manufacturing and trade industry. This situation can be called as product contribution.

Based on Arthur Lewis theory on Unlimited Supplies of Labor theory, in the process of economic development, the surplus labor (which MP from more workers is close or equal to 1) as a consequence productivity and real income growth of agriculture were low and it will make labor from agriculture (urban) transferred to industry and other rural sectors. As a result industrial sector will achieved higher production without reducing agriculture output. This is factors of production contribution.

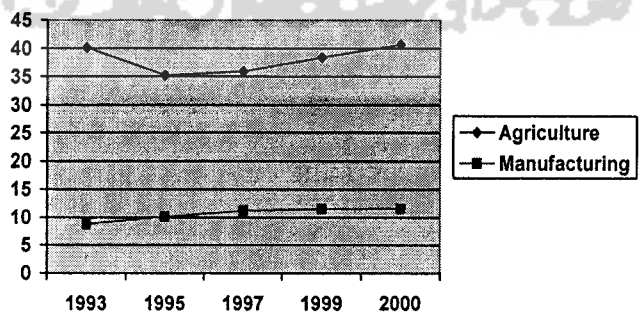
Table 2.1: GDP Distribution Based on Economic Sectors at Constant 1993 Market Prices (%)

Economic Sectors	1995	1996	1997	1998	1999	2000	2001
Agriculture, livestock, forestry, and fishery	16.1	15.4	15.0	18.1	19.6	17.0	16.4
Mining and quarrying	9.3	9.2	8.8	12.6	10.0	13.8	13.6
Manufacturing industry	23.9	24.7	24.7	25.0	26.0	26.2	26.0
Electricity, gas, and water supply	1.1	1.2	1.3	1.2	1.2	1.2	1.2
Construction	7.6	8.0	8.2	6.5	6.2	5.9	5.6
Trade, hotel, and restaurant	16.7	16.7	17.0	15.3	16.0	15.2	16.1
Transport and communication	7.1	7.2	7.3	5.4	5.0	5.0	5.4
Financial, ownership, and business services	7.5	7.3	7.3	7.3	6.5	6.2	6.2
Services	10.7	10.3	10.4	8.6	9.5	9.5	9.5

Source: BPS

The decrease of output contribution in a sector does not have to deal with decreasing volume of production (negative growth). It could be because of its output growth rate is slower than output growth of other sector.

Figure 2.1: Job Opportunity Growth Trend in Agriculture and Manufacturing Industry Sectors (%)



Source: BPS

In long-term economic development process, there will be a change in economic structure and will change the job opportunity as well. From the graph above, job opportunity in agriculture shows declining growth, while in manufacturing the job opportunity seems to increase.

2.2. Theoretical Framework

2.2.1. National income accounts

Key concept in national income is Gross Domestic Product (GDP). The measurement of GDP can be considered as economic growth. Calculating GDP is based on income, expenditure, and production (output) approach. Production and income approach is from aggregate supply while expenditure approach is derived from aggregate demand.

- Production approach

  Production approach is the summation of all final goods and services of all production sectors (industrial origin).

  $GDP = Q_1 + Q_2 + \ldots\ldots\ldots + Q_9$

  Where: Q = Quantity of production

- Income approach

  Income approach come from total income that factor of production earned within a process of production.

  GDP = wages + rent + interest rate + profit

  Beside that, this approach also takes into account the depreciation, taxes, and subsidy.

- Expenditure approach

Expenditure approach is total of all expenses done by economic agent.

GDP = C + I + G + X – M

Where: C = Consumption

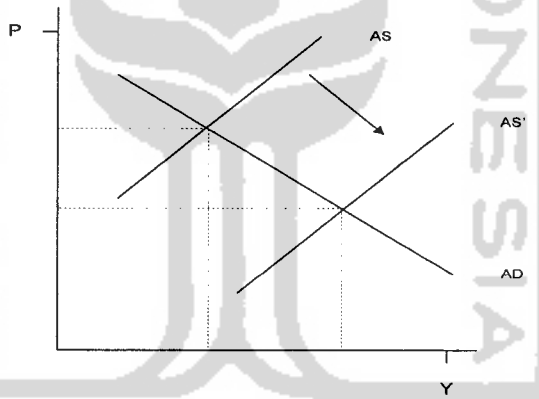
I = Investment

G = Government expenditure

X = Export

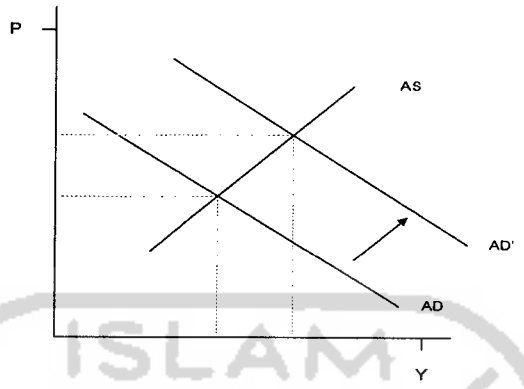
M = Import

Figure 2.2: A shift in Aggregate Supply



A Shift in aggregate supply and make output increases can be derived from the addition of number or productivity of factor of production.

Figure 2.3: A Shift in Aggregate Demand



A shift in aggregate demand and push output to increase can be derived from the increasing demand from consumer (society), private enterprise and/or government.

2.2.2. Employment

Employment is the use of labor as factor of production.

Labor force = employed + unemployed

Population = labor force + not in labor force

People classified as 'labor force' was people whom in their productive age.

$$\text{Unemployment rate} = \frac{\text{unemployed}}{\text{employed} + \text{unemployed}}$$

The relationship between growth in output and employment can be presented with model as follows,

$$\frac{dQ}{Q} - \frac{d(Q/N)}{Q/N} = \frac{dN}{N}$$

Where: $\frac{dQ}{Q}$ = the rate of growth in output

$\frac{d(Q/N)}{Q/N}$ = the rate of growth in labor productivity

$\frac{dN}{N}$ = the rate of growth of employment

2.2.3. Economic growth

Economic growth is the process of production accumulation of sectors throughout time in an economy and brings national income to a better level. There are three components of economic growth:

- Capital accumulation.
- Growth in population and at the end will create growth in labor force.
- Technological progress: neutral, labor-saving or capital-saving technological progress.

2.2.4. Okun's law

Okun's law emphasizes on changes in economic growth and rate of unemployment. Michel Beaud and Gilles Dostaler emphasizes that Okun's law establishes a correlation between the unemployment rate and the potential national income which is lost as a result of the underemployment. For example: if there is a 1% decreasing in unemployment level then real GDP will increase 3%.

2.2.5. Harrod economic-growth model

From the Harrod growth model, it is explained that the rate of growth is derived from labor force and productivity. For example: labor force rate is increasing 1% and productivity is 2% per year then attainable rate of national income growth and output is 3%.

2.2.6. Arthur Lewis theory

Lewis developed Economic Development with Unlimited Supplies of Labor theory. Based on this theory, Lewis distinguishes two sector models:

a. Traditional sector; low productivity and loaded with workers. It is characterized by zero marginal productivity. Then Lewis classifies this as surplus labor that can be withdrawn from agricultural sector without any loss of output.

b. Modern sector; high productivity and capital accumulation. This sector experience the transferred of labor from agricultural sector.

Lewis focused on the process of labor transfer and the growth of output and employment in the modern sector. The labor transfer and employment growth are caused by the expansion of that sector. It still continues to happen until all surplus labor is absorbed in industrial sector. After that, to transfer surplus labor is more expensive.

2.3. Hypothesis Formulation

The researcher formulates the following hypothesis:

1. Is there a circular causation on intersectoral output?
2. Is there a cross elasticity among sectors and employment rate? If so, could it be greater or lower?
3. Does the economic crisis could affect the output?

CHAPTER III

RESEARCH METHOD

3.1. Type of Research Method

The researcher is going to use quantitative method. Quantitative method is a tool of analysis with an aim to process data and become useful information in related area of economics. The researcher uses qualitative method when discussing the difference on intersectoral output and employment between two situations (before and after economic crisis). Those qualitative data are going to be quantified in order to be examined.

3.2. Research Subject

The objectives of the research is to analyze the presence of circular causation among GDP sectors, the connection between GDP sectors and employment, and finally the difference on output before and after economic crisis with the research subjects are primary sector, secondary sector, tertiary sector, financial sector, and employment sector. Primary sector is compiled by quantity of agriculture, livestock, forestry, and fishery and quantity of mining and quarrying. Secondary sector is coming from quantity of manufacturing industry, quantity of electricity, gas, and water supply, and quantity of construction. Tertiary sector is derived from quantity of trade, hotel, and restaurant, quantity of transportation and communication, and quantity of services. Those variables become dependent and independent variable at the same time.

The researcher uses secondary data that are collected previously by *Biro Pusat Statistik* (Central Bureau of Statistics) and *Bank Indonesia* (Bank of Indonesia).

3.3. Definition of Terms

- GDP

  GDP stands for Gross Domestic Product, it means final goods and services produced within a nation in a given year and measured by value of money. There are three ways to measure GDP, they are: GDP calculation based on expenditure, income, and output approach. In this research, the researcher uses the output approach. The output method measures the production of industrial sectors during a given year, usually one year.

  There are two classifications of GDP that is real GDP and nominal GDP. The difference between them is the use of price. The real GDP uses constant price, there is a base year where the price in following years followed the price in base year. On the other hand, the nominal GDP uses current market price. It does not track what happen in the previous years, it only counted what happen in the present year.

- Productive sectors

  Productive sectors are sectors that producing output. Productive sectors in producing goods and services can not be separated with employment and finance as its input. Productive sectors are the same with

real economic sectors. Besides productive sector, there is banking sector. The banking sector is financial intermediaries which accept funds from public, firm, as well as institution and allocate the funds to customers, borrowers and investing in securities.

- Sectoral output

  Total output comes from several economic sectors. Each sector has the same ability to contribute in economic growth.

- Intersectoral linkages

  Intersectoral linkage is the relationship or connection between sectors. When there is an intersectoral linkage in the model, it means a change in one sector will have a link to another sector. This research is trying to analyze the existence of relationship on economic sectors and also employment.

- Employment

  Employment is the use of labor as input in production process. It is a crucial matter since the measurement of absorption labor in industry can increase its production (although it is not the only one) while the low level of unemployment can give explanation of a good economic and social indicator within economy.

- Economic crisis

  Economic crisis strikes Indonesia in 1998. Afterward, Indonesia experienced slower growth (and then sectoral output and total employment

change). This research tries to find out the change in output as the effect of economic crisis.

- Aggregation

From International Encyclopedia of Economics, aggregation means the process of combining individuals' demand functions into a single market demand function, or the process of combining the supply functions of many businesses into a single market or industry supply function.

In this research, the aggregation is being used to compact the GDP sectors from 11 become 9 sectors. As mentioned earlier, the 9 sectors come up from several changes. The banking and other financial intermediaries, as well as ownership of dwellings were become one sector (namely financial, ownership, and business services). Likewise, public administration and defense was included to services sector.

To know the real growth of GDP, we should distinguish each price in each year by price index.

$$\text{Price Index} = \frac{\sum Qi \; x \; Pit}{\sum Qi \; x \; Pib}$$

Where: Qi = Quantity of each good

Pit = Price in time

Pib = Price in base period

Price index can also refer to GDP deflator. GDP deflator calculation is the comparison between nominal GDP and real GDP.

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}}$$

However, since the researcher is having difficulties in collecting the GDP deflator then the researcher uses nominal GDP as the object of analysis. The researcher is aware of the limitation when using nominal GDP. The problem of analysis will occur because nominal GDP does not record the changes in price and exchange rate.

This research classifies the variables into some sectors, namely:

1. primary sector, consist of:
    1. agriculture, livestock, forestry, and fishery
    2. mining and quarrying
2. secondary sector, consist of:
    3. manufacturing industry
    4. electricity, gas, and water supply
    5. construction
3. tertiary sector, consist of:
    6. trade, hotel, and restaurant
    7. transport and communication
    8. services
4. finance sector, consist of:
    - financial, ownership, and business services
5. employment sector, consist of:

- total employment

- Causality and circular causation

Causality takes place when variables have causes and effects to each other (can be apply only to two variables relationship). It means, for example: Does x causes y or y causes x? Or do both variables have causes to each other? Causation occurs in a situation where more than two relationships appear in the model (can be used to examine more then two variables contribution). For example: x influences y (bidirectional), x influences z (bidirectional), and at the same time y influences z (bidirectional. Look at figure 3.1 – 3.5 as the example of simple regression while figure 3.6 as the example of circular causation.

