

MIICEMA2010-192
**CONTRIBUTION ANALYSIS OF AGRICULTURAL SECTOR,
BANKING, TECHNOLOGY, INDUSTRIAL SECTOR AND
SERVICES SECTOR IN ECONOMIC GROWTH IN
INDONESIA: REVIEW FROM LAGS AND
VARIANCE DECOMPOSITION**

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ABSTRACT

This research attempts to analyze the lag of VAR model to examine the impact of agricultural sector, industrial sector and financial indicators on the economic growth of Indonesia. Time series data from 1988 – 2008 are used in this research. The Financial indicator used in this paper are asset, loans and third party funds. Other variabels for setting the condition are electricity, agriculture, industries and services. The proxy for growth is GDP growth per capita at constant price 2000. Based on the variance decomposition analysis, the research reveals empirical evidence that assets and agriculture have the highest percentage of contribution to economic growth. This study is not so different compared to the research conducted by Ang and McKibbing (2007) which indicates that the lag obtained from the model is 6 (quarterly) or one and half year.

Field of Research: Banking, Finance

1. INTRODUCTION

Banking industry in Indonesia showed a proliferative growth following the Banking Deregulation in 1988. This is an immediate impact of the deregulation called Pakto 88 issued by the Central Bank of Indonesia that facilitate establishment of new banks and branch offices But later, the impact of this deregulation turned out to instigate various flaws owchic put in danger both the banking industry and national economy. The financial difficulties worsened by the bankruptcy of several banks as results of the unprofessional management of banks; the terminations of 16 banks operational courses in November 1997 became the evidence of the financial problems (Hermana, 2007). This was partly caused by mismanagement and driven by the monetary crisis in Indonesia happened since the mid of 1997. If in 1995 the number of banks still amounted to 240, then the next year the number has increased rapidly and then decreased up to the amount of 222 banks at the end of 1998, as shown in table 1. The reduced number of banks is an

indication of declining business activity and also describe consolidation made by the Indonesian banking.

Table 1. Total Banks in Indonesia in the period of 1996-1998

No.	Bank Category	1996	July 1997	Dec. 1997	1998
1.	Stated Owned Banks	7	7	7	7
2.	Regional Development Banks (BPD)	27	27	27	27
3.	Foreign Exchange Banks	164	160	144	130
4.	Joint Venture Banks	41	44	44	58
5.	Rural Banks (BPR)	9276	9230	9230	9147
6.	Sharia Banks	1	1	1	1
Total		9516	9469	9453	9370

Source: Economic and Financial Statistics of Indonesia, February 1999

The number of private national banks and rural banks based on Table 1 above, shows the largest amount. The crisis caused not only the the number of private banks but also the number of rural banks. This was because the capital structure was not strong enough and was not managed professionally. Number of state banks and BPD did not change before and after the crisis. This situation demonstrates the commitment of governments and local governments to strengthen the capital structure of banks to still be able to maintain public confidence. The development of the next bank of approximately 10 years after the monetary crisis shown at Table 2 below.

Table 2. Number of Bank in Indonesia in December 2008

No.	Bank Category	December 2008
1.	Stated Owned Banks	5
2.	Regional Development Banks	26
3.	Foreign Exchange Banks	71
4.	Joint Venture Banks	28
5.	Sharia Banks	5
6.	Conventional Commercial Bank whose owned Sharia Unit	27
7.	Rural Bank	1772
8.	Sharia Rural Banks	131
Total		2065

Source: Economic and Financial Statistics, December 2008

Based on the background and the issues that have been described above, the problem formulation of this study are developed as follows.

1. What is the optimal level of inaction are obtained from VAR models?
2. How large a percentage variable contribution of assets, loans, finance, agriculture, industry, electricity, services to economic growth?

This study aims to analyze the contribution of the agricultural sector, banking, technology, industry and services to economic growth.

2. LITERATURE REVIEW

Using both traditional cross-section instrumental variable procedures and recent dynamic panel techniques, Levine, Loayza and Beck (2000) find that the exogenous component of financial intermediary development is positively with the economic growth. The data also show that cross country differences in legal and accounting systems help account for differences in financial development.

