THE CONTRIBUTION OF FOREIGN AND DOMESTIC FUNDING ON ECONOMIC GROWTH OF FISHERY SECTOR: THE CASE OF INDONESIA

Muhammad Fadli Hanafi
Faculty of Economics
University of Indonesia

Fadli Umam
Faculty of Economics
University of Indonesia

Ijmal Hanandra Purba
Faculty of Economics
University of Indonesia

Abstract

Indonesia is a maritime country consisting of 75% sea from the total area of the territory with coastline reaching 8,069.8 mil supported by huge economic potential within Exclusive Economic Zone by 12 mil. The following variables employed in the research are FDI, DDI, Loan, State Expenditure, and Labor in fishery sector. It employs panel data using Generalized Method of Moment estimation technique where the result expresses that FDI and labor perform a positive and significant role on economic growth in fishery sector. 1% increase of FDI will increase growth of fishery sector by 0.08% with 99% level of confidence. Moreover, 1% increase of labor in fishery sector will promote better economic performance in fishery sector by 1.02% with 99% level of confidence. Furthermore, bidirectional relationship is also employed using Granger Test-Vector Error Correction Model (VECM). The result shows that both loan and State Expenditure perform bidirectional relationship in fishery sector.

JEL Classifications : B22, C33, E22, F43, O13, Q22
Keywords : Maritime, Fishery, Growth, Data Panel, sys GMM, Granger, VECM

I. Background

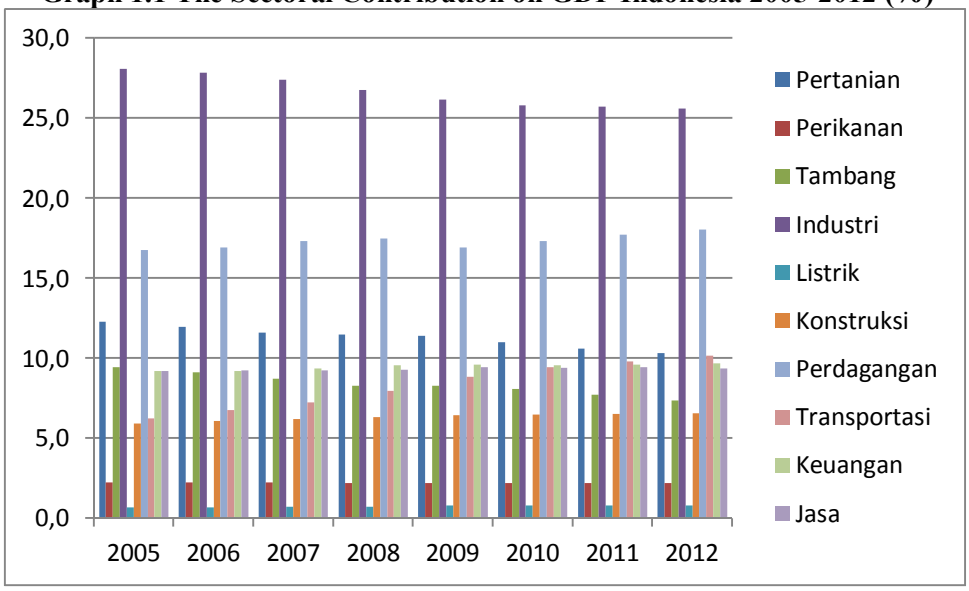
Since many decades, Indonesia has been widely known as a maritime state represented by the victorious ancient empires in the time. It has been started since the establishment o Sriwijaya empire in South Sumatera in 671 a.d counting on maritime hegemony to expand the Malaka and Sunda straits as the world strategic trading route at that moment (Sumasni and Fitrianto, 2013). Subsequently, it is continued by the glorious Majapahit empire counting on the maritime power (Sondakh, 2009) and Gowa-Tallo Makassar with the great maritime power that was able to conquer the whole central and eastern part of Indonesia (Zuraya, 2011).

Indonesia, with the stable 6% economic growth, is the 16th largest world economy and the 4th is Asia (Oppenheimer Asset Management Investment Strategy and World Bank, 2013). Various sectors have been contributing significantly in boosting the economic growth of Indonesia. If we refer to the composition, Indonesia is a state with wider maritime area and it has been declared in 13 December 1957 by Djuanda Kartawidjaya and further known as Djuanda declaration in 13 December 1957.

The Ministry of Fishery has been doing a hard to optimize the role of maritime sector to create more prosperity. Nevertheless, it did not perform good progress as maritime development has remained *periphery* for the last few decades. It makes maritime not to be the priority of national development. It is very contradictive as Indonesia is strategically located between Pacific and Indian Ocean as the most economically and politically dynamic region (Kusumastanto, 2002).