Figure 3.1: correlation between secondary, tertiary, finance, and employment sectors to primary sector

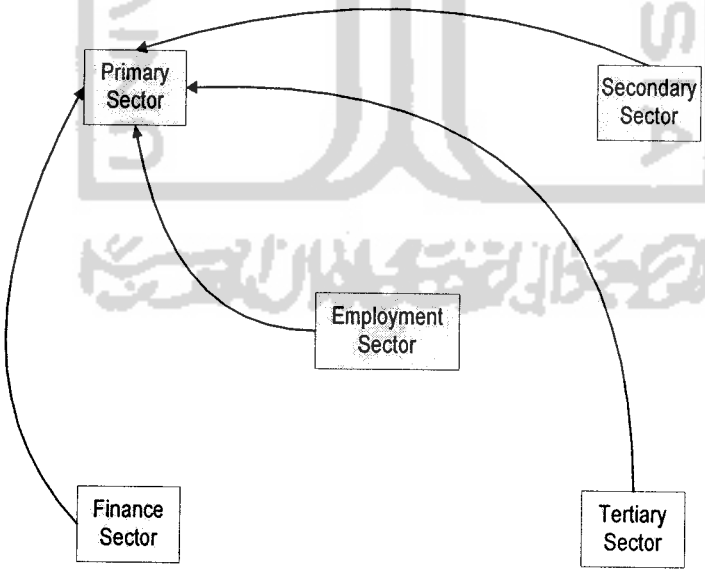


Figure 3.2: secondary sector affect by primary, tertiary, finance, and employment sector

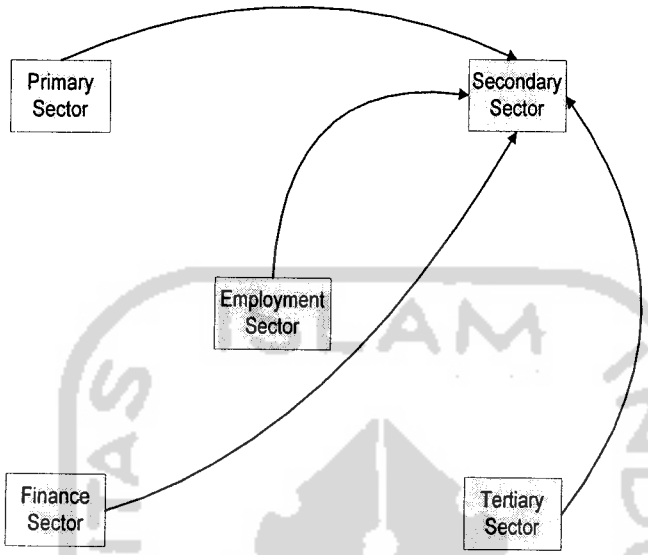


Figure 3.3: relationship between tertiary sector to primary, secondary, finance, and employment sector

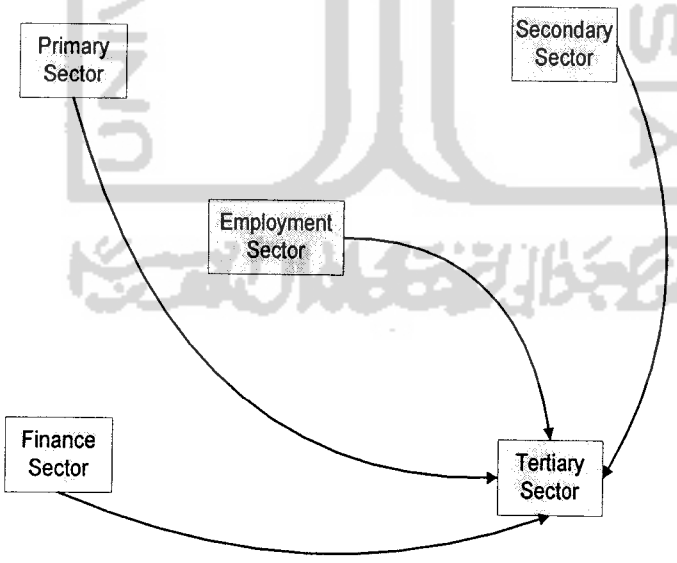


Figure 3.4: regression of finance sector and primary, secondary, tertiary, and employment sector

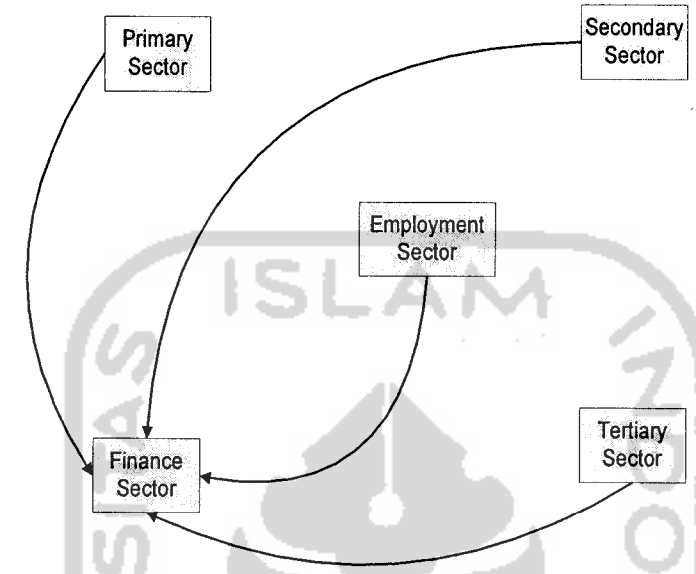


Figure 3.5: employment sector caused by primary, secondary, tertiary, and finance sector

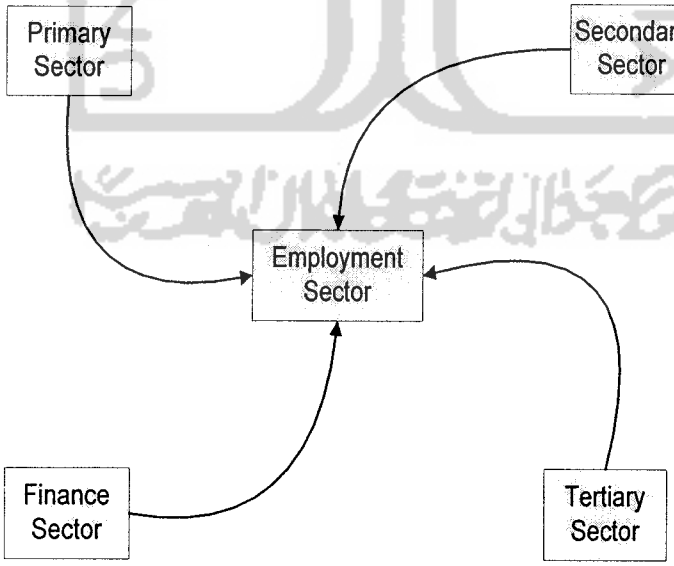
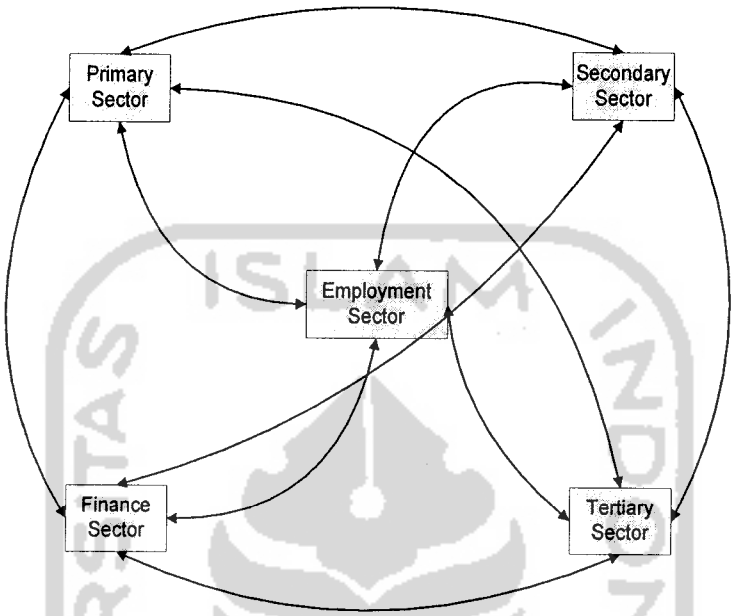


Figure 3.6: circular causation between primary, secondary, tertiary, finance, and employment sector



3.4. Research Setting

The setting of the research is in Indonesia and the researcher uses Indonesia's data of sectoral output in current market price and total employment. The time of analysis is limited to 21 years from 1984 until 2004. Time of observation for New Order is 1984 – 1997 in addition to observation time for after New Order is 1998 – 2004.

3.5. Research Variables

P = f (S, T, F, E)

S = f (P, T, F, E)

T = f (P, S, F, E)

F = f (P, S, T, E)

E = f (P, S, T, F)

Where: P = Quantity of primary sector (billion Rupiah)

S = Quantity of secondary sector (billion Rupiah)

T = Quantity of tertiary sector (billion Rupiah)

F = Quantity of finance sector (billion Rupiah)

E = Total employment (million people)

As mentioned earlier, the researcher classified into some categories:

1. Primary sector, consist of: a. agriculture, livestock, forestry, and fishery, and b. mining and quarrying.
2. Secondary sector, consist of: a. manufacturing industry, b. electricity, gas, and water supply, and c. construction.
3. Tertiary sector, consist of: a. trade, hotel, and restaurant, b. transport and communication, and c. services.
4. Finance sector, consist of: financial, ownership, and business services.
5. Employment sector, consist of: total employment.

The following equations are made to check the relationship among variables:

$$\ln P = \alpha_1 + \alpha_2 \ln S + \alpha_3 \ln T + \alpha_4 \ln F + \alpha_5 \ln E + \mu_1$$

$$\ln S = \beta_1 + \beta_2 \ln P + \beta_3 \ln T + \beta_4 \ln F + \beta_5 \ln E + \mu_2$$

$$\ln T = \delta_1 + \delta_2 \ln P + \delta_3 \ln S + \delta_4 \ln F + \delta_5 \ln E + \mu_3$$

$$\ln F = \varepsilon_1 + \varepsilon_2 \ln P + \varepsilon_3 \ln S + \varepsilon_4 \ln T + \varepsilon_5 \ln E + \mu_4$$

$$\ln E = \gamma_1 + \gamma_2 \ln P + \gamma_3 \ln S + \gamma_4 \ln T + \gamma_5 \ln F + \mu_5$$

3.6. Technique of Data Analysis

3.6.1. Regression Analysis

1. T-test

It is used to detect whether each independent variable has any effect to the dependent variable.

H_0 [2] $\rightarrow \beta = 0$

Ha [3] $\rightarrow \beta \neq 0$

Then to check each variables influence on model, we compare computed t statistic with critical t (from t-table):

Computed $|t|$ > critical $|t|$, then we accept alternative hypothesis and reject null hypothesis (it is statistically significant).

Computed $|t|$ < critical $|t|$, then we reject alternative hypothesis and accept null hypothesis (it is not statistically significant).

Degree of freedom = n – k (where k is the number of parameters)

2. F-test

It is used to test whether all independent variables simultaneously have significant effect to dependent variable.

$H_0 \rightarrow \beta_1 = \beta_2 = \beta_3 = 0$

$Ha \rightarrow \beta_1 = \beta_2 = \beta_3 \neq 0$

---

[2] H_0 in here means null hypothesis.
[3] Ha in here means alternative hypothesis.

Computed F > critical F, then we accept alternative hypothesis and reject null hypothesis (it is statistically significant).

Computed F < critical F, then we reject alternative hypothesis and accept null hypothesis (it is not statistically significant).

Degree of freedom for numerator = k – 1

Degree of freedom for denominator = n – k

3. R squared

It is used to measure how well the regression fits the data. The result of R squared is ranged from 0 to 1. The higher the R squared (closed to 1) then the more probable the data can be explained by the model, it is more accurate. The R squared is usually converted into percentage in order to make the analysis easier.

3.6.2. Classical assumptions

1. Multicollinearity

Multicollinearity is an existence of a perfect (nearly exact) linear relationship among independent variables in the model. There are some methods to detect multicollinearity:

- Multicollinearity happens when in the regression there is a high R squared and significant F statistic but some t statistic appears to be not statistically significant.

- If correlation between variables exceeds 0.8 then multicollinearity appears in regression.

2. Heterocedasticity

Heterocedasticity appears when disturbance term (μ) in the model did not have a constant variance. Method to test the presence of heterocedasticity is by White General Heterocedasticity test.

$$\mu_1^2 = \varphi_1 + \varphi_2 S + \varphi_3 T + \varphi_4 F + \varphi_5 E + \nu_1$$

$$\mu_2^2 = \phi_1 + \phi_2 P + \phi_3 T + \phi_4 F + \phi_5 E + \nu_2$$

$$\mu_3^2 = \eta_1 + \eta_2 P + \eta_3 S + \eta_4 F + \eta_5 E + \nu_3$$

$$\mu_4^2 = \lambda_1 + \lambda_2 P + \lambda_3 S + \lambda_4 T + \lambda_5 E + \nu_4$$

$$\mu_5^2 = \kappa_1 + \kappa_2 P + \kappa_3 S + \kappa_4 T + \kappa_5 F + \nu_5$$

Observation * R squared $< \chi^2 \rightarrow$ there is heterocedasticity

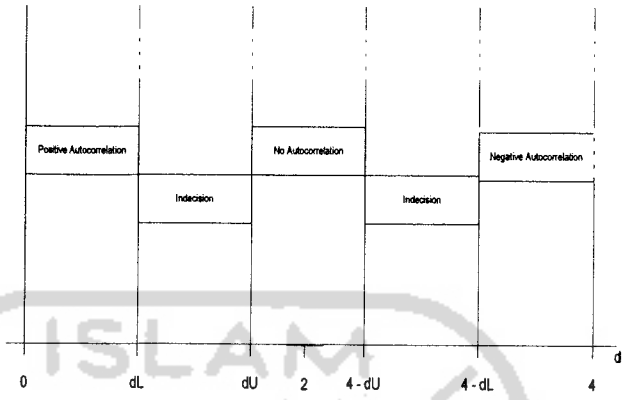
Observation * R squared $> \chi^2 \rightarrow$ there is no heterocedasticity

Degree of freedom for χ^2 = number of regressors (excluding the constant term) in auxiliary regression.

3. Autocorrelation

Autocorrelation defined as correlation between residual of observation. This problem arises because the disturbance term is not freely to move from one observation to another. Method to measure the existence of autocorrelation is by Durbin Watson test.

Figure 3.7: Durbin Watson Decision



3.6.3. Dummy variable

Dummy variable is used to measure nominal scale variables. It functions is to indicate the presence or absence of a quality.