Kar and Pentecost (2000) used five alternative proxies for financial development and Granger causality tests applied the cointegration and vector error correction methodology (VECM). The empirical results show that the direction of causality between financial development and economic growth in Turkey is sensitive to the choice of proxy used for financial development. For example, when financial development is measured by the money to income ratio, the direction of causality runs from financial development to economic growth. But when the bank deposits, private credit and domestic credit ratios are alternatively used to proxy financial development, growth is found to lead financial development.

Nasrudin (2004) investigate financial development topics related to economic growth with regional approach and adopting full Levine's model, replace the measured of sample unit from 71 countries in the world with provinces in Indonesia. Empirical results show that financial indicator has a positif relationship with economic growth are assets and the total of bank branch office. Loans and the third party funds suppose as power of bank intermediation show a negative sign.

Deepening financial development and rapid economic growth in China have been accompanied by widening income disparity between the coastal and inland regions. By employing panel dataset for 29 Chinese provinces over the period of 1990-2001 and applying the Generalized Method of Moment (GMM) techniques, the empirical results show that financial development significantly promotes economic growth in coastal regions but not in the inland regions; the weak finance-growth nexus in inland provinces may aggravate China's regional disparities (Liang, 2006).

Using time series data from 1960-2001, the empirical evidence suggests that financial liberalization through removing the repressionist policies, has favorable effect in stimulating financial sector development. Financial depth and economic development are positively related; but contrary to the conventional findings, the results support Robinson's view that output growth leads to higher financial depth in the longrun (Ang and McKibbing, 2007). The results show that although financial sector reforms have enlarge the financial systems, the policy changes do not appear to have led to higher long run growth.

3. DATA AND METODOLOGY

3.1 Model

Econometric model used in this study is a modification of the model made by Levine, Loayza and Beck (2000), which is also adopted by Nasrudin (2004). The reason the authors chose this approach is the consideration that the data used is time series data and the properties of the VAR that supports the goals of this research. Parameters used in the model is also not a latent variable, the variable that is not measured directly but is formed through the dimensions of the observed (Ferdinand, 2002).

Three main indicators of the banking variables adopted in this study the author is fully equal to the variables used by Nasrudin (2004) is an asset, loans and third party funds. Another variable is natural resource variables are measured through the agricultural sector and human resource variables. In addition to the agricultural sector, the size of the natural resource variables plus the industrial sector by reason of the industrial sector's contribution to GDP has exceeded the agricultural sector that is equal to 27.29% in 2008 (BPS, 2009). Another new variable is added in the model in this study were variable size technology with electricity and a dummy variable. Dummy variable representing the most influential events on the economy of Indonesia, namely the monetary crisis in 1997.

General equation of the form used in this research is adopting a model used by Levine, Loayza and Beck (2000) and Nasrudin (2004) with modifications. Adopted a general equation is as follows:

$$g_t = \alpha + \beta [\text{banking indicator}]_t + \gamma [\text{conditionset}]_t + \varepsilon_t$$

In these equations g is the rate of economic growth, calculated as the rate of growth of income per capita in 2000 constant prices. In this case the welfare of the adopted measure is income per capita because it reflects the level of welfare even though not yet reflect the distribution level.

3.2 Data

Data used in this research was secondary data with the range / range of time from the year 1988 - 2008 in the form of quarterly data. Data obtained from the publication of Bank Indonesia (BI) in the form of the Indonesian Financial Statistics (SEKI) as a source of financial data and publications BPS (Central Bureau of Statistics) in the form of Statistics Indonesia (SI), as a source of data for forming variable economic growth. Banking data include are the third-party funds, the nominal amount of savings, current accounts, deposits and loans for all banks (commercial banks, rural banks, Islamic banks and Islamic unit), the total assets of all banks, data for indicators covering economic growth, the rate of GDP per capita, GDP sectors agricultural and industrial sectors (oil and non oil) to GDP and electricity entirely by the constant price in 2000. The use of GDP at constant prices (real) both theoretically and based on the explanation on the National Revenue Report published by BPS, is more appropriate to be used to indicate the overall economic growth rate for each sector from year to year.