Indonesia would have potential income by USD 156 billion if the maritime sector was maximally optimized. Nevertheless, the contribution of maritime sector on GDP of Indonesia remained extremely small (compared to the huge potential of Indonesia maritime sector) by 20.06% where the 49.78% is the contribution from oil and gas containing in the bowels of the earth. Entering 2005, the contribution of maritime sector was just 22.42% of GDP Indonesia, where the contribution of sub sector of marine products was just 3.1% with growth trend by 2.75% until 2010 annually.

Graph 1.1 The Sectoral Contribution on GDP Indonesia 2005-2012 (%)



Source: Bank Indonesia 2013

The raising questions are, *the first*, how could the fishery's contribution remain so small where Indonesia is a maritime country? And *the second*, how to optimize the role of fishery sector on GDP growth of Indonesia? All the answers will be explained in details in this paper.

2. Theory and Literature

2.1 Economic Growth

In measuring both sectoral and aggregate growth, the economists use Gross Domestic Product (GDP) generally dividing state total income with the total population or widely known as GDP per Capita. In Solow growth theory, there are four determinants of growth, they are capital accumulation, population growth, technology, and capital depreciation. The theory has developed into Augmented Solow Growth Model including the aspect of human capital (Mankiw, Romer, and Weil, 1992).

Solow model use the capital accumulation, population growth, and technology as exogenous. There are two inputs, per capita input and labor. It is assumed that the Cobb-Douglas function as follow:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha} \quad (2.1)$$

Where Y is the output, K is the capital, L is labor, and A is technology. L and A are assumed to grow exogenously in level n and g.

$$L_t = L(0)e^{nt} \quad (2.2)$$

$$A_t = A(0)e^{nt} \quad (2.3)$$

The effective number of labor $A_t L_t$ grows on the level $n + g$

The model assumes that constant fraction of output, s, is invested. Furthermore, k is the capital per effective labor, $k = K/AL$, and y is the level of output per effective labor, $y = Y/AL$, so k can be explained as follow:

$$\dot{k}_t = sy_t - (n + g + \delta)k_t \quad (2.4)$$

$$= sk_t^{\alpha} - (n + g + \delta)k_t \quad (2.5)$$

Where δ is depreciation rate. Equation 2.5 implies that k concentrates the value of *steady state* k^* explained by $sk^{*\propto} = (n + g + \delta)k^*$

$$k^* = [\frac{s}{n+g+\delta}]^{1/(1-\alpha)} \quad (2.6)$$

The ratio of capital-labor of *steady state* is positively related on the level of savings and negative on the population growth level.

The primary analysis of Solow model focuses on the impact of savings and the population growth on real income. By substituting equation 2.6 into production function using log, we will get the steady state per capita as follow:

$$\ln\left[\frac{Y_t}{L_t}\right] = lnA(0) + gt + \frac{\alpha}{(1-\alpha)}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n + g + \delta) \quad (2.7)$$

As the model assumes that those factors lead to the marginal products, thus it would not only discuss direction, but also the magnitude of the coefficient of savings and population growth. In details, as the size of capital on income ($\propto$) is about two-third, thus the model implies the existing elasticity of per capita income on savings by 0.5 and elasticity of $n + g + \delta$ by -0.5. It is assume that $g + \delta$ is 0.05, which is the change of measurable depreciation.

2.2 Literature Review

As a state indicated to be maritime country, Indonesia should have optimized the effort to maximize the potential output of maritime sector. There have been several problems regarding capital accumulation, labor, and technology. From the capital side, we can analyze FDI, DDI, loan, and other lending resources. Some of the prior literatures showed that FDI perform a positive and significant impact in growth in any sectors, just like what Anwar and Nguyen (2010) found in the case of Vietnam. What interesting is that the government of Vietnam gives a high support on small medium enterprises. With the coast line length by 3,260 km, Vietnam has been successful to attract foreign investment up to USD 310 million. Besides, FDI also played strategic role on China's economy especially in agriculture and fishery by 52.49% in 2008 (Jianming and Ichihashi, 2011). High global interest of investing in China was led by high production of marine sector and high domestic demand. China implement the policy of captive market (making domestic demand as a protection for fishery and agriculture sector) and was proven to be successful in stimulating their production (Saparini, 2011).

Nevertheless, the role of FDI in some other countries performed a bit different result. Alfaro (2003) examined the negative impact of FDI on growth of the primary sectors

(agriculture, gardening, forestry, and fishery), while it tended to be positive on manufacture. He employed *cross section* data taken from some regionals such as Asia Pacific, Africa, Latin America, and Caribbean Island. These findings describe sort of misallocation of FDI on less-productive sectors on those countries/regionals. However, Khaliq and Noy (2007) found that FDI performed positive impact on all sectors except mining using OLS estimation technique.