D = 0 → indicate the absence of an attribute → before economic crisis (for observations 1984 – 1997)

D = 1 → indicate the presence of an attribute → otherwise, after economic crisis (for observations 1998 – 2004)

The researcher inserted the dummy variable into the previous equations then the functions have changed as follows:

P = f (S, T, F, E, D)

S = f (P, T, F, E, D)

T = f (P, S, F, E, D)

F = f (P, S, T, E, D)

E = f (P, S, T, F, D)

Where: D = Dummy variable

The equations are:

$$\ln P = \pi_1 + \pi_2 \ln S + \pi_3 \ln T + \pi_4 \ln F + \pi_5 \ln E + \pi_6 e^D + \omega_1$$

$$\ln S = \theta_1 + \theta_2 \ln P + \theta_3 \ln T + \theta_4 \ln F + \theta_5 \ln E + \theta_6 e^D + \omega_2$$

$$\ln T = \rho_1 + \rho_2 \ln P + \rho_3 \ln S + \rho_4 \ln F + \rho_5 \ln E + \rho_6 e^D + \omega_3$$

$$\ln F = \tau_1 + \tau_2 \ln P + \tau_3 \ln S + \tau_4 \ln T + \tau_5 \ln E + \tau_6 e^D + \omega_4$$

$$\ln E = \sigma_1 + \sigma_2 \ln P + \sigma_3 \ln S + \sigma_4 \ln T + \sigma_5 \ln F + \sigma_6 e^D + \omega_5$$

To check the significance of dummy variable is using t-test:

$H_0 \rightarrow \beta = 0$

$Ha \rightarrow \beta \neq 0$

Computed t > critical t, then we accept alternative hypothesis and reject null hypothesis (it is statistically significant).

Computed t < critical t, then we reject alternative hypothesis and accept null hypothesis (it is not statistically significant).

Degree of freedom = n – k (where k is the number of parameters).

The researcher assumes that all data of this research are cointegrated and stationary. Then there is no need to perform set of analysis to investigate those actions.

3.6.4. Sensitivity Analysis

1. **Regression coefficient**

   It analyses the interpretation of individual meaning.

   For example: $\varepsilon_{s,p} = \dfrac{\% \Delta Qp}{\% \Delta Qs}$

2. **Economic impact**

There are two economic impacts backward and forward linkage. For example there are two industries, industry A and B. Backward linkage occurs when industry B has a higher effect (coefficient) to industry A. Moreover, forward linkage happens when industry A has a greater influence (coefficient) to industry B.

3. Learning process

The learning process is better, worse, or stable. It compares the elasticity between output before and after economic crisis. A better learning process occurs when there is a higher coefficient and/or positive relationship. A worse learning process results in a situation when there is a lower coefficient and/or negative relationship. And a stable learning process happens when there is no difference between those two eras, the coefficient and the relationship is the same.

CHAPTER IV

RESEARCH FINDING AND DISCUSSION

4.1. Intersectoral Relationship among GDP Sectors

The result of GDP output comes out from the summation of sectoral GDP output. Economic sector may not produce in isolation, and then it is obvious that GDP sectors should have connection to each other, it is called intersectoral relationship. This condition might happen because of an industry development reliant to other industry development (interdependency). This dependency level can be seen in the situation where an industry output could become other industry input, and then the progress of an industry could rely on the development of other industry (input provider). This interdependency among productive sectors is depending on the use of domestic inputs other than using imported raw material or intermediate inputs. This situation has managed to explain that a change in one sector output could change other sector output as well (if they feel strong intersectoral linkage). Subsequently, fluctuation in economic sectors, at the end will affect GDP as a whole. This is one of indication of the importance in investigating the mutual relationship among GDP sectors.

4.1.1. Primary Sector

a. Estimate equation:

Ln primary = 2.035542 + 0.800916 ln secondary + 1.304116 ln tertiary − 1.159083 ln finance + 0.707258 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

  Critical t = |2.120| (df = 16, α = 5%, two tail test)

  t-secondary: |2.246407| > |2.120| → it is statistically significant, it means secondary sector has contribution to primary sector.

  t-tertiary: |4.683381| > |2.120| → it is statistically significant, it indicates tertiary sector correlates with primary sector.

  t-finance: |4.932595| > |2.120| → it is statistically significant, it implies that financial sector growth will effect primary sector growth.

  t-employment: |1.061742| < |2.120| → it is not statistically significant, it refers to employment sector does not contribute to the growth of primary sector.

- F statistic

  Critical F = 3.01 (numerator = 4, denominator = 16, α = 5 %)

  F statistic: 801.1007 > 3.01 → it is statistically significant. In that case, secondary, tertiary, finance, and employment sector jointly have contribution to primary sector.

- R squared

  99.50% can be explained by the model.

c. Classical assumption:

- Multicollinearity

R squared = 0.99

F statistic = statistically significant

T-test = secondary, tertiary, and finance are statistically significant, however, employment is not statistically significant

Then there is multicollinearity

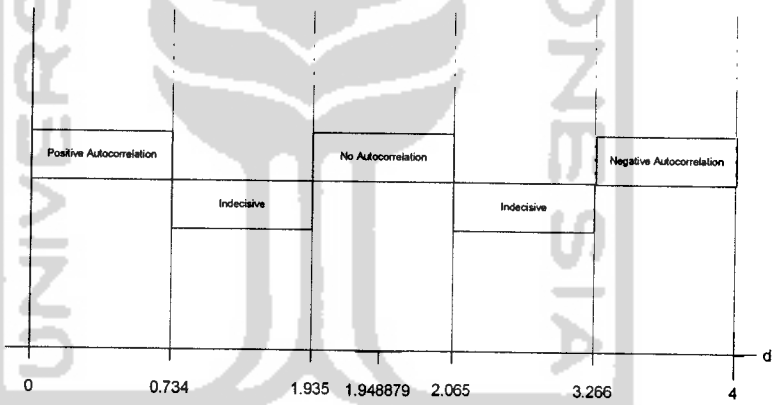
- Heterocedasticity

  $\chi^2 = 21.0261$ (df = 12, α = 5 %)

  18.03443 < 21.0261 → there is no heterocedasticity

- Autocorrelation

Figure 4.1: detection of autocorrelation in primary sector



Then the model is in no autocorrelation area.

4.1.2. Secondary Sector

a. Estimate equation:

Ln secondary = -4.580124 + 0.299374 ln primary + 0.059213 ln tertiary* + 0.668239 ln finance + 1.180067 employment + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

  Critical t = |2.120| (df = 16, α = 5 %, two tail test)

  t-primary: |2.246407| > |2.120| → it is statistically significant, it signifies primary sector has contribution to the growth of secondary sector.

  t-tertiary: |0.226250| < |2.120| → it is not statistically significant, then tertiary sector does not have relationship to the growth of secondary sector.

  t-finance: |4.303012| > |2.120| → it is statistically significant, it indicates the financial sector supports secondary sector.

  t-employment: |3.922411| > |2.120| → it is statistically significant, it means the growth of employment sector coherent with the growth of secondary sector.

- F statistic

  Critical F = 3.01 (numerator = 4, denominator = 16, α = 5%)

  F statistic: 3925.443 > 3.01 → it is statistically significant. Therefore, primary, tertiary, finance, and employment sector together have relationship in advancing secondary sector growth.

- R squared

  99.90 % can be explained by the model

c. Classical assumption:

- Multicollinearity

  R squared = 0.99

F statistic = statistically significant

T-test = primary, finance, and employment are statistically significant while tertiary is not statistically significant.

Then there is multicollinearity.

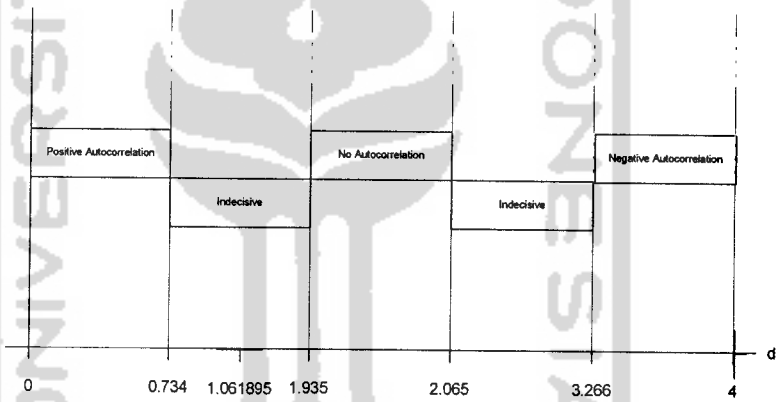
- Heterocedasticity

  $\chi^2 = 22.3621$ (df = 13, α = 5 %)

  13.07000 < 22.3621 → there is no heterocedasticity

- Autocorrelation

Figure 4.2: detection of autocorrelation in secondary sector



Then the model is in indecision area.

4.1.3. Tertiary Sector

a. Estimate equation:

Ln tertiary = 2.098688 + 0.443377 ln primary + 0.053858 ln secondary * + 0.512219 ln finance – 0.323023 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

Critical t = |2.120| (df = 16, α = 5%, two tail test)

t-primary: |4.683381| > |2.120| → it is statistically significant, it refers to primary sector has an influence to tertiary sector.

t-secondary: |0.226250| < |2.120| → it is not statistically significant, it means that secondary sector does not have anything to do with tertiary sector.

t-finance: |2.912853| > |2.120| → it is statistically significant, it signifies the relationship between financial sector and tertiary sector.

t-employment: |0.820565| < |2.120| → it is not statistically significant, it indicates the growth of employment sector will not make changes to tertiary sector.

- F statistic

  Critical F = 3.01 (numerator = 4, denominator = 16, α = 5%)

  F statistic: 2919.470 > 3.01 → it is statistically significant. For that reason between primary, secondary, finance, and employment sector appears mutual relationship to tertiary sector.

- R squared

  99.86 % can be explained by the model

c. Classical assumption:

- Multicollinearity

  R squared = 0.99

  F statistic = statistically significant

T-test = primary and finance are statistically significant, nevertheless, secondary and employment are not statistically significant

Then there is multicollinearity.

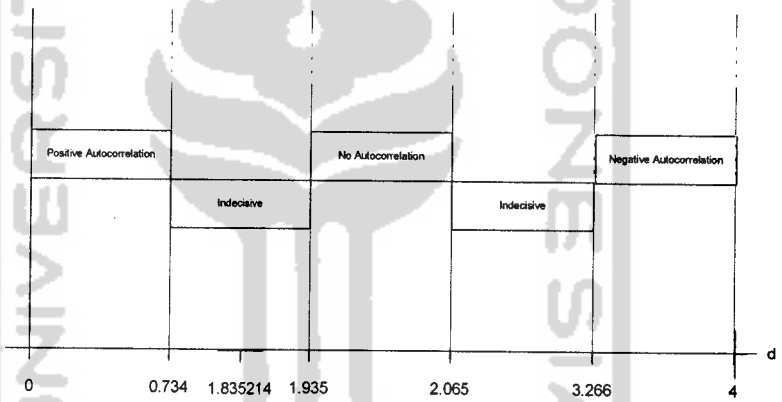
- Heterocedasticity

  $\chi^2 = 21.0261$ (df = 12, α = 5 %)

  12.28907 < 21.0261 → there is no heterocedasticity

- Autocorrelation

Figure 4.3: detection of autocorrelation in tertiary sector



Then the model is in indecision area.

4.1.4. Finance Sector

a. Estimate equation:

Ln finance = 1.451825 – 0.520479 ln primary + 0.802775 ln secondary + 0.676259 ln tertiary – 0.547786 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

Critical t = |2.120| (df = 16, α = 5%, two tail test)

t-primary: |4.932595| > |2.120| → it is statistically significant, it specifies the relationship between primary sector and financial sector.

t-secondary: |4.303012| > |2.120| → it is statistically significant, it implies to an increase in secondary sector will make changes to financial sector also.

t-tertiary: |2.912853| > |2.120| → it is statistically significant, it indicates the positive correlation of tertiary sector and financial sector.

t-employment: |1.241962| < |2.120| → it is not statistically significant, it denotes the employment sector disability to increase the growth of financial sector.

- F statistic

  Critical F = 3.01 (numerator = 4, denominator = 16, α = 5%)

  F statistic: 2801.970 > 3.01 → it is statistically significant. Hence, primary, secondary, tertiary, and employment sector collectively have correlation to financial sector.

- R squared

  99.86 % can be explained by the model

c. Classical assumption:

- Multicollinearity

  R squared = 0.99

F statistic = statistically significant

T-test = primary, secondary, and tertiary are statistically significant excluding employment which is not statistically significant.

Then there is multicollinearity.

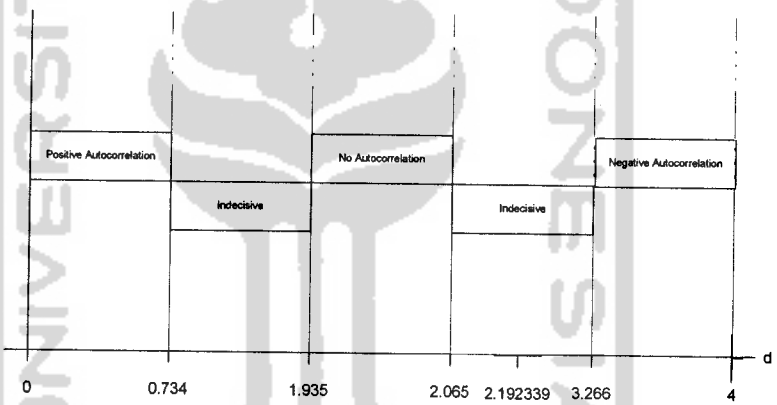
- Heterocedasticity

  $\chi^2 = 19.6751$ (df = 11, α = 5 %)

  13.28509 < 19.6751 → there is no heterocedasticity

- Autocorrelation

Figure 4.4: detection of autocorrelation in financial sector



Then the model is in indecision area.

4.1.5. Employment Sector

a. Estimate equation:

Ln employment = 3.744536 – 0.093062 ln primary* + 0.415406 ln secondary – 0.125017 ln tertiary* – 0.160515 ln finance* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

Critical t = |2.120| (df = 16, α = 5%, two tail test)

t-primary: |1.061742| < |2.120| → it is not statistically significant, it shows the primary sector incapability to alter employment sector.

t-secondary: |3.922411| > |2.120| → it is statistically significant, it explains that secondary sector changes will influence the employment sector growth.

t-tertiary: |0.820565| < |2.120| → it is not statistically significant, it indicates that employment sector growth will not support by the growth of tertiary sector.

t-finance: |1.241962| < |2.120| → it is not statistically significant, it signifies financial sector does not have any correlation with employment sector.

- F statistic

  Critical F = 3.01 (numerator = 4, denominator = 16, α = 5%)

  F statistic: 107.2022 > 3.01 → it is statistically significant. Thus, the primary, secondary, tertiary, and financial sector simultaneously has relationship to employment sector.