It is often found that economic theory was not good enough to specify the dynamic relationship among variables. VAR method by Sims then appear as a solution to this problem with non structural approach (Widarjono, 2007). Identification formula for the model according to order condition as follows (Gujarati, 2003):

$$K-k < m-1$$

If $K-k < m-1$ then the equation in the condition called underidentified

$$K-k = m-1$$

If $K-k = m-1$ then the equation in the condition called identified

$$K-k > m-1$$

If $K-k > m-1$ then the equation in the condition called overidentified

VAR model consisting of eight macroeconomic variables:

$$Vljgdp_t = \beta_1 + \sum_{i=1}^n \beta_{1i} Vljgdp_{t-i} + \sum_{i=0}^n \beta_{2i} Vaset_{t-i} + \sum_{i=0}^n \beta_{3i} Vkredit_{t-i} + \sum_{i=0}^n \beta_{4i} Vdana_{t-i} + \sum_{i=0}^n \beta_{5i} Vlstk_{t-i} + \sum_{i=0}^n \beta_{6i} Vjasa_{t-i} + \sum_{i=0}^n \beta_{7i} Vtani_{t-i} + \varepsilon_1$$

$$Vaset_t = \beta_2 + \sum_{i=0}^n \beta_{8i} Vljgdp_{t-i} + \sum_{i=1}^n \beta_{9i} Vaset_{t-i} + \sum_{i=0}^n \beta_{10i} Vkredit_{t-i} + \sum_{i=0}^n \beta_{11i} Vdana_{t-i} + \sum_{i=0}^n \beta_{12i} Vlstk_{t-i} + \sum_{i=0}^n \beta_{13i} Vjasa_{t-i} + \sum_{i=0}^n \beta_{14i} Vtani_{t-i} + \varepsilon_2$$

$$Vkredit_t = \beta_3 + \sum_{i=0}^n \beta_{15i} Vljgdp_{t-i} + \sum_{i=0}^n \beta_{16i} Vaset_{t-i} + \sum_{i=1}^n \beta_{17i} Vkredit_{t-i} + \sum_{i=0}^n \beta_{18i} Vdana_{t-i} + \sum_{i=0}^n \beta_{19i} Vlstk_{t-i} + \sum_{i=0}^n \beta_{20i} Vjasa_{t-i} + \sum_{i=0}^n \beta_{21i} Vtani_{t-i} + \varepsilon_3$$

$$Vdana_t = \beta_4 + \sum_{i=0}^n \beta_{22i} Vljgdp_{t-i} + \sum_{i=0}^n \beta_{23i} Vaset_{t-i} + \sum_{i=0}^n \beta_{24i} Vkredit_{t-i} + \sum_{i=1}^n \beta_{25i} Vdana_{t-i} + \sum_{i=0}^n \beta_{26i} Vlstk_{t-i} + \sum_{i=0}^n \beta_{27i} Vjasa_{t-i} + \sum_{i=0}^n \beta_{28i} Vtani_{t-i} + \varepsilon_4$$

....(because of the page limitation, another equation such as vlstk, vjasa, and vtani, can not be written here)

Econometric model in this research is the analysis of VAR models are divided into two stages, namely:

- (A) VAR model with 8 variables without the dummy variable of economic growth, and three indicators of banking assets, loans, funding and economic growth of four variables namely agriculture, industry, electricity and services, and
- (B) VAR model with 8 variables with dummy variable consisting of the rate of economic growth, assets, credit, finance, agriculture, industry, electricity, services and monetary crisis dummy variable.

4. FINDINGS AND DISCUSSION

The analysis described in this section is based on the results of data processing done in two steps: first stage analysis model that consists of eight variables, covering the three indicators of banking assets, loans, funds, and variable economic growth is economic growth, agriculture, electricity, industry and services. Second step in the analysis is the addition of dummy variables in the model so the model consists of nine variables. Testing phase of secondary data for eight variable VAR model and the nine variables is the same.

Equation Identification

The identification equation is obtained results with overidentified conditions. The condition is due to the amount of information held by exceeding the number of parameters to estimates of $(384-64) > 7$. The next step is to test the unit roots to determine the data stationary.

