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The Relationship between Economic Growth and Financial Sector Development in Indonesia

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Abstract

What is the relationship between the finance sector development and economic growth? This paper is intended to analyze a fewer number of important financial factors using econometric analysis on some selected indicators of Indonesian financial sector during the period 1988 - 2013. This paper then tries to check whether the identified financial factors development cause economic growth or economic growth causes financial factors development. The Granger – Causality test shows that no financial factor significantly causes economic growth; rather economic growth causes the financial sector development during the period. In general, the financial sector of Indonesia is being unstably deepened with response to the demand of economic growth since 1988.

Keywords:
Finance – growth nexus
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1. Introduction

The relationship between the financial sector development and economic growth has been widely investigated for a while. There were few economists who believed finance cause growth until about 1990, when endogenous growth gained prominence. Joan Robinson in the early 1990s thought that finance followed growth. Until now, economists are deeply divided on the issue and disproportionate or unverified use of different statistical methods fuel it to continue. It is evident that Schumpeter (1911) was the first person who addressed the relationship between financial development and economic growth almost one hundred years ago. Broadly speaking, there are two sides of financial development – one is banking sector and another is stock market; where the banking sector development has more contribution than the stock market development in accelerating economic growth, especially for developing countries like Indonesia. Most empirical studies conclude that the financial development, together with a more efficient banking system, accelerates economic growth (Levine, 1997; Levinee, 2005; Wachtel, 2001). Levinee (2005) suggests that financial institutions and markets can foster economic growth through several channels. A meta-analysis of 67 empirical studies finds that financial development is robustly associated with economic growth. It is showed that there is long run relationship between banking sector development, remittances and economic growth in Fiji in Sami (2013). In addition causality analysis indicates causality from economic growth and remittances to banking sector development in Fiji. Ray (2013) checked whether financial development causes economic growth or vice versa. The Granger – causality test confirmed that financial development granger causes economic growth in India between time span of 1990 – 91 to 2010 – 11; where financial sector development is measured by ratio of gross domestic capital formation to GDP, ratio of gross domestic savings to GDP, etc. Saad (2014) found the presence of a positive relationship between financial development and economic growth of Lebanon in the short run (but insignificant in the long run) that is accompanied by bidirectional Granger causality between these variables. Shahbaz, Rehman, and Muzaffar (2015) revisited the relationship between

financial development and economic growth in Indonesia by incorporating trade openness in production function. Using quarter frequency data over the period of 1976 – 2012, they showed that development of financial sector along with trade openness and labour stimulates economic growth in Indonesia but capitalization impedes it.

There are some economists who have opposite opinions that finance – growth relationship is important; for example, Lucas Jr (1988), Chandavarkar (1992) etc. Patrick (1966) postulate a two way relationship (supply – leading and demand – following) between financial sector development and economic growth. The absence of adequate financial sector policies could have disastrous outcome, as illustrated by the global financial crisis. Financial sector development has heavy implication on economic development – both when it functions and malfunctions. Rachdi (2014) showed that these claims have an empirical backing and that the marginal effect of financial development on economic growth becomes negative when credit to the private sector reaches 100 percent (or some plus/minus 100 percent depending on other economic or financial factors) of GDP. In the 1980's and 1990's, several developed and developing countries liberalized their banking systems and witnessed many episodes of banking crises characterized by a huge decrease of the level of economic growth. To sum up, the direction of causality between financial system development and economic development is clearly very ambiguity. It is also possible to get a positive, negative, no association or negligible relationship between financial development and economic growth (Guryay, Safkli, & Tuzel, 2007).

The framework (developed by the World Bank's Global Development Database) identifies four sets of proxy variables characterizing a well – functioning financial system: financial depth, access, efficiency and stability. These four dimensions are then broken down for two major components in the financial sector, namely the financial institutions (mainly banking) and financial markets (mainly stock market). Since there are many indicators, importantly, private sector credit, stock market capitalization, number of listed companies, interest rate spread, turnover ratio and non-performing loan categorized in the four dimensions, so it is another big challenge to choose one or two important factors to measure the development of financial sectors.