- R squared

  96.40% can be explained by the model

c. Classical assumption:

- Multicollinearity

  R squared = 0.96

F statistic = statistically significant

T-test = secondary is statistically significant, other than primary, tertiary, and finance that are not statistically significant

Then there is multicollinearity.

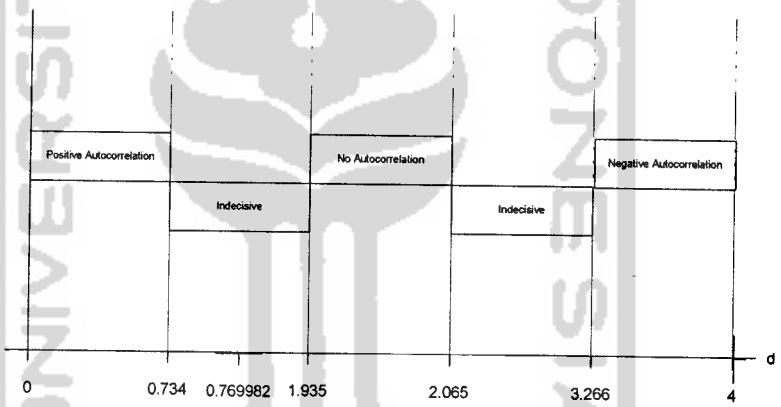
- Heterocedasticity

  $\chi^2 = 19.6751$ (df = 11, α = 5 %)

  17.46059 < 19.6751 → there is no heterocedasticity

- Autocorrelation

Figure 4.5: detection of autocorrelation in employment sector



Then the model is in indecision area.

4.2. Relationship between GDP Sectors and Employment

A good record of output will create macroeconomic stability and finally will effect employment. Since economic sectors need employment (as one of their vital input); then when sectoral output increases, employment will also change. A good development of output hopefully will create good record of overall employment also.

1. E → P (0.707258)*

   P → E (-0.093062)*

   Note: * means not statistically significant at the level of 5 %.

   There is not any relationship between employment sector and primary sector in both directions.

2. E → S (1.180067)

   S → E (0.415406)

   Note: * means not statistically significant at the level of 5 %.

   Between employment and secondary sector occurs a positive relationship. Employment sector contribution to secondary sector is 118.01 %. At the same time secondary sector has contribution to employment sector by 41.54 %. The coefficient of direction from employment to secondary sector is higher than between secondary sector to employment, afterward forward linkage appears in the model.

3. E → T (-0.323023)*

   T → E (-0.125017)*

   Note: * means not statistically significant at the level of 5 %.

   Employment sector growth does not contribute to tertiary sector growth, this situation also happens in the opposite direction.

4. E → F (-0.547786)*

   F → E (-0.160515)*

   Note: * means not statistically significant at the level of 5 %.

Employment and financial sector does not support the growth of each other since they are statistically not significant.

4.3. Relationship among GDP sectors and employment with the change happen in Economic Condition

The intersectoral relationship among GDP sectors and overall employment can be seen in the interpretation of their constant value. Afterward, the presence of economic impacts could be discovered. The difference of output with the change of economic crisis condition also examined to figure out the learning process. With these changes, sectors should experience learning process. Hopefully the learning process would be better then the sectors output will result to a greater value of constant.

4.3.1. Primary Sector

a. Estimate equation:

Before Economic Crisis:

Ln primary = 3.902725 + 0.735380 ln secondary + 0.480790 ln tertiary* – 0.525895 ln finance – 0.257835 ln employment* + μ

After Economic Crisis:

Ln primary = 4.263418 + 0.735380 ln secondary + 0.480790 ln tertiary* – 0.525895 ln finance – 0.257835 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

Critical t = |2.131| (df = 15, α = 5%, two tail test)

t-secondary = |3.152207| > |2.131| → it is statistically significant, it means secondary sector has capacity to change primary sector growth.

t-tertiary = |1.912377| < |2.131| → it is not statistically significant, then tertiary sector does not influence primary sector.

t-finance = |2.585368| > |2.131| → it is statistically significant, it shows financial sector ability to influence primary sector.

t-employment = |0.579012| < |2.131| → it is not statistically significant, it indicates employment sector does not contribute primary sector.

t-dummy = |4.743577| > |2.131| → it is statistically significant, it means primary sector has the higher coefficient after economic crisis.

- F statistic

  Critical F = 2.90 (numerator = 5, denominator = 15, α = 5 %)

  F statistic: 1506.625 > 2.90 → it is statistically significant, therefore secondary, tertiary, finance, employment, and dummy jointly have correlation to primary sector.

- R squared

  99.80 % can be explained by the model

4.3.2. Secondary Sector

a. Estimate equation:

Before Economic Crisis:

Ln secondary = -5.185437 + 0.541856 ln primary + 0.067501 ln tertiary* + 0.558632 ln finance + 0.917683 ln employment + μ

After Economic Crisis:

Ln secondary = -5.185437 + 0.541856 ln primary + 0.067501 ln tertiary* + 0.558632 ln finance + 0.917683 ln employment + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

  Critical t = $|2.131|$ (df = 15, α = 5%, two tail test)

  t-primary = $|3.152207| > |2.131| \rightarrow$ it is statistically significant, it indicates the presence of relationship between primary sector and secondary sector.

  t-tertiary = $|0.281193| < |2.131| \rightarrow$ it is not statistically significant, it explains that tertiary sector does not support secondary sector.

  t-finance = $|3.662188| > |2.131| \rightarrow$ it is statistically significant, it signifies financial sector has correlation to secondary sector.

  t-employment = $|3.005441| > |2.131| \rightarrow$ it is statistically significant, it proves employment sector correlation with secondary sector.

t-dummy = $|2.006004| < |2.131| \rightarrow$ it is not statistically significant, in that case secondary sector does not feel a higher coefficient after economic crisis.

- F statistic

  Critical F = 2.90 (numerator = 5, denominator = 15, $\alpha = 5\ \%$)

  F statistic: $3734.697 > 2.90 \rightarrow$ it is statistically significant, hence primary, tertiary, finance, employment, and dummy have mutual relationship to secondary sector.

- R squared

  99.92 % can be explained by the model

4.3.3. Tertiary Sector

a. Estimate equation:

Before Economic Crisis:

Ln tertiary = 2.271986 + 0.407705 ln primary* + 0.077683 ln secondary* + 0.507417 ln finance – 0.320816 ln employment* + μ

After Economic Crisis:

Ln tertiary = 2.271986 + 0.407705 ln primary* + 0.077683 ln secondary* + 0.507417 ln finance – 0.320816 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

  Critical t = $|2.131|$ (df = 15, $\alpha = 5\%$, two tail test)

t-primary = |1.912377| < |2.131| → it is not statistically significant, it explains primary sector can influence the growth of tertiary sector.

t-secondary = |0.281193| < |2.131| → it is not statistically significant, it refers to disability of secondary sector to change tertiary sector.

t-finance = |2.769969| > |2.131| → it is statistically significant, it implies that financial sector might have power to modify tertiary sector.

t-employment = |0.789682| < |2.131| → it is not statistically significant, it shows the incapability of employment sector to cause tertiary sector.

t-dummy = |0.188238| < |2.131| → it is not statistically significant, it means that tertiary sector remain unchanged in different economic condition.

- F statistic

  Critical F = 2.90 (numerator = 5, denominator = 15, α = 5 %)

  F statistic: 2194.782 > 2.90 → it is statistically significant, therefore primary, secondary, finance, employment, and dummy, collectively have contribution to tertiary sector.

- R squared

  99.86 % can be explained by the model

4.3.4. Finance Sector

a. Estimate equation:

Before Economic Crisis:

Ln finance = 1.798675 – 0.586144 ln primary + 0.845005 ln secondary + 0.666931 ln tertiary – 0.540940 ln employment* + μ

After Economic Crisis:

Ln finance = 1.798675 – 0.586144 ln primary + 0.845005 ln secondary + 0.666931 ln tertiary – 0.540940 ln employment* + μ

Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

- T-test

  Critical t = |2.131| (df = 15, α = 5%, two tail test)

  t-primary = |2.585368| > |2.131| → it is statistically significant, it shows the change of primary sector might cause financial sector to change as well.

  t-secondary = |3.662188| > |2.131| → it is statistically significant, it explains the relationship might occur between secondary sector and financial sector.

  t-tertiary = |2.769969| > |2.131| → it is statistically significant, it indicates that tertiary sector might correlates with financial sector.

  t-employment = |1.190555| < |2.131| → it is not statistically significant, it refers to the growth of employment sector will not change the growth of financial sector.

t-dummy = |0.329942| < |2.131| → it is not statistically significant, afterward financial sector coefficient will stay same despite the change in economic condition.

- F statistic

  Critical F = 2.90 (numerator = 5, denominator = 15, α = 5 %)

  F statistic: 2116.750 > 2.90 → it is statistically significant, consequently primary, secondary, tertiary, employment, and dummy jointly have correlation to financial sector.

- R squared

  99.86 % can be explained by the model

4.3.5. Employment sector

a. Estimate equation:

   Before Economic Crisis:

   Ln employment = 3.700832 – 0.084790 ln primary* + 0.409564 ln secondary – 0.124413 ln tertiary* – 0.159604 ln finance* + μ

   After Economic Crisis:

   Ln employment = 3.700832 – 0.084790 ln primary* + 0.409564 ln secondary – 0.124413 ln tertiary* – 0.159604 ln finance* + μ

   Note: * means not statistically significant at the level of 5 %.

b. Statistical test:

   - T-test

     Critical t = |2.131| (df = 15, α = 5%, two tail test)

t-primary = |0.579012| < |2.131| → it is not statistically significant, it denotes the inability of primary sector to change employment sector.

t-secondary = |3.005441| > |2.131| → it is statistically significant, it shows the presence of correlation between secondary sector and employment sector.

t-tertiary = |0.789682| < |2.131| → it is not statistically significant, it indicates the change in tertiary sector will not effect employment sector to change.

t-finance = |1.190555| < |2.131| → it is not statistically significant, it explains that financial sector does not have relationship with employment sector.

t-dummy = |0.071857| < |2.131| → it is not statistically significant, then employment sector does not have a higher coefficient as the effect of economic condition changes.

- F statistic

  Critical F = 2.90 (numerator = 5, denominator = 15, α = 5 %)

  F statistic: 80.43036 > 2.90 → it is statistically significant, as a result primary, secondary, tertiary, finance, and dummy in cooperation have link to employment sector.

- R squared

  96.40 % can be explained by the model

4.3.6. Sensitivity Analysis among GDP Sectors as well as GDP Sectors and Employment with Their Changes on Different Economic Condition

Table 4.1: Correlation among Sectors and the Effect in Different Economic Condition

D / I	P	S	T	F	E
P	-	0.541856	0	-0.586144	0
S	0.735380	-	0	0.845005	0.409564
T	0	0	-	0.666931	0
F	-0.525895	0.558632	0.507417	-	0
E	0	0.917683	0	0	-
Dummy	0.360693	0	0	0	0

Note: 0 means statistically not significant at the level of 5 %.

Sectoral output relationship:

1. P → S (0.541856)

   S → P (0.735380)

   Relationship appears between primary sector and secondary sector although the effect is not the same. Primary sector contributes to expand secondary sector growth by 54.19%, whereas, secondary sector have contribution to increase primary sector growth by 73.54%. Secondary sector much influence primary sector compares to the relationship between primary sector and secondary sector, and then on those two sectors there is a backward linkage.

2. P → T (0)

   T → P (0)

   Primary sector and tertiary sector does not have any relationship between them.

3. P → F (-0.586144)

   F → P (-0.525895)

   Primary sector and financial sector have a negative effect to each other. Primary sector growth will reduce the growth of financial sector by 58.61%. At the same time, financial sector will lessen primary sector growth by 52.59%. There is a trade off between primary sector and financial sector. However between primary and financial sector appears backward linkage, in view of the fact that primary sector has a bigger effect to reduce the growth of financial sector contrast to financial sector to primary sector.

4. S → T (0)

   T → S (0)

   There is not any relationship between secondary sector and tertiary sector.

5. S → F (0.845005)

   F → S (0.558632)

   In this model occurs positive relationship. Secondary sector influences financial sector growth by 84.50% and the influence of financial sector is increasing the growth of secondary sector by 55.86%. The

coefficient of secondary sector influences to financial sector is higher than the opposite direction; subsequently there is a forward linkage between secondary sector and financial sector.

6. T → F (0.666931)

   F → T (0.507417)

   Tertiary sector and financial sector have a positive contribution to each other. Tertiary sector has contribution to financial sector by 66.69% while the contribution of financial sector by tertiary sector is 50.74%. Since tertiary sector has a higher influence on financial sector than financial sector to tertiary sector, afterward between those two sectors, occurs a forward linkage.

GDP sectors and employment relationship:

1. P → E (0)

   E → P (0)

   Primary sector and employment sector does not have contribution to each other since they are not statistically significant.

2. S → E (0.409564)

   E → S (0.917683)

   Secondary sector and employment sector have contribution to each other. Secondary sector has support in increasing employment sector growth by 40.96%. Furthermore, employment sector growth has support in increasing the growth of secondary sector by 91.77%. The secondary sector has lower contribution to employment sector,

whereas employment sector has higher contribution to secondary sector; consequently, between them occurring backward linkage.

3. T → E (0)

   E → T (0)

   Tertiary sector and employment sector does not support the growth of each other.

4. F → E (0)

   E → F (0)

   Financial sector does not support the growth of employment sector as well as the employment sector does not support the growth of financial sector.

Relationship between economic situation, GDP sectors output, and total employment:

1. Economic condition → P (0.360693)

   There is a difference on output due to economic condition fluctuation (before and after economic crisis). After economic crisis, the multiplier effect is increasing by 36.07%. Afterward, there is a better learning process.

2. Economic condition → S (0)

   There is no difference on secondary sector because of economic crisis. Then the learning process is stable.

3. Economic condition → T (0)

Before and after economic crisis, there is not any difference occur in the model of secondary sector. Between those two situations, the learning process is stable.