Unit Root Test

Tests performed on this part of the eight variables, assets, loans, funds, economic growth, agriculture, electricity, industry, and services. The results of the unit root test for the eight variables are included on Table 3 below.

Table 3. Unit Root Tests for 8 variables VAR Model

Variable	ADF Value, Level I(0)	Critical Value Mac Kinnon	Variable	ADF Value first difference I(1)
Vljgdp	-9.13983	1% = -3.51554	Dljgdp	-10.5622
Vaset	-2.10648	5% = -2.89862	Daset	-7.83093
Vkredit	1.213735	10% = -2.58661	Dkredit	-5.30707
Vdana	1.51198		Ddana	-6.29407
Vlstk	-3.14617		Dlstk	-10.82968
Vjasa	-2.14569		Djasa	-13.04782
Vtani	-2.15605		Dtani	-9.823905
Vindus	-6.35785		Dindus	-6.81385

Source: processed data

Analysis of Banking Indicator, Economic Growth, Agriculture, Industry, Electricity, and Services

Based on the above results it can be concluded that the variable rate of economic growth and industrial sector are stationary on a level, so that all variables are not stationary at the same degree, therefore, need to be differentiated. Results in Table 3 indicates that the variable is stationary significant at the same confidence level of 5%.

Lag Optimal Criteria

Maximum lags obtained are 6 which can be generated by a stable VAR system. Here in Table 4. results from Eviews processing data.

Table 4. Elections results of the Lag Optimal

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-299.272	NA	2.70E-08	8.112407	8.388415*	8.222713*
1	-190.841	188.3261	1.33e-08*	7.39056	10.15064	8.493622
2	-121.379	104.1938	1.96E-08	7.694179	12.93833	9.789995
3	-37.7244	105.6688	2.30E-08	7.624325	15.35255	10.7129

4	64.14829	104.5535*	2.15E-08	7.075045	17.28734	11.15637
5	157.8092	73.94286	3.87E-08	6.741862	19.43823	11.81594
6	282.2112	68.74845	6.88E-08	5.599705*	20.78014	11.66654

Source: processed data

Based on the results in Table 4 above, the obtained optimal lags are chosen based on minimum AIC criterion is 6 (six quarters). Eviews software recommends lags based on the lags of the asterisk are 6, 4, 1 and 0. The lag 0 can not be selected, because it can not be estimated, whereas 4 is a candidate lag by LR and the lag 1 by FPE.

Analysis of these lags levels shows an optimal effect caused by the variable assets, funds, loans, agriculture, industry and services in accordance with the economic growth rate lags obtained is six quarters or one and a half years. These results are not so different from the results conducted by Ang and McKibbing (2007) who obtained the level of inaction from the VAR model is one year. From the study of the theory, the level lags obtained by strengthening the economic growth theory that one of the main factors of economic growth is an aspect of the capital, covering all forms or types of new investment is invested in land, equipment and physical capital or human resources (Todaro, 2000).

Based on National Income Statements analysis (BPS, various editions), shows that the dominance of the industrial sector contribution to GDP has exceeded the agricultural sector. The following discussion of the results of economic growth in response to a shock of VAR model consisting eight variables.

Response of the Shock of 7 Variables to Economic Growth

1. Impulse Response Function

Economic growth response to the shocks of variable assets, loans, finance, agriculture, industry, electricity and services can be analyzed through one property ie. VAR impulse response functions. The results show that the shock of loans variables affects economic growth until the second quarter. Economic growth decreases after the second quarter until the fourth quarter, but after this period of economic growth moves up to the fifth quarter.

Especially with regard to third-party funds, an increase resulting in a lower economic growth in the second quarter, but in the next quarter turn directly cause of the increase of economic growth.

Shock of asset variable has not been influential in the first quarter, then those shocks in the second quarter resulting in a lower economic growth. Economic growth is moving up after the second quarter. These results support the research conducted by Levine, Loayza and Beck (2000), Kar and Pentecost (2000), Ingrid (2006), and Liang (2006) that the loans affect the economic growth.