To keep the study as simple as possible, most of the existing studies, especially with Indonesia have considered only one or two indicators or dimensions (individually) to explain the whole financial sector and then tried to find out their role in economic growth. But it is not enough to consider only one or two indicators for the whole sector. Although it is very difficult to explain the relationship, we should consider more indicators or dimensions of financial sectors because they have some interaction effects on economic growth and can give different results. To make this difficult job possible, factor analysis can be incorporated in the analysis of finance – growth nexus. Keeping the interaction effects in count, this factor analysis can be used to convert many original indicators (importantly, private sector credit, stock market capitalization, number of listed companies, interest rate spread, turnover ratio and non-performing loan) or dimensions into a few factors (one or two). Considering one important (determined by existing researches) indicator from each dimensions of each sectors, the objectives of this study regarding the finance – growth relationships of Indonesia are as follows: (1) Identifying the important factors, in a smaller number, those explain the development of financial sector of Indonesia the most by using a factor analysis, and (2) Determining the direction of causality (or the type of the relationship – whether demand following and supply - leading) between identified financial factor (s) and economic growth of Indonesia. As far we know, nobody implemented the same objectives especially in Indonesia.

The idea of this paper is gained from (Guo, 2017a). The method heavily depends on the approach in. However, Guo focuses on the relationship between development of the real estate sector and economic growth, and this paper focus on the relationship between the financial sector development and economic growth. The remaining part of the paper is organized as follows. In section 2, data source and variable are described. Appropriate research methodologies are presented in section 3 in detailed. Section 4 interprets and discuss about the results. Finally, conclusion is drawn on the basis of a rigorous summary in section 5.

2. Data and Variable Description

We extract the annual data from the World Development Indicators (of World Bank Database) on Indonesia, for the time period of 1988 – 2013.The study uses real per capita GDP growth as a measure of economic growth. Selected financial variables or indicators of the Indonesia financial sector are categorized under the four dimensions named financial depth, access, efficiency, and stability as follows. The ratio of domestic credit (% of GDP) to the private sector by Bank (DCPB) and the ratio of Market Capitalization to GDP (MC) belong to the dimension of financial depth .Financial access is measured by the number of listed companies per million people (NLC). Interest rate spread (Lending rate- deposit rate, %) (IRS) and the ratio of stock market turnover or value traded/capitalization (TOR), are used to measure the financial efficiency. Bank non-performing loan to total gross loans (NPLs) belong the dimension of financial stability. The selected variables are common in most of the existing studies.

3. Research Methodologies

3.1. Unit Root Test

Stationary in time series implies that its mean and variance are independent of time, if a series has a mean

and variance that changes overtime; and has a unit root. Non-stationary data can then be converted to stationary by differencing *k* times, it is said to be integrated of order *k*, denoted I(k); therefore a series that does not need to be differenced is donated by I(0). The stationary properties of the considered variables will be examined using (Dickey & Fuller, 1979) unit root tests. The Dickey–Fuller test tests the null hypothesis of whether a unit root is present in an autoregressive model. The alternative hypothesis is different depending on which version of the test is used, but is usually stationary or trend-stationary. A simple AR (1) model,

$$y_t = \rho y_{t-1} + u_t \qquad (1)$$

Where, y_t is the variable of interest, t is the time index, ρ is a coefficient and $u_t \sim i.i.d\ N(0,\sigma^2)$. If $\rho < 1$ the model is assumed to be stationary and the characteristic polynomial of the AR (1) process lies in the unit circle, otherwise it is non-stationary and the variance increases with time.
The regression model can be written as

$$\Delta y_t = (\rho - 1) y_{t-1} + u_t = \delta y_{t-1} + u_t \qquad (2)$$

Where, Δ is the first difference operator. In this model, the null hypothesis is that $\delta = 0$; that is, there is a unit root – the time series is non-stationary. The alternative hypothesis is that $\delta < 0$; that is the time series is stationary. Being ensured stationarity of the considered variables is mandatory for the following factor analysis and Granger – Causality test.

3.2. Johansen Cointegration Test

The Johansen test is a test for cointegration that allows for more than one cointegrating relationship. This test is subject to asymptotic properties, i.e. larges samples. If the sample size is too small then the results will not be reliable and one should use Auto Regressive Distributed Lags (Pesaran, Shin, & Smith, 2001). If the variables are found to be integrated of same order then a test for cointegration can be done to check the existence of a long run relationship. Times series variables are considered to be cointegrated if they have a linear relationship and both are integrated of the same order.