4. Economic condition → F (0)

   The financial sector output before and after economic crisis appears to have the same result. It indicates a stable learning process.

5. Economic condition → E (0)

   The employment sector's model before economic crisis and the model after economic crisis remain unchanged. A stable learning process appears in the model.

In the intersectoral relationship among GDP sectors, there are four intersectoral linkages either backward or forward linkage. There are two correlation sectors that have backward linkage; they are causation between primary sector and secondary sector as well as primary sector and financial sector. Furthermore, there are two intersectoral linkages in forward linkage; they are causation between secondary sector and financial sector as well as tertiary sector and financial sector. However the relationship does not necessarily imply positive in all correlation sectors. This exclusivity happens on correlation between primary sector and financial sector, to them negative relationship appears in the model. Besides having intersectoral linkages, there are also sectors that do not have relationship to other sectors; there are two correlation sectors. These correlation sectors are primary sector and tertiary sector as well as secondary sector and tertiary sector.

In the interserctoral relationship among GDP sectors and employment, there is only one sector that correlates with employment. Secondary sector and employment sector at the same time have positive contribution to each other and between them backward linkage take place. Afterward, primary, tertiary, and financial sector does not have linkage with employment sector.

Before and after economic crisis might create learning process. Based on this research, a better learning process is found on primary sector. The output of primary sector is greater after economic crisis strike Indonesia. This sector experience higher multiplier effect. Moreover, a stable learning process is dominated the whole model with four sectors, they are secondary sector, tertiary sector, financial sector, and employment sector. Then the amount of those sectors before and after economic crisis is the same. Finally, there is not any worse learning process in this research.

4.4. Summary of Statistical Test and with Dummy Variable

This section summarizes the statistical test and also the changes in output due to different economic situation (to measure the qualitative value is using dummy variable).

Table 4.2.: Summary of Statistical Test

No.	Economic Sectors	Value of Constant	T-test	F statistic	R squared
1.	Primary	C = 2.0355		801.1007	0.995
	S → P	0.8009	|2.2464|		
	T → P	1.3041	|4.6834|		
	F → P	-1.1591	|4.9326|		
	E → P	0.7073	|1.0617| *		
2.	Secondary	C = -4.5801		3925.443	0.999
	P → S	0.2994	|2.2464|		
	T → S	0.0592	|0.2262| *		
	F → S	0.6682	|4.3030|		
	E → S	1.1801	|3.9224|		
3.	Tertiary	C = 2.0987		2919.4700	0.9986
	P → T	0.4434	|4.6834|		
	S → T	0.0539	|0.2262| *		
	F → T	0.5122	|2.9128|		
	E → T	-0.3230	|0.8206| *		
4.	Finance	C = 1.4518		2801.9700	0.9986
	P → F	-0.5205	|4.9326|		
	S → F	0.8028	|4.3030|		
	T → F	0.6765	|2.9128|		
	E → F	-0.5478	|1.2420| *		
5.	Employment	C = 3.7445		107.2022	0.9640
	P → E	-0.0931	|1.0617| *		
	S → E	0.4154	|3.9224|		
	T → E	-0.1250	|0.8206| *		
	F → E	-0.1605	|1.2420| *		

Note: → have an effect to
* means not statistically significant at the level of 5 %

Table 4.3.: Summary of Statistical Test with Dummy Variable

No	Economic Sectors	Constant Value with Dummy	T-test with Dummy	Value of the constant	
				Before Economic Crisis	After Economic Crisis
1.	Primary	C = 3.902725		3.902725	4.263418
	S → P	0.73538	|3.1522|		
	T → P	0.48079	|1.9124| *		
	F → P	-0.525895	|2.5854|		
	E → P	-0.257835	|0.5790| *		
	Dummy → P	0.360693	|4.7436|		
2.	Secondary	C = -5.185437		-5.18544	-5.18544
	P → S	0.541856	|3.1522|		
	T → S	0.067501	|0.2812| *		
	F → S	0.558632	|3.6622|		
	E → S	0.917683	|3.0054|		
	Dummy → S	-0.183833	|2.0060| *		
3.	Tertiary	C = 2.271986		2.271986	2.271986
	P → T	0.407705	|1.9124| *		
	S → T	0.077683	|0.2812| *		
	F → T	0.507417	|2.7700|		
	E → T	-0.320816	|0.7897| *		
	Dummy → T	0.020816	|0.1883| *		
4.	Finance	C = 1.798675		1.798675	1.798675
	P → F	-0.586144	|2.5854|		
	S → F	0.845005	|3.6622|		
	T → F	0.666931	|2.7700|		
	E → F	-0.54094	|1.1905| *		
	Dummy → F	0.041728	|0.3299| *		
5.	Employment	C = 3.700832		3.700832	3.700832
	P → E	-0.08479	|0.5790| *		
	S → E	0.409564	|3.0054|		
	T → E	-0.124413	|0.7897| *		
	F → E	-0.159604	|1.1905| *		
	Dummy → E	-0.004953	|0.0716| *		

Note: → have an effect to
* means not statistically significant at the level of 5 %

4.5. The Answer of Hypothesis

1. Is there a circular causation on intersectoral output?

   Yes, circular causation appears on several intersectoral linkages. The circular causation arises in the relationship between primary sector and secondary sector, primary sector and financial sector, financial sectors and secondary

sector, and financial sector and tertiary sector. However, negative relationship appears on intersectoral output between primary sector and financial sector (two directions). Finally, between primary and tertiary sector as well as secondary and tertiary sector do not occur (significant) relationship.

Figure 4.6: the result of correlation between secondary, tertiary, finance, and employment sectors to primary sector

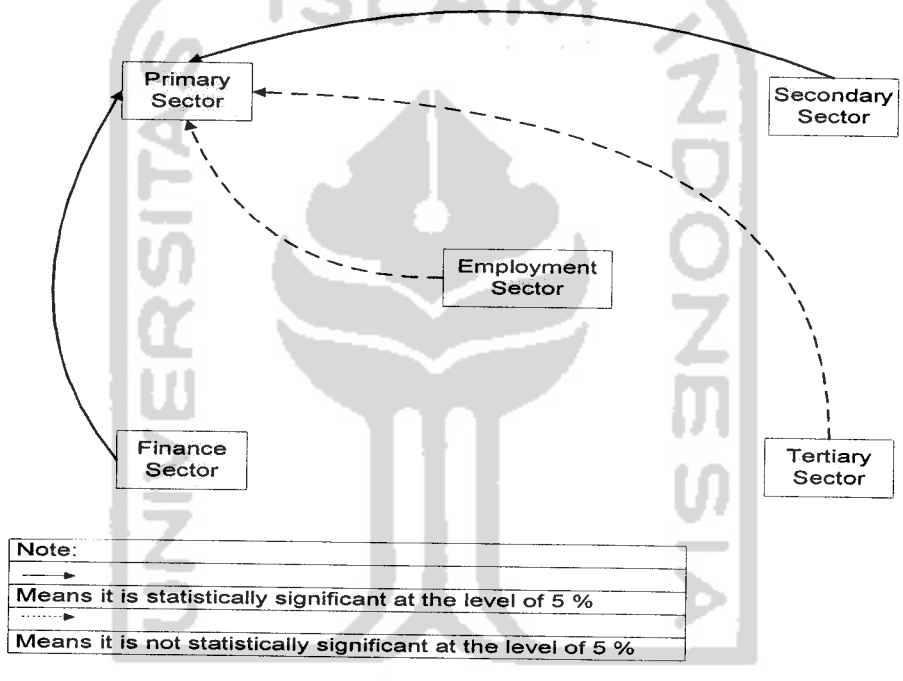


Figure 4.7: the result of secondary sector affect by primary, tertiary, finance, and employment sector

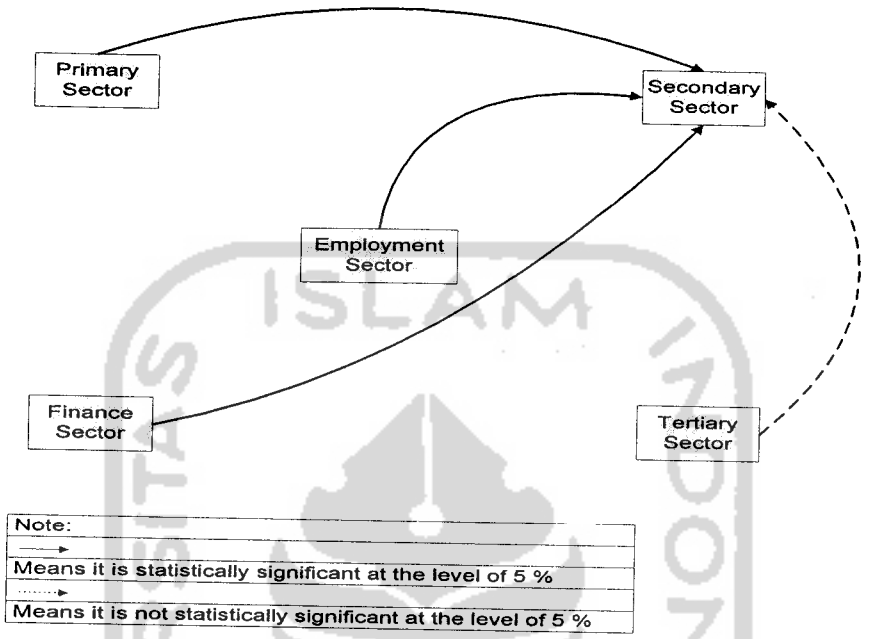


Figure 4.8: the result of relationship between tertiary sector to primary, secondary, finance, and employment sector

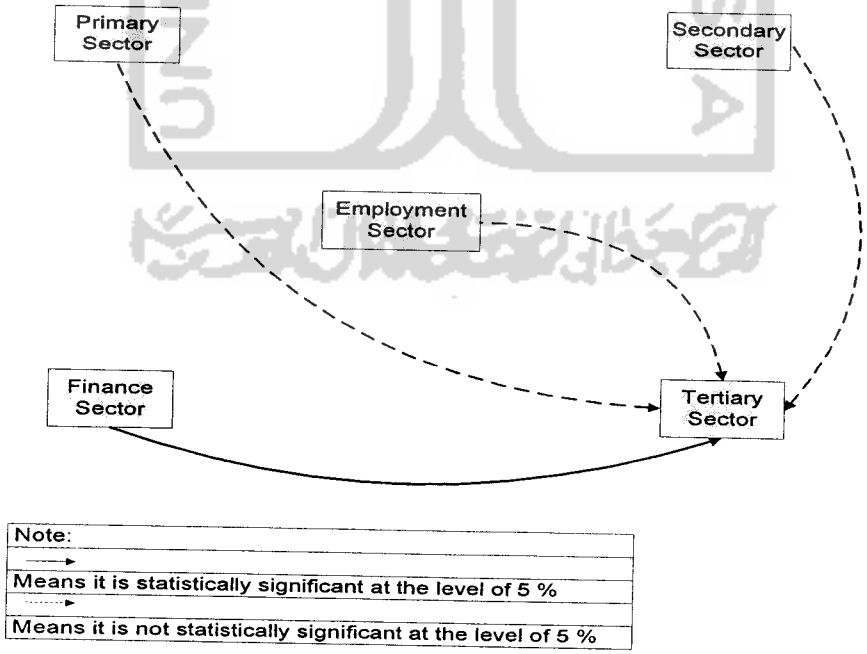


Figure 4.9: the result of regression between finance sector and primary, secondary, tertiary, and employment sector

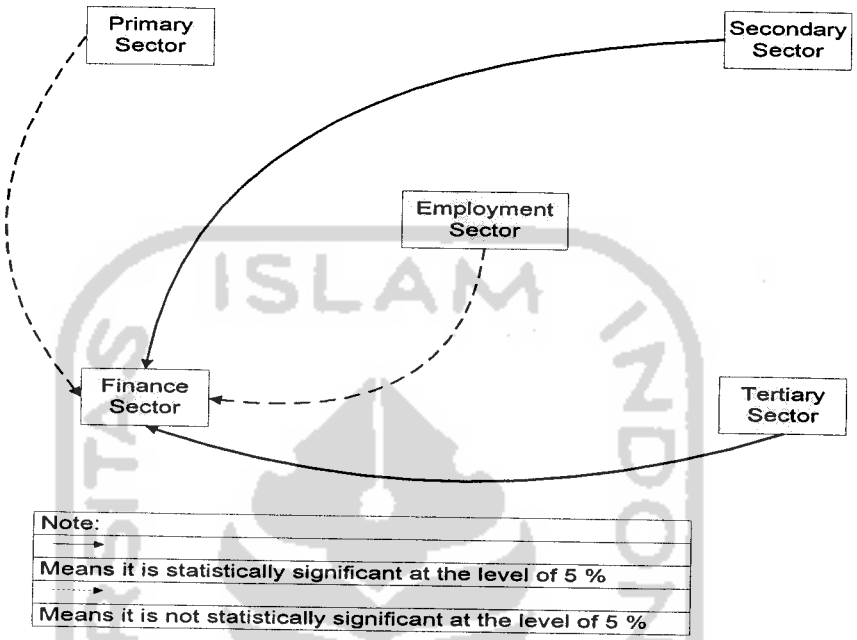


Figure 4.10: the result of employment sector caused by primary, secondary, tertiary, and finance sector