The growth of the agricultural sector in the last 5 years prior to the periods shows that growth tends to slow down and since the late 90s this sector exceeded by

industrial sector. Performance improvements in this sector was mainly due to ban rice imports during the period before the harvest up to two months later according to Minister of Industry Decree No. 9/MPP/Kep/1/2004 on Imports of Rice (Bank Indonesia, 2004). The bank would have positive impact on farmers' efforts to obtain optimal results every time always harvest. Yields the optimal means of its domestic rice needs will be met and farmers will prosper through the sale of such rice. Images that show the response of economic growth to the shocks given to the three indicators of banking, agriculture, electricity, industry and services can be seen in Figure 2 below.

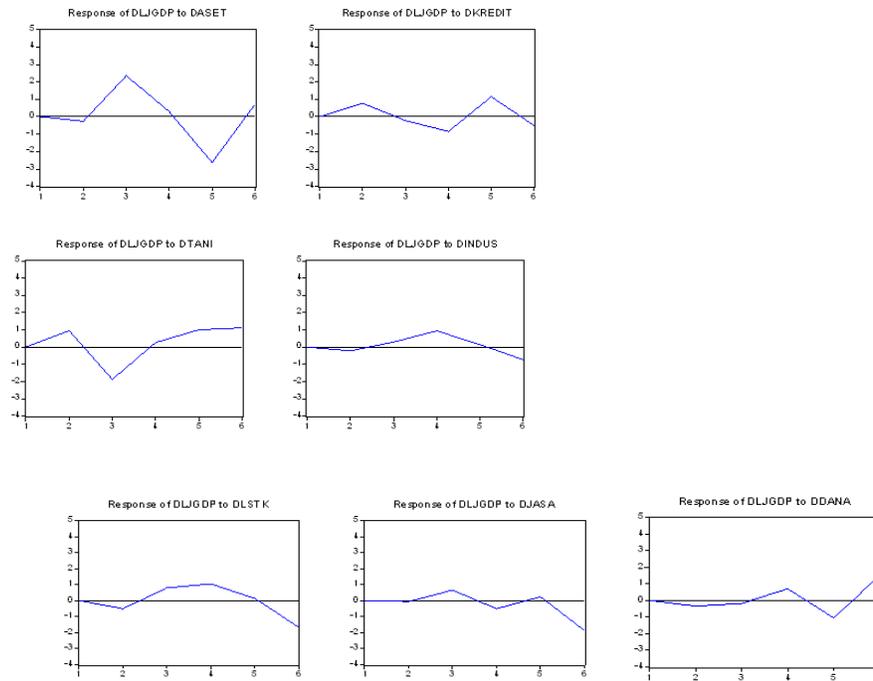


Figure 2. Economic Growth response to the shock of 6 variables
Source: processed data

As shown in Figure 2, It can generally be seen a positive response shown by the shock of the variables and credit services. The shock of service variable in the first quarter has not drive economic growth. Electricity sector showed an increase after the second quarter. Based on good economic reports from Bank Indonesia and BPS, various editions, the growth of the electricity sector due to the increased consumption of electricity to meet the needs of industry and households. Improving the quality of such services in the banking sector with the use of technology also gives the effect on increasing the productivity of the economy especially the services sector.

The shock of variable of industrial sector to economic growth is not drive the economic growth in the first quarter and second quarter as shown in Figure 2 above. This sector is not moving, among others, caused by various problems which still have to continue facing this sector. For example, the textile industry and textile

products, the obstacles are located on the engine condition, which generally has exceeded the economic life or is already obsolete. Another obstacle is the scarcity of raw materials, such as the pulp industry. In the subsequent period of economic growth has increased and peaked in the fourth quarter.