3.3. Factor Analysis

Since a financial sector has many indicators categorized in different dimensions and they are correlated in different factors, so it is not enough to consider indicators separately to explain the development of that financial sector and then its marginal effects on economic growth. In this regard, Factor Analysis can be used to find a fewer number of important factors, necessarily less than the number of original indicators to explain the development of financial sector well. Here, one importance of Factor analysis on the considered indicators of financial sector is that it gives a fewer number of factors combining all indicators in each factor. Overall, it creates an opportunity to explain the financial sector with a fewer number of factors and understand the finance – growth nexus relatively well.

The explorative factor analysis for this study is summarized as follows. Much like the cluster analysis grouping similar cases, the factor analysis groups similar variables into dimensions. This process is also called identifying latent variables. Since factor analysis is an explorative analysis it does not distinguish between independent and dependent variables.
The factor analysis equation can be written in matrix form:

$$Z = \lambda F + \varepsilon \qquad (3)$$

where Z is a $p \times 1$ vector of financial indicators or variables, λ is a $p \times m$ matrix of factor loadings; F is an $m \times 1$ vector of factors and ε is a $p \times 1$ vector of error or residual factors. Because of differences in the units of variables used in factor analysis, the variables were standardized and a correlation matrix of variables was used to obtain eigenvalues. Then number of important factors is determined based on the values of eigenvalues or Scree plot. Factors loadings can be estimated different methods like principal component and maximum likelihood methods. This study uses the principal component method. In order to facilitate interpretation of factor loadings (L_{ik}), *VARIMAX* rotation can be used. Factor coefficients (C_{ik}) are used to obtain factor scores for selected factors using regression method. After obtaining factor scores for the determined each factor, the following Granger Causality test will be used to understand the directional relationship between financial factors and economic growth of Indonesia.

3.4. The Granger Causality Test

The Granger causality has been widely used in testing for causality. For example, the traditional Granger

test for testing causality between Factor 1 and economic growth (GDP) can be represented as follows:

$$GDP_t = \sum_{i=1}^{n} \beta_i Factor1_{t-1} + \sum_{i=1}^{n} \lambda_i GDP_{t-1} + \delta_t \quad (4)$$

$$Factor1_t = \sum_{i=1}^{n} \mu_i Factor1_{t-1} + \sum_{i=1}^{n} \theta_i GDP_{t-1} + \varepsilon_t \quad (5)$$

where δ_t and ε_t are uncorrelated. The test involves testing the null hypothesis that there is no Granger causality and any of the following conditions may prevail:

- If estimated coefficients on lagged Factor 1 are statistically different from zero, i.e $\sum \beta_i \neq 0$ and set of coefficients on lagged GDP is not statistically different form zero, i.e. $\sum \theta_i = 0$, then there is unidirectional causality from, Factor 1→ GDP
- If lagged GDP coefficients are statistically different from zero, i.e. $\sum \theta_i \neq 0$ and set of lagged Factor 1 coefficients are not statistically different from zero, i.e. $\sum \beta_i = 0$. This implies unidirectional causality from GDP → Factor 1.
- If both estimated coefficients on lagged Factor 1 and lagged GDP coefficients are statistically different from zero, i.e. $\sum \beta_i \neq 0$ and $\sum \theta_i \neq 0$, then there is bilateral causality or Feedback, GDP↔ Factor 1
- Finally independence is implied when sets of GDP and Factor 1 coefficients are not statistically significant in both equations, i.e. $\sum \theta_i = 0$ and $\sum \beta_i = 0$.

To test the hypothesis, the Granger causality uses the simple F-test statistic, which follows the F Distribution with m and (n-k) degrees of freedom, where m is the number of lagged Factor 1 terms and k is estimated parameters in the unrestricted regression (number). Therefore the null hypothesis is rejected if computed F value exceeds critical F value at a certain level of confidence; i.e. Factor 1 causes GDP. The process is the same for the causal relationship between Factor 2 and GDP growth.

4. Result and Discussion

All variables are expressed in standardized values because they were with different units. Abbreviated names of the original variables are then changed to ZGDPG, ZDCPB, ZIRS, ZNPLs, ZMC, ZNLC and ZTOR, respectively. To examine stationarity of the used variables in this study, the Dickey-Fuller (DF) test is used to test for unit root. Table 1 reports that the variables are not stationary at 1% or 5% or 10% level of significance by using DF tests for the standardized variables.