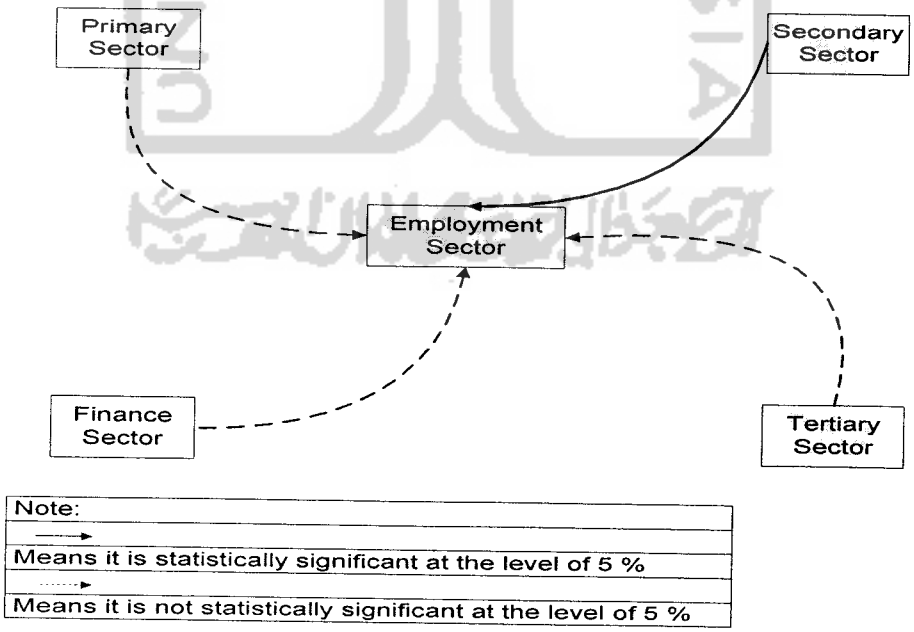
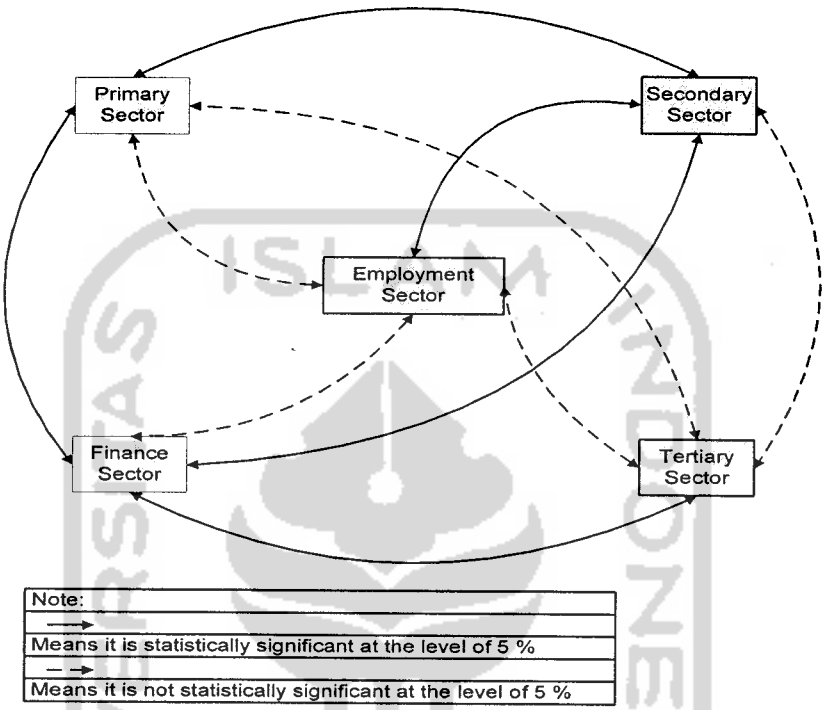


Figure 4.11: the result of circular causation between primary, secondary, tertiary, finance, and employment sector



2. Is there a cross elasticity among GDP sectors and employment rate? If so, could it be greater or lower?

   Yes, there is. The cross elasticity happens only in the relationship between secondary sector and employment sector. The elasticity between secondary sector and employment sector is 0.409564 (40.96 %) while the sensitivity between employment sector and secondary sector is 0.917683 (91.77 %). The coefficient is greater on the correlation between the level of employment and secondary output. Since the coefficient is greater on regression between employment sector and secondary sector then between them appears backward linkage.

3. Does the economic crisis could affect the output?

   Yes, it does. The difference is on primary sector output. The primary sector has a higher multiplier effect by 0.360693 after economic crisis compare to the output before economic crisis. Then the multiplier effect of primary sector after economic crisis becomes 4.263418 from 3.902725.

Overall, this research only answers part of its hypothesis. The circular causation only appears in several intersectoral outputs with positive and negative relationship along with there are also some sectors that do not have correlation with other sector. As well as, only primary sector that has higher multiplier effect (i.e. better learning process) after economic crisis, the rest of the sectors feel stable learning process.

4.6. Research Discussion

4.6.1. The Discussion of Intersectoral Relationship among GDP Sectors

Among GDP sectors, they should have circular causation. Each sector has contribution to other sector, vice versa. Since an industry can not work in isolation, they should hand in hand. But in reality (based on this research), circular causation only appears on some intersectoral output. They are correlation between primary sector and secondary sector (P ↔ S), primary sector and financial sector (P ↔ F), secondary sector and financial sector (S ↔ F), and tertiary sector and financial sector (T ↔ F). On the other hand, the intersectoral output that have no-linkage are

primary sector and tertiary sector (P ↔ T), and secondary sector and tertiary sector (S ↔ T). On those intersectoral relationships, the influences of the sectors are positive and negative. Positive relationship appears on correlation between P ↔ S, S ↔ F, and T ↔ F. On the other hand, negative relationship takes place on correlation between P ↔ F.

The trade off between primary sector and financial sector could happen because primary sector does not use credit from financial sector in advancing its output. At the same time, the negative contribution on financial sector to primary sector could be caused by the perspective of financial sector itself, investing in primary sector considers to be unprofitable (low profit and high risk). However, finance still grow but not for primary sector but for secondary and tertiary sector. The link of finance is not for primary sector since between them occur negative relationship. This situation can be seen with if the growth of primary increase by 1% then the growth of finance will reduce by 58%. At the same time, if secondary sector growth increased by 1% then the growth of finance will expand 84%.

The no relationship appears on regression between primary sector and tertiary sector (bidirectional) as well as secondary sector and tertiary sector (bidirectional) could arise with the reason that those sectors are not using output produced by those industries (the independent variables) in fulfilling demand of inputs. They might prefer imported good (as their raw material, intermediate input or final output) compare to domestic good.

4.6.2. The Discussion of Intersectoral Relationship between GDP Sectors and Employment

GDP sectors and the level of employment should correlate with each other. Economic sectors are industries that absorb labor. If the development of economic sectors runs well then the level of unemployment should reduce as well. However, in this case (this research), the relationship between GDP sectors and overall employment only appears in one sector which is secondary sector to employment (S ↔ E); between them the contribution is positive. Conversely, primary sector, tertiary sector, and financial sector are not having close relationship to employment sector. Those sectors feel not statistically significant with employment.

The reason behind the problem of insignificance of primary, tertiary, and financial sector to employment sector (bidirectional) are those sectors might not taking much consideration on labor, they form of industry might be capital intensive (instead of labor intensive). The way to raise the growth could be by increasing capital, advancing (new) technology, and adding more raw materials. Another reason could be the amount of labor on those industries might had reached maximum number then the adding more labor will not improve the growth of sectoral output.

The explanation of employment not statistically significant in contribution of primary, tertiary, and financial sector growth is from labor side those sectors might not interest them to be their fieldwork. This may

happen because the return on labor may not appealing (i.e. the wage is low, few job ladders).

If secondary sector output increases by 1% then the overall employment will also increase by 40%. Employment only statistically significant at the level of 5% with secondary sector but it does not mean only this sector has relationship with employment. Other sector (except secondary) may have relationship but does not have significant effect, the relationship may not close (see table 4.4). This may happen because all industries other than secondary do not have any exact pattern (either positive or negative) with employment.

Table 4.4: Pairwise Correlation Matrix

	LPRIMARY	LSECONDARY	LTERTIARY	LFINANCE	LEMPLOYMENT
LPRIMARY	1	0.987396	0.992963	0.98124	0.934499
LSECONDARY	0.987396	1	0.997259	0.998125	0.966079
LTERTIARY	0.992963	0.997259	1	0.995957	0.951232
LFINANCE	0.98124	0.998125	0.995957	1	0.961074
LEMPLOYMENT	0.934499	0.966079	0.951232	0.961074	1

From the table above, secondary sector has the highest correlation value to employment compare to other sector. Moreover, secondary sector has the closest relationship with employment.

4.6.3. The Discussion of Intersectoral Relationship among GDP Sectors themselves as well as between GDP Sectors and Employment in Different Economic Condition (Before and After Economic Crisis)

After economic crisis, all sectors (primary, secondary, tertiary, finance, and employment) should feel a better learning process. Better learning process will stimulate greater output. In reality (based on this

research), there is only primary sector which have a greater constant value after economic crisis. On the other hand, the rest of the sectors are in stable learning process.

After the economic crisis, based on this research primary sector is the only sector which able to increase its performance, while other sectors are in stable learning process. Primary increase its constant value by 0.360693 after economic crisis then the output from 3.902725 become 4.263418. This situation might be happen because agriculture and mining are act as input to most of industries and agriculture is needed for household as food supplier, then they can still producing because the demand is not too effected. Other industries are collapsed mainly because they have many debts in term of US dollar, as the US dollar is much depreciate (because of the economic crisis) then the industries are having difficulties in repaying the loans. Another reason behind the impressive of primary sector is this sector after the crisis has to maintain its growth by small number of negative growth compare to other industries, and then it is much easier to sustain its growth (see table 4.5).

The economic crisis has forced countries to slash their purchasing power by 20 – 50% (Onchan, Tongroj, 2000). This situation has forced value of stocks, real estate and other assets to be sharply declined along with interest rates and non performing loans value to be increased (has a dual effect to businesses and employment, they become worsen).

Table 4.5: Growth Rate of GDP at Constant 1993 Market Prices by Industrial Origin

Industry	1996	1997	1998*	1999**	2000	2001	2002*
Primary	9.44	3.12	(2.26)	0.56	7.39	2.98	4.56
Secondary	37.98	24.98	(50.51)	10.59	19.18	15.72	14.28
Tertiary	20.24	16.46	(36.33)	1.00	16.59	14.60	13.97
Finance	6.04	5.93	(26.63)	(8.67)	4.59	5.40	5.73
GDP	**7.82**	**4.70**	**(13.20)**	**0.23**	**4.92**	**3.45**	**3.69**

Note: * preliminary figures
** very preliminary figures
Number in the bracket is in negative value

Source: BPS

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Based on the discussion of problems and analysis earlier conducted in this research, the researcher has come forward to conclude some important issues, they are:

1. There are only several causation occur on intersectoral output. They are primary sector and secondary sector, primary sector and financial sector, secondary sector and financial sector, and tertiary sector and financial sector. However, the contribution does not always imply positive, a negative effect may also occur. For example: the correlation between primary sector and financial sector is negative relationship (bidirectional) while others held positive. Furthermore, GDP sectors that do not statistically significant at the level of 5% are primary sector and tertiary sector as well as secondary sector and tertiary sector.
2. There is only one sector correlates with employment that is secondary sector. The two directions of secondary sector and employment is positive relationship. Other sectors do not have close relationship with employment, since in the model occur insignificant.
3. There is only one sector feels better learning process and the rest of the sectors feel stable learning process. It is only primary sector feels a greater

multiplier effect after economic crisis. While secondary, tertiary, finance, and employment sector feel stable learning process.

5.2. Recommendation

After completing the analysis of this paper and make conclusion, then the researcher offer some recommendation based on the situation of what should happen and what is happening in this research. The recommendation is aimed to Government as the regulator and the one who is able to manage the economy within a nation. The recommendations are:

1. Economic sectors should have circular causation on intersectoral output; the relationship among them should take place. Then government should consider in building up the relationship among sectors. This research has proven causation only appears in several sectors. Then the interdependency among sectors is small. The correlation among productive sectors should be positive. Along with, Intersectoral relationship among sectors and employment should be positive. A negative relationship will create a wider gap among productive sectors, since development of a sector will worsen the development of other sector (for correlation sectors that feel negative relationship). Then government should consider in improving intersectoral relationship among sectors and employment that have negative influence or no linkage to become positive relationship. If among GDP sectors take place positive relationship then a better rate of

economic growth can be achieved. Since a strong intersectoral linkages will mutually have an effect to increase sectoral output.

2. GDP sectors output should have relationship to employment. Then Government should think about strengthening relationship between GDP sectors and employment. The development of sectors if at the end have an effect (positive) to employment will eliminate high unemployment problem. Since the problem of unemployment is the mismatch between the growth of labor force and jobs creation. On the other hand, if employment has a positive contribution, it will improve the growth of productive sectors.
3. Primary sector, secondary sector, tertiary sector, financial sector, and employment sector should have a higher amount after economic crisis. Different economic situation should result in different output (either positive or negative) because of the learning process. Then government should find a way to improve output of sectors because only secondary sector that have a higher output after economic crisis.
4. The researcher does not claim the research to be entirely true. The research is limited then this research may have some weaknesses, it can not fully explain the circular causation on productive sectors in Indonesia. Further research need to expand the observations, if the studies of circular causation on productive sectors want to be redefined.