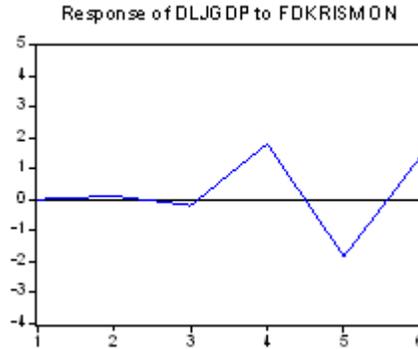


Figure 3. The Shock of Dummy Variable Monetary Crisis to Economic Growth

The economic crisis that hit Indonesia has brought the banking performance falls on the nadir point. The peak of the crisis that is revoked the business licenses of 16 banks that includes categories of insolvent (Bank Indonesia, 1998). The next process is the establishment of IBRA as one item in a series of Letter of Intent (LOI) between the Government of Indonesia and the IMF, with its first LOI was signed on 1 November 1997 (Hermana, 2007). The next IMF agreed to lend idle (stand-by credit) amounted to U.S. \$ 10 billion. Other assistance also came from the World Bank and ADB respectively U.S. \$ 4.5 billion and U.S. \$ 3.5 billion (Bank Indonesia, 1998). This is done to save the banks and the Indonesian economy.

The shock of monetary crisis dummy variable, as shown in Figure 3 shows that in the second quarter of economic growth do a little movement, and then tend to be decline in the third quarter.

2. Analysis of Variance Decomposition

Table 5 below shows the percentage contribution of the variant variable predictions of economic growth to changes in three indicators of banking credit, asset and fund third parties as well as four other economic variables. The length of the period of prediction is in accordance with the optimal lags obtained by the sixth quarter.

Table 5. Variance Decomposition of DLJGDP

Period	DLJGDP	DASET	DKREDIT	DDANA	DTANI	DINDUS	DLSTK	DJASA	FDKRISMON
1	100	0	0	0	0	0	0	0	0
2	92.83186	0.236686	2.147686	0.410454	3.221648	0.16611	0.92784	0.00884	0.048881
3	68.67305	14.23424	1.659333	0.369908	11.16051	0.344776	2.309319	1.127608	0.121246
4	58.70162	12.26898	2.944955	1.410837	9.613372	2.181467	4.307697	1.506529	7.064534
5	47.35419	20.08267	4.30082	2.812967	8.738279	1.64893	3.232501	1.213275	10.61637

6	39.21318	17.28277	3.899608	5.394029	8.87194	2.069915	6.33124	5.568948	11.36837
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Source: processed data

Based on Table 5 above, it is clear that economic growth in the first quarter can not be explained by all variables except economic growth itself. That is, the three indicators of banking assets, loans, funds and economic growth of four variables namely agriculture, industry, electricity and services have not provided the impact on economic growth. As previously explained that in the initial period, gathering the third party funding can not be directly disbursed by the bank in the form of credit. Awareness of the bank to strengthen its capital structure, lending a more restrained become empty because the percentage contribution of these three indicators of banking. Later in the second quarter, economic growth can be explained by the agricultural 3.22% and 2.147% by loans. In the 4th quarter, the contribution assets increased sharply in the quarter to 5, namely from 0.236% to 14.23%. The bank's assets which include a building that is the increasing number of branch offices indicate employment in addition to ease of access to the bank.

The contribution of power sector shows a fairly consistent increase from the third quarter until the fifth quarter. Services sector shows a fairly sharp increase in the sixth quarter of the observation period. This can be explained that, utilization of services, especially financial services to the people of Indonesia made progress in the subsector of business services and financial support services. Based on the above discussion, the results indicate that services sectors, loans and the third party funds affects economic growth in a relatively small percentage of contributions as shown in Table 5.

Concerned about the banking sector, it can be conclude that the banking sector affects economic growth but that role is relatively small. These result is come into align with Medyawati, Nopirin, Bambang Sutopo and Budi Hermana (2010). These results are confirmed by analysis of the data of the financial sector, real estate and business services sub-sector bank that the contribution never reached more than 5% of GDP.

CONCLUSION AND IMPLICATIONS

Analysis of the level lags (lag) obtained in the two VAR models demonstrate that the role of banks in the economic growth is relatively small. The main cause of this relatively small role, is the poor quality of the structure of the banking industry. The launching of the API in 2004 to measure the improvement of the quality of the banking structure became the main objective through the six pillars of the API into its work program.

The model in this study can be used to analyze the role of banks, agriculture, industry, electricity, and services sectors in the economic growth. As for the Indonesian banking, it is obligately that the role of banks as intermediary institutions in the economic growth required to be improved. The role of Central Bank of Indonesia is also required to be more active as an institution that can accelerate the recovery process of banking intermediation.

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