Table-1. Unit Root (Dickey Fuller) Test Results of Standardized data.

Variables	Test Statistic
ZGDPG	-2.429
ZDCPB	0.070
ZIRS	-0.792
ZNPLs	-0.077
ZMC	-1.569
ZNLC	-2.426
ZTOR	-1.753

***/**/* indicates stationary at 1%/ 5%/ 10% respectively.

To make all the variables stationary, first difference is used for each series or variable. Then DF test results are given in Table 2. Table 2 ensures that all the variables become stationary after first differencing.

Table-2. Unit Root (Dickey Fuller) Test Results of Difference Standardized data.

Variables	Test Statistics
DZGDPG	-8.657***
DZDCPB	-3.696 ***
DZIRS	-2.863**
DZNPLs	-2.835*
DZMC	-5.469***
DZNLC	-4.717***
DZTOR	-3.890***

***/**/* indicates stationary at 1%/ 5%/ 10% respectively.

Table-3. Johansen Cointegration test.

Trend: constant					Number of obs: 23	
Sample: 1991 - 2013					Lags: 2	
Maximum				trace statistic	5% critical value	1% critical value
rank	parms	LL	eigenvalue			
0	55	-58		290	124.2	133.6
1	68	21	0.99	128	94.1	103.2
2	81	46	0.86	79	68.5	76.1
3	88	60	0.75	43	47.2	54.5
4	95	74	0.62	21	29.7	35.6
5	100	82	0.47	9	15.4	20.1

From the results of Table 3 it is seen that three cointegrating equations are significant at 1% level of significance, though four equations are not significant at all. Since several equations are represented as significant, the variables are cointegrated and they have a long run relationship.

Table-4. Principal Component Analysis.

component	eigenvalue	difference	proportion	cumulative
comp1	2.22	1.05	0.37	0.37
comp2	1.17	0.25	0.19	0.56
comp3	0.91	0.17	0.15	0.71
comp4	0.75	0.06	0.12	0.83
comp5	0.69	0.04	0.11	0.94
comp6	0.28		0.06	1

The Table 4 reports the total explained variance of the factor model using principal component method. The table also includes the eigenvalues of each factor. The eigenvalue is the sum of the squared factor loadings for each factor. STATA extracts all factors that have an eigenvalue greater than 0.1. In our case the analysis extracts two factors. This table finally shows us the total explained proportional and cumulative variance for each factors. The model explains about 57% of the total variance with these two factors.

The Table 5 and Table 6 respectively show the *factor loading matrix* and the *rotated factor loading matrix*. These tables are the key to interpreting the two factors and assigning a name for each of them. The factor loadings that are shown in these tables are the correlation coefficients between variable and factors. If a factor loading is less than 0.5, then the corresponding variable will be kept out and the remaining variables will form a factor. These remaining variables play dominating roles to give a name for the identified factor.

Table-5. Factor Loading.

variable	factor1	factor2	uniqueness
DZDCPB	-0.65	0.11	0.53
DZIRS	0.24	0.56	0.51
DZNPLS	0.45	-0.61	0.43
DZMC	-0.63	0.34	0.41
DZNLC	0.81	0.18	0.31
DZTOR	0.54	0.45	0.45

Table-6. Rotated Factor Loading.

variable	factor1	factor2	uniqueness
DZDCPB	0.59		0.53
DZIRS		0.67	0.51
DZNPLS	-73		0.43
DZMC	0.78		0.41
DZNLC		0.64	0.31
DZTOR		0.75	0.45

(blanks represent abs(loading)<0.55).

In Table 6 the rotated factor loadings indicate that the DCPB, NPLs and MC load highly on the first factor, forming a "Depth/Stability" dimension. While NLC, TOR and IRS load highly on the second factor, forming a "Efficiency/Accessible" dimension.

Finally Table 7 reports results of the relationship between two identified financial factor and GDP growth of Indonesia; where, the first factor, "Depth/Stability" significantly causes second factor "Efficiency/Accessible" and vice-versa. That is, there exist two way relationships between "Depth/Stability" factor and "Efficiency/ Accessible" factor. Although Gross domestic product per capita growth rate (GDPG) causes first factor "Depth/Stability", it doesn't cause the second factor "Efficiency/Accessible" during the time period of 1988 – 2013 in Indonesia.