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APPENDIX I

Data of GDP Sectors (agriculture, mining, manufacturing, electricity, construction, trade, transport, finance, and services) and Employment

Year	Economic Sectors	Nominal GDP (Billion Rupiah)	Employment (Million People) [d]
1984	Agriculture [r]	20333.9	-
	Mining [r]	15985.8	-
	Manufacturing [r]	11081.6	-
	Electricity [r]	655.2	-
	Construction [r]	4756.8	-
	Trade [r]	13973.5	-
	Transport [r]	5112.5	-
	Finance [r]	4967.7	-
	Services [r]	10187.8	-
	Total	87054.8	60.1
1985	Agriculture [r]	22412	-
	Mining [r]	15403.6	-
	Manufacturing [r]	12713.3	-
	Electricity [r]	781.3	-
	Construction [r]	5301.8	-
	Trade [r]	14561.4	-
	Transport [r]	6149	-
	Finance [r]	5245.4	-
	Services [r]	11923.7	-
	Total	94491.5	62.46
1986	Agriculture [r]	24750.5	-
	Mining [r]	11502.8	-
	Manufacturing [r]	17184.7	-
	Electricity [r]	647.1	-
	Construction [r]	5313.8	-
	Trade [r]	17083.4	-
	Transport [r]	6406.9	-
	Finance [r]	7034.8	-
	Services [r]	12621.9	-
	Total	102545.9	68.34
1987	Agriculture [r]	29016	-

	Mining [r]	17266.8	-
	Manufacturing [r]	21150.4	-
	Electricity [r]	746.9	-
	Construction [r]	6087.4	-
	Trade [r]	20870.2	-
	Transport [r]	7414.1	-
	Finance [r]	8172.8	-
	Services [r]	13814.3	-
	Total	124538.9	70.41
1988	Agriculture [r]	34277.9	-
	Mining [r]	17161.8	-
	Manufacturing [r]	26252.4	-
	Electricity [r]	869	-
	Construction [r]	7169.2	-
	Trade [r]	24379.2	-
	Transport [r]	8139.6	-
	Finance [r]	9058.4	-
	Services [r]	14797.3	-
	Total	142104.8	72.82
1989	Agriculture *	39163.9	-
	Mining *	21822.5	-
	Manufacturing *	30323.3	-
	Electricity *	1008.3	-
	Construction *	8884.2	-
	Trade *	28855.5	-
	Transport *	9305.5	-
	Finance *	10817.8	-
	Services *	17003.7	-
	Total	167184.7	73.91
1990	Agriculture	42148.7	-
	Mining	26119	-
	Manufacturing	38910.2	-
	Electricity	1258.1	-
	Construction	10748.5	-
	Trade	32999.7	-
	Transport	10999.6	-
	Finance	13177.9	-
	Services	19235.5	-
	Total	195597.2	75.85
1991	Agriculture [r]	44720.8	-
	Mining [r]	31402.6	-
	Manufacturing [r]	47665.5	-

	Electricity [r]	1750.2	-
	Construction [r]	12902.1	-
	Trade [r]	36953.8	-
	Transport [r]	13908	-
	Finance [r]	16082.3	-
	Services [r]	22064.9	-
	Total	227450.2	76.42
1992	Agriculture *	50733.1	-
	Mining *	29970.2	-
	Manufacturing *	56541.6	-
	Electricity *	2147.7	-
	Construction *	15305.2	-
	Trade *	42731.5	-
	Transport *	17099.3	-
	Finance *	19095.6	-
	Services *	26323.3	-
	Total	259947.5	78.52
1993	Agriculture **	55745.5	-
	Mining **	30749.5	-
	Manufacturing **	67441.4	-
	Electricity **	2714.3	-
	Construction **	18139.9	-
	Trade **	49789.4	-
	Transport **	20728.2	-
	Finance **	22867.2	-
	Services **	33842.4	-
	Total	302017.8	79.2
1994	Agriculture [r]	66071.5	-
	Mining [r]	33507.1	-
	Manufacturing [r]	89240.7	-
	Electricity [r]	4577.1	-
	Construction [r]	28016.9	-
	Trade [r]	63858.7	-
	Transport [r]	27352.7	-
	Finance [r]	34505.6	-
	Services [r]	35089.4	-
	Total	382219.7	79.88
1995	Agriculture	77896.2	-
	Mining	40194.7	-
	Manufacturing	109688.7	-
	Electricity	5655.4	-
	Construction	34451.9	-

	Trade	75639.8	-
	Transport	30795.1	-
	Finance	39510.4	-
	Services	40681.9	-
	Total	454514.1	80.11
1996	Agriculture *	88040.8	-
	Mining *	45915.7	-
	Manufacturing *	135580.9	-
	Electricity *	6593.7	-
	Construction *	42024.8	-
	Trade *	88877.8	-
	Transport *	34926.3	-
	Finance *	44371.4	-
	Services *	46299.4	-
	Total	532630.8	85.7
1997	Agriculture	101009.4	-
	Mining	55561.7	-
	Manufacturing	168178	-
	Electricity	7832.4	-
	Construction	46678.8	-
	Trade	99581.9	-
	Transport	38530.9	-
	Finance	54360.3	-
	Services	55962	-
	Total	627695.4	87.05
1998	Agriculture	172827.6	-
	Mining	120328.6	-
	Manufacturing	238897	-
	Electricity	11283.1	-
	Construction	61761.6	-
	Trade	146740.1	-
	Transport	51937.2	-
	Finance	69891.7	-
	Services	82086.8	-
	Total	955753.7	87.67
1999	Agriculture	215686.7	
	Mining	109925.4	-
	Manufacturing	285873.9	-
	Electricity	13429	-
	Construction	67616.2	-
	Trade	175835.4	-
	Transport	55189.6	-
	Finance	71220.2	-
	Services	104955.3	-

	Total	1099731.7	88.82
2000	Agriculture	217897.9	-
	Mining	175262.5	-
	Manufacturing	314918.4	-
	Electricity	16519.3	-
	Construction	76573.4	-
	Trade	199110.4	-
	Transport	62305.6	-
	Finance	80459.9	-
	Services	121871.4	-
	Total	1264918.8	89.84
2001	Agriculture	263327.9	-
	Mining	182007.8	-
	Manufacturing	506319.6	-
	Electricity	10854.8	-
	Construction	89298.9	-
	Trade	267656.1	-
	Transport	77187.6	-
	Finance	135369.8	-
	Services	152258	-
	Total	1684280.5	90.81
2002	Agriculture	298876.8	-
	Mining	161023.8	-
	Manufacturing	553746.6	-
	Electricity	15392	-
	Construction	101573.5	-
	Trade	314646.7	-
	Transport	97970.3	-
	Finance	154442.2	-
	Services	165602.8	-
	Total	1863274.7	91.64
2003	Agriculture *	325653.7	-
	Mining *	169535.6	-
	Manufacturing *	590051.3	-
	Electricity *	19540.9	-
	Construction *	112571.3	-
	Trade *	337840.5	-
	Transport *	118267.3	-
	Finance *	174323.6	-
	Services *	198069.3	-
	Total	2045853.5	92.81
2004	Agriculture **	354435.3	-
	Mining **	196892.4	-

	Manufacturing **	652729.5	-
	Electricity **	22855.4	-
	Construction **	134388.1	-
	Trade **	372340	-
	Transport **	140604.2	-
	Finance **	194542.2	-
	Services **	234244.4	-
	Total	2303031.5	93.72

Note: [d] = rounded
[r] = revised
* = preliminary figures
** = very preliminary figures

Source: Statistical Year Book of Indonesia, Central Bureau of Statistics, various issue

APPENDIX II

Data of Primary, Secondary, Tertiary, Finance, and Employment Sector and also Dummy Variable

Year	Sectors	Quantity	Dummy
1984	Primary [r]	36319.7	0
	Secondary [r]	16493.6	0
	Tertiary [r]	29273.8	0
	Finance [r]	4967.7	0
	Employment [d]	60.1	0
1985	Primary [r]	37815.6	0
	Secondary [r]	18796.4	0
	Tertiary [r]	32634.1	0
	Finance [r]	5245.4	0
	Employment [d]	62.46	0
1986	Primary [r]	36253.3	0
	Secondary [r]	23145.6	0
	Tertiary [r]	36112.2	0
	Finance [r]	7034.8	0
	Employment [d]	68.34	0
1987	Primary [r]	46282.8	0
	Secondary [r]	27984.7	0
	Tertiary [r]	42098.6	0
	Finance [r]	8172.8	0
	Employment [d]	70.41	0
1988	Primary [r]	51439.7	0
	Secondary [r]	34290.6	0
	Tertiary [r]	47316.1	0
	Finance [r]	9058.4	0
	Employment [d]	72.82	0
1989	Primary *	60986.4	0
	Secondary *	40215.8	0
	Tertiary *	55164.7	0
	Finance *	10817.8	0
	Employment [d]	73.91	0

1990	Primary	68267.7	0
	Secondary	50916.8	0
	Tertiary	63234.8	0
	Finance	13177.9	0
	Employment [d]	75.85	0
1991	Primary [r]	76123.4	0
	Secondary [r]	62317.8	0
	Tertiary [r]	72926.7	0
	Finance [r]	16082.3	0
	Employment [d]	76.42	0
1992	Primary *	80703.3	0
	Secondary *	73994.5	0
	Tertiary *	86154.1	0
	Finance *	19095.6	0
	Employment [d]	78.52	0
1993	Primary **	86495	0
	Secondary **	88295.6	0
	Tertiary **	104360	0
	Finance **	22367.2	0
	Employment [d]	79.2	0
1994	Primary [r]	99578.2	0
	Secondary [r]	121834.7	0
	Tertiary [r]	126300.8	0
	Finance [r]	34505.6	0
	Employment [d]	79.88	0
1995	Primary	118090.9	0
	Secondary	149796	0
	Tertiary	147116.8	0
	Finance	39510.4	0
	Employment [d]	80.11	0
1996	Primary *	133956.5	0
	Secondary *	184199.4	0
	Tertiary *	170103.5	0
	Finance *	44371.4	0
	Employment [d]	85.7	0
1997	Primary	156571.1	0
	Secondary	222689.2	0
	Tertiary	194074.8	0

	Finance	54360.3	0
	Employment [d]	87.05	0
1998	Primary	293156.2	1
	Secondary	311941.7	1
	Tertiary	280764.1	1
	Finance	69891.7	1
	Employment [d]	87.67	1
1999	Primary	325612.1	1
	Secondary	366919.1	1
	Tertiary	335980.3	1
	Finance	71220.2	1
	Employment [d]	88.82	1
2000	Primary	393160.4	1
	Secondary	408011.1	1
	Tertiary	383287.4	1
	Finance	80459.9	1
	Employment [d]	89.84	1
2001	Primary	445335.7	1
	Secondary	606473.3	1
	Tertiary	497101.7	1
	Finance	135369.8	1
	Employment [d]	90.81	1
2002	Primary	459900.6	1
	Secondary	670712.1	1
	Tertiary	578219.8	1
	Finance	154442.2	1
	Employment [d]	91.64	1
2003	Primary *	495189.3	1
	Secondary *	722163.5	1
	Tertiary *	654177.1	1
	Finance *	174323.6	1
	Employment [d]	92.81	1
2004	Primary **	551327.7	1
	Secondary **	809973	1
	Tertiary **	747188.6	1
	Finance **	194542.2	1
	Employment [d]	93.72	1

Note: [d] = rounded
[r] = revised

* = preliminary figures
** = very preliminary figures
primary, secondary, tertiary, and finance in billion rupiahs
employment in million people

Source: Statistical Year Book of Indonesia, various issues, Central Bureau of Statistics

APPENDIX III

Regression of Primary Sector Log Linear

Dependent Variable: LPRIMARY
Method: Least Squares
Date: 10/05/06 Time: 13:29
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.035542	2.589441	0.786093	0.4433
LSECONDARY	0.800916	0.356532	2.246407	0.0391
LTERTIARY	1.304116	0.278456	4.683381	0.0002
LFINANCE	-1.159083	0.234984	-4.932595	0.0001
LEMPLOYMENT	-0.707258	0.666130	-1.061742	0.3041

R-squared	0.995032	Mean dependent var	11.74677
Adjusted R-squared	0.993790	S.D. dependent var	0.953716
S.E. of regression	0.075159	Akaike info criterion	-2.134175
Sum squared resid	0.090381	Schwarz criterion	-1.885479
Log likelihood	27.40884	F-statistic	801.1007
Durbin-Watson stat	1.948879	Prob(F-statistic)	0.000000

APPENDIX IV

Regression of Secondary Sector Log Linear

Dependent Variable: LSECONDARY
Method: Least Squares
Date: 10/05/06 Time: 13:31
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.580124	1.136677	-4.029399	0.0010
LPRIMARY	0.299374	0.133268	2.246407	0.0391
LTERTIARY	0.059213	0.261716	0.226250	0.8239
LFINANCE	0.668239	0.155296	4.303012	0.0005
LEMPLOYMENT	1.180067	0.300852	3.922411	0.0012

R-squared	0.998982	Mean dependent var	11.69702
Adjusted R-squared	0.998728	S.D. dependent var	1.288168
S.E. of regression	0.045951	Akaike info criterion	-3.118239
Sum squared resid	0.033783	Schwarz criterion	-2.869543
Log likelihood	37.74151	F-statistic	3925.443
Durbin-Watson stat	1.061895	Prob(F-statistic)	0.000000

APPENDIX V

Regression of Tertiary Sector Log Linear

Dependent Variable: LTERTIARY
Method: Least Squares
Date: 10/05/06 Time: 13:33
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.098688	1.446520	1.450853	0.1661
LPRIMARY	0.443377	0.094670	4.683381	0.0002
LSECONDARY	0.053858	0.238047	0.226250	0.8239
LFINANCE	0.512219	0.175848	2.912853	0.0102
LEMPLOYMENT	-0.323023	0.393660	-0.820565	0.4240

R-squared	0.998632	Mean dependent var	11.80787
Adjusted R-squared	0.998290	S.D. dependent var	1.059673
S.E. of regression	0.043824	Akaike info criterion	-3.213034
Sum squared resid	0.030728	Schwarz criterion	-2.964338
Log likelihood	38.73686	F-statistic	2919.470
Durbin-Watson stat	1.835214	Prob(F-statistic)	0.000000

APPENDIX VI

Regression of Finance Sector Log Linear

Dependent Variable: LFINANCE
Method: Least Squares
Date: 10/05/06 Time: 13:34
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.451825	1.730745	0.838844	0.4139
LPRIMARY	-0.520479	0.105518	-4.932595	0.0001
LSECONDARY	0.802775	0.186561	4.303012	0.0005
LTERTIARY	0.676529	0.232257	2.912853	0.0102
LEMPLOYMENT	-0.547786	0.441065	-1.241962	0.2321

R-squared	0.998574	Mean dependent var	10.31814
Adjusted R-squared	0.998218	S.D. dependent var	1.193107
S.E. of regression	0.050364	Akaike info criterion	-2.934810
Sum squared resid	0.040585	Schwarz criterion	-2.686115
Log likelihood	35.81551	F-statistic	2801.970
Durbin-Watson stat	2.192339	Prob(F-statistic)	0.000000

APPENDIX VII

Regression of Employment Sector Log Linear

Dependent Variable: LEMPLOYMENT
Method: Least Squares
Date: 10/05/06 Time: 13:36
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.744536	0.200014	18.72142	0.0000
LPRIMARY	-0.093062	0.087650	-1.061742	0.3041
LSECONDARY	0.415406	0.105906	3.922411	0.0012
LTERTIARY	-0.125017	0.152355	-0.820565	0.4240
LFINANCE	-0.160515	0.129243	-1.241962	0.2321

R-squared	0.964029	Mean dependent var	4.377977
Adjusted R-squared	0.955037	S.D. dependent var	0.128572
S.E. of regression	0.027263	Akaike info criterion	-4.162308
Sum squared resid	0.011892	Schwarz criterion	-3.913612
Log likelihood	48.70423	F-statistic	107.2022
Durbin-Watson stat	0.769982	Prob(F-statistic)	0.000000

APPENDIX VIII

Primary Sector, White Heterocedasticity Test with cross term

White Heteroskedasticity Test:

F-statistic	4.054179	Probability	0.027709
Obs*R-squared	18.03443	Probability	0.114649

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/14/06 Time: 05:13
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.06238	8.335105	1.447178	0.1859
LSECONDARY	8.727580	3.395634	2.570236	0.0331
LSECONDARY^2	0.528082	0.445533	1.185282	0.2699
LSECONDARY*LTERTIARY	-0.655988	0.656021	-0.999950	0.3466
LSECONDARY*LFINANCE	-0.382284	0.583120	-0.655584	0.5305
LSECONDARY*LEMPLOYMENT	-2.151351	0.850414	-2.529770	0.0353
LTERTIARY	-7.843471	4.471738	-1.754009	0.1175
LTERTIARY^2	-0.443505	0.342919	-1.293324	0.2320
LTERTIARY*LFINANCE	1.092765	0.341920	3.195972	0.0127
LTERTIARY*LEMPLOYMENT	3.371127	1.384504	2.434899	0.0409
LFINANCE	-3.316795	0.750942	-4.416849	0.0022
LFINANCE^2	-0.248803	0.225479	-1.103442	0.3019
LEMPLOYMENT^2	-1.654811	0.741577	-2.231477	0.0562

R-squared	0.858782	Mean dependent var	0.004304
Adjusted R-squared	0.646956	S.D. dependent var	0.006137
S.E. of regression	0.003646	Akaike info criterion	-8.117155
Sum squared resid	0.000106	Schwarz criterion	-7.470545
Log likelihood	98.23012	F-statistic	4.054179
Durbin-Watson stat	2.858146	Prob(F-statistic)	0.027709

APPENDIX IX

Secondary Sector, White Heterocedasticity Test with cross term

White Heteroskedasticity Test:

F-statistic	0.887477	Probability	0.596241
Obs*R-squared	13.07000	Probability	0.442419

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/14/06 Time: 05:17
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.02348	6.177294	2.108282	0.0730
LPRIMARY	-0.305205	1.650948	-0.184867	0.8586
LPRIMARY^2	-0.028791	0.085046	-0.338527	0.7449
LPRIMARY*LTERTIARY	-0.187660	0.327156	-0.573611	0.5842
LPRIMARY*LFINANCE	0.165916	0.216149	0.767598	0.4678
LPRIMARY*LEMPLOYMENT	0.336058	0.411906	0.815862	0.4415
LTERTIARY	-3.326118	3.461225	-0.960965	0.3686
LTERTIARY^2	0.329812	0.445479	0.740354	0.4832
LTERTIARY*LFINANCE	-0.500805	0.599049	-0.836000	0.4308
LTERTIARY*LEMPLOYMENT	0.667531	0.723830	0.922221	0.3871
LFINANCE	3.250083	2.136792	1.521010	0.1721
LFINANCE^2	0.195274	0.197101	0.990729	0.3548
LFINANCE*LEMPLOYMENT	-0.759357	0.473896	-1.602370	0.1531
LEMPLOYMENT	-3.895132	1.911199	-2.038057	0.0809

R-squared	0.622381	Mean dependent var	0.001609
Adjusted R-squared	-0.078912	S.D. dependent var	0.001871
S.E. of regression	0.001943	Akaike info criterion	-9.414317
Sum squared resid	2.64E-05	Schwarz criterion	-8.717968
Log likelihood	112.8503	F-statistic	0.887477
Durbin-Watson stat	2.946951	Prob(F-statistic)	0.596241

APPENDIX X

Tertiary Sector, White Heterocedasticity Test with cross term

White Heteroskedasticity Test:

F-statistic	0.940510	Probability	0.554256
Obs*R-squared	12.28907	Probability	0.422752

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/14/06 Time: 05:21
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.412379	5.000156	0.882448	0.4033
LPRIMARY	-0.550107	1.137126	-0.483770	0.6415
LPRIMARY^2	-0.030584	0.060488	-0.505618	0.6268
LPRIMARY*LSECONDARY	-0.013348	0.202103	-0.066043	0.9490
LPRIMARY*LFINANCE	0.057408	0.133714	0.429337	0.6790
LPRIMARY*LEMPLOYMENT	0.190669	0.330811	0.576370	0.5802
LSECONDARY	0.565688	1.104561	0.512138	0.6224
LSECONDARY^2	-0.075617	0.198399	-0.381138	0.7130
LSECONDARY*LFINANCE	0.162099	0.294677	0.550090	0.5973
LSECONDARY*LEMPLOYMENT	-0.073314	0.206238	-0.355480	0.7314
LFINANCE	-0.291225	0.377370	-0.771724	0.4625
LFINANCE^2	-0.110090	0.120521	-0.913449	0.3877
LEMPLOYMENT	-1.372841	1.531871	-0.896185	0.3963

R-squared	0.585194	Mean dependent var	0.001463
Adjusted R-squared	-0.037015	S.D. dependent var	0.001942
S.E. of regression	0.001978	Akaike info criterion	-9.340704
Sum squared resid	3.13E-05	Schwarz criterion	-8.694095
Log likelihood	111.0774	F-statistic	0.940510
Durbin-Watson stat	2.261865	Prob(F-statistic)	0.554256

APPENDIX XI

Finance Sector, White Heterocedasticity Test with cross term

White Heteroskedasticity Test:

F-statistic	1.408912	Probability	0.308414
Obs*R-squared	13.28509	Probability	0.275101

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/14/06 Time: 05:23
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.967393	5.716767	1.043841	0.3238
LPRIMARY	-1.045195	1.076956	-0.970508	0.3572
LPRIMARY^2	-0.072270	0.087303	-0.827803	0.4292
LPRIMARY*LSECONDARY	0.060704	0.086293	0.703463	0.4996
LPRIMARY*LTERTIARY	0.000568	0.215767	0.002635	0.9980
LPRIMARY*LEMPLOYMENT	0.461819	0.371527	1.243031	0.2453
LSECONDARY	0.515660	0.854009	0.603811	0.5609
LSECONDARY^2	0.007183	0.092821	0.077389	0.9400
LSECONDARY*LTERTIARY	-0.027695	0.168517	-0.164348	0.8731
LSECONDARY*LEMPLOYMENT	-0.253550	0.218829	-1.158669	0.2764
LTERTIARY	0.363866	0.581669	0.625554	0.5471
LEMPLOYMENT	-2.371472	1.836603	-1.291227	0.2288

R-squared	0.632623	Mean dependent var	0.001933
Adjusted R-squared	0.183608	S.D. dependent var	0.002698
S.E. of regression	0.002438	Akaike info criterion	-8.899710
Sum squared resid	5.35E-05	Schwarz criterion	-8.302840
Log likelihood	105.4470	F-statistic	1.408912
Durbin-Watson stat	2.876484	Prob(F-statistic)	0.308414

APPENDIX XII

Employment Sector, White Heterocedasticity Test with cross term

White Heteroskedasticity Test:

F-statistic	4.036253	Probability	0.022664
Obs*R-squared	17.46059	Probability	0.094970

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/14/06 Time: 05:24
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.178087	0.182452	-0.976073	0.3545
LPRIMARY	0.052628	0.070872	0.742579	0.4767
LPRIMARY^2	-0.000896	0.019511	-0.045907	0.9644
LPRIMARY*LSECONDARY	0.005322	0.025921	0.205328	0.8419
LPRIMARY*LTERTIARY	0.000497	0.041957	0.011854	0.9908
LPRIMARY*LFINANCE	-0.009417	0.016410	-0.573854	0.5801
LSECONDARY	-0.061900	0.126631	-0.488824	0.6367
LSECONDARY^2	-0.002800	0.021790	-0.128516	0.9006
LSECONDARY*LTERTIARY	-0.000339	0.033010	-0.010261	0.9920
LSECONDARY*LFINANCE	0.006035	0.012438	0.485182	0.6391
LTERTIARY	0.000714	0.110127	0.006486	0.9950
LFINANCE	0.042897	0.057288	0.748789	0.4731

R-squared	0.831457	Mean dependent var	0.000566
Adjusted R-squared	0.625460	S.D. dependent var	0.000740
S.E. of regression	0.000453	Akaike info criterion	-12.26548
Sum squared resid	1.85E-06	Schwarz criterion	-11.66861
Log likelihood	140.7875	F-statistic	4.036253
Durbin-Watson stat	2.519552	Prob(F-statistic)	0.022664

APPENDIX XIII

Regression of Primary Sector with Dummy Variable

Dependent Variable: LPRIMARY
Method: Least Squares
Date: 12/15/06 Time: 19:37
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.902725	1.736580	2.247362	0.0401
LSECONDARY	0.735380	0.233290	3.152207	0.0066
LTERTIARY	0.480790	0.251410	1.912377	0.0751
LFINANCE	-0.525895	0.203412	-2.585368	0.0207
LEMPLOYMENT	-0.257835	0.445301	-0.579012	0.5712
DUMMY	0.360693	0.076038	4.743577	0.0003

R-squared	0.998013	Mean dependent var	11.74677
Adjusted R-squared	0.997350	S.D. dependent var	0.953716
S.E. of regression	0.049092	Akaike info criterion	-2.955268
Sum squared resid	0.036151	Schwarz criterion	-2.656833
Log likelihood	37.03031	F-statistic	1506.625
Durbin-Watson stat	1.834295	Prob(F-statistic)	0.000000

APPENDIX XIV

Regression of Secondary Sector with Dummy Variable

Dependent Variable: LSECONDARY
Method: Least Squares
Date: 12/15/06 Time: 19:40
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.185437	1.085222	-4.778227	0.0002
LPRIMARY	0.541856	0.171897	3.152207	0.0066
LTERTIARY	0.067501	0.240051	0.281193	0.7824
LFINANCE	0.558632	0.152541	3.662188	0.0023
LEMPLOYMENT	0.917683	0.305341	3.005441	0.0089
DUMMY	-0.183833	0.091641	-2.006004	0.0632

R-squared	0.999197	Mean dependent var	11.69702
Adjusted R-squared	0.998930	S.D. dependent var	1.288168
S.E. of regression	0.042141	Akaike info criterion	-3.260655
Sum squared resid	0.026637	Schwarz criterion	-2.962220
Log likelihood	40.23687	F-statistic	3734.697
Durbin-Watson stat	1.142638	Prob(F-statistic)	0.000000

APPENDIX XV

Regression of Tertiary Sector with Dummy Variable

Dependent Variable: LTERTIARY
Method: Least Squares
Date: 12/15/06 Time: 19:42
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.271986	1.753347	1.295799	0.2146
LPRIMARY	0.407705	0.213193	1.912377	0.0751
LSECONDARY	0.077683	0.276262	0.281193	0.7824
LFINANCE	0.507417	0.183185	2.769969	0.0143
LEMPLOYMENT	-0.320816	0.406260	-0.789682	0.4420
DUMMY	0.020816	0.110584	0.188238	0.8532

R-squared	0.998635	Mean dependent var	11.80787
Adjusted R-squared	0.998180	S.D. dependent var	1.059673
S.E. of regression	0.045207	Akaike info criterion	-3.120155
Sum squared resid	0.030656	Schwarz criterion	-2.821720
Log likelihood	38.76163	F-statistic	2194.782
Durbin-Watson stat	1.846864	Prob(F-statistic)	0.000000

APPENDIX XVI

Regression of Finance Sector with Dummy Variable

Dependent Variable: LFINANCE
Method: Least Squares
Date: 12/15/06 Time: 19:44
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.798675	2.068157	0.869699	0.3982
LPRIMARY	-0.586144	0.226716	-2.585368	0.0207
LSECONDARY	0.845005	0.230738	3.662188	0.0023
LTERTIARY	0.666931	0.240772	2.769969	0.0143
LEMPLOYMENT	-0.540940	0.454360	-1.190555	0.2523
DUMMY	0.041728	0.126472	0.329942	0.7460

R-squared	0.998585	Mean dependent var	10.31814
Adjusted R-squared	0.998113	S.D. dependent var	1.193107
S.E. of regression	0.051828	Akaike info criterion	-2.846804
Sum squared resid	0.040293	Schwarz criterion	-2.548369
Log likelihood	35.89144	F-statistic	2116.750
Durbin-Watson stat	2.156259	Prob(F-statistic)	0.000000

APPENDIX XVII

Regression of Employment Sector with Dummy Variable

Dependent Variable: LEMPLOYMENT
Method: Least Squares
Date: 12/15/06 Time: 19:45
Sample: 1984 2004
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.700832	0.642316	5.761701	0.0000
LPRIMARY	-0.084790	0.146438	-0.579012	0.5712
LSECONDARY	0.409564	0.136274	3.005441	0.0089
LTERTIARY	-0.124413	0.157549	-0.789682	0.4420
LFINANCE	-0.159604	0.134059	-1.190555	0.2523
DUMMY	-0.004953	0.068935	-0.071857	0.9437

R-squared	0.964042	Mean dependent var	4.377977
Adjusted R-squared	0.952056	S.D. dependent var	0.128572
S.E. of regression	0.028152	Akaike info criterion	-4.067414
Sum squared resid	0.011888	Schwarz criterion	-3.768979
Log likelihood	48.70784	F-statistic	80.43036
Durbin-Watson stat	0.773632	Prob(F-statistic)	0.000000