Table-7. Granger Causality Test.

Equation	Excluded	chi2	df	Prob > chi2
DZGDPG	f1	0.92	2	0.63
DZGDPG	f2	3.14	2	0.21
DZGDPG	all	4.12	4	0.39
f1	DZGDPG	10.74	2	0.01
f1	f2	10.71	2	0.01
f1	all	26.12	4	0
f2	DZGDPG	3.14	2	0.21
f2	f1	8.73	2	0.01
f2	all	11.42	4	0.02

5. Summary and Conclusion

Schumpeter (1911) first addressed the relationship between financial development (broadly, banks and stock markets) and economic growth almost a hundred years ago. Since then it has been the most concerned phenomenon in the area of financial economics (that is, at the nexus point of financial development and economic growth) and a lot of researchers contributed to the area. Unfortunately, there is no consensus on the pattern of the relationship based on empirical evidences. The patterns (both magnitude and direction) of the relationship differ from one time-period/country/region to another and they may be caused by different environmental, political, social and economic events.

Empirical evidences suggest that the relationship can be any of the following types: significant or insignificant, positive or negative, demand – following or supply – leading etc. Another problem is that there are many indicators (importantly, private sector credit, stock market capitalization, number of listed companies, interest rate spread, turnover ratio and non-performing loan) categorized in different dimensions (depth, access/use, efficiency and stability) to measure the development of financial sectors, mainly, banking and stock market. Most of the existing studies, especially with Indonesia have considered only one or two indicators or dimensions (individually) to explain the whole financial sector and then tried to find out their role in economic growth. But it is not enough to consider only one or two indicators for the whole sector. So it is important to consider many important indicators and dimensions to explain the development of financial sector and then understand the finance – growth nexus well. Here, factor analysis can be used to convert many original indicators (importantly, private sector credit, stock market capitalization, number of listed companies, interest rate spread, turnover ratio and non-performing loan) or dimensions into a few factors (one or two) along with keeping the interaction effects among different financial indicators or dimensions in count. That is, the identified factors combine all the considered original indicators with their each other interaction effects.

To understand the nexus, this paper is intended to find a fewer number of important factors (where the factors' number is necessarily less than the number of original indicators) using Factor Analysis on some selected indicators of Indonesia financial sector. This paper then tries to check whether the identified financial factors cause economic growth or economic growth causes financial factors using the Granger – Causality test. The data are extracted from the World Development Indicators of World Bank Database from 1988 – 2013.

All the variables are standardized to unit free the data. Dickey-Fuller test is used to check the stationarity of all variables. Test results suggest that all the variables are integrated with the same order 1(one) to become stationary. Results of Factor Analysis show that financial indicators under the dimensions, depth and stability form Factor 1, and the indicators under the dimensions, use/access and efficiency form Factor 2. Granger – Causality test shows that the first factor, "Depth/Stability" significantly causes second factor "Efficiency/Accessible" and vice-versa. That is, there exist two way relationships between "Depth/Stability" factor and "Efficiency/Accessible" factor. Financial sector development (both Factor 1 and Factor 2) do not significantly causes per capita GDP growth. That is, the supply – leading relationship between finance and growth is not working in Indonesia during 1988-2013, which means a significant amount of capital is not accumulated for investment in generating goods and services. Reversely, GDP growth significantly causes only the first factor "Depth/Stability" in Indonesia during the time period. Hence the demand following relationship between finance and growth is true here in Indonesia during the specified period that the financial sector is being developed with response to GDP growth. But the previous works with Indonesia, covering the same period, especially by Yusuf, Sumner, and Rum (2014) showed the relationship was supply – leading, which is opposite to the result of this study. In the previous study, indicators of financial sector development were individually considered with GDP growth or interaction effects of them did not take into account whereas this study (current) takes the interaction effects into account using factor analysis. Since the results of factor analysis prove the existence of these interaction effects and that is also justified by experiences of Indonesia economy during that period, so this (current) study and its results are reasonably accepted. So Economist John Robinson seems to be right for Indonesia that finance (though "Depth/Stability" factor only) follows growth. In summary, on average, financial sector of Indonesia is being unstably deepened with response to the demand of economic growth since 1988.

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