Moreover, loan facilities also play important role in promoting better economic growth in all sectors. Cappiello, Kadareja, Saensen, and Patropapa (2010) found that loan performed significant effect on growth in Austria, Belgium, Greek, Ireland, Italy, Netherland, Portugal, and Spain using OLS estimation technique. Interestingly, there ware different findings from Oluitan (2010) in the case of Nigeria where loan performed no significant effect on growth using OLS and VECM estimation technique. These various findings indicated different loan optimization in each countries.

State budget also played strategic role in promoting growth in real sector, including fishery. Alexiou (2009) found that government expenditure performed positive and significant impact on the growth. He observed the trend happening in some South Eastern Europe (SEE) using Generalized Least Square. Nevertheless, different result was found by Davarajan, Swaroop, and Zou (1996) observing 43 developing countries within 20 years observation period using OLS estimation technique. The result showed that each component of government expenditure performed significant and negative effect on growth. It was led by budget misallocation in developing states. It will be benchmark to Indonesia to identify whether misallocation occurred from fishery sector to other ones that were less-productive.

Besides capital, human capital also plays important role in fishery sector. Seren (2001) found that human capital performed positive and significant role on maritime sector in some countries. The finding has been confirmed by Betyak (2012) discussing determinant of economic performance using OLS estimation technique observing Portugal, Italia, Ireland, and Spain. He found that human capital performed positive and significant effect on growth in the long-term.

3. Methodology

3.1 Model

The research estimates long term relationship between capital (FDI, DDI, Loan, and Government Expenditure) and human capital on growth of fishery sector using panel regression to produce accurate output (Greene, 2010). Besides, it is urgent to examine bidirectional relationship between dependent and independent variables using granger causality. The following model is:

$$y_{it} = \beta_{01} + \beta_i m_{it} + u_{it} \quad (3.1)$$

Where y_{it} is dependent variables which is economic growth in the respective sectors proxied by sectoral GDP, m_{it} is the sequence of independent variables including Foreign Direct Investment proxied by log of the proportion of FDI to GDP, Domestic Direct Investment proxied by log of the proportion of DDI to GDP, loan proxied by log of the proportion of loan to GDP, government expenditure proxied by log of government expenditure to GDP, and human capital proxied by log fisherman. Meanwhle, u_{it} is the error term which is anything beyond the model that is believed to have impact on growth.

3.2 Data

Referring to Solow growth theory, some of the variables that have been chosen followed the prior literatures. The theory mentioned that determinant of economic growth are long term capital, labor, and technology innovation (including education of labor). The following variables are available in the table below.

Table 3.1. Variables and Data

Variables	Name	Unit	Source
Dependent	ln (GDP/Labor)	Percentage (%)	- Bank Indonesia - Central Bureau of Statistics
Independent	ln (FDI/GDP)	Percentage (%)	- BKPM - Bank Indonesia
	ln (DDI/GDP)	Percentage (%)	- BKPM - Bank Indonesia
	ln (Kredit/GDP)	Percentage (%)	- Ministry of Fishery - Central Bureau of Statistics - Bank Indonesia
	ln (APBN/GDP)	Percentage (%)	- Ministry of Finance
	ln (labor/GDP)	Percentage (%)	- Ministry of Fishery - Central Bureau of Statistics - Bank Indonesia

Besides using secondary data, the research is equipped with some information obtained from the interview with the related institutions. The result will be confronted to the empirical findings output.

Table 3.2. Information Access

Institution	Sources	Methodology	Topics
Ministry of Fishery	Public Relation	Interview and Data Statistics	General Policies of Blue Economy
	Data and Information Centre	Interview	Fishermen Prosperity and Blue Economy Potentials
	Directorate	Interview	The Role of FDI and Loan on Blue Economy
Ministry of Industry		Narrative Information	The Progress of Industry Related to Blue Economy
Ministry of Small Medium Enterprises		Narrative Information	The Progress of Small Medium Enterprises Related to Blue Economy
Bappenas		Narrative Information	Middle Term National Development Plans
Ministry of Trade		Data Statistics	Export and Import of Fishery Product
Fisherman Village BNI Muara Angke		Interview	Information of Human Resources of Fishery Sector

3.3. Data Panel Estimation

Data panel is the sequence of multiple observations on every sample unit (Baltagi, 2006). Data panel is longitudinal data (Hsiao, 2003). In other words, we are able to explain in details that data panel consists of more than two observations in many units. Data panel becomes very popular to use in the social and behavioral research. Data panel is a repeating measurement on one or more variables on more than one objects *cross section time series* (Bruderl, 2005). Compared to the two other types of data (cross section and time series), data panel is able to minimize the possibility of heteroscedasticity in each variables, providing complete data with lower collinearity, higher degree of freedom, match with dynamic adjustment, and be reliable to identify and measure both individuals and *time effect* which cannot be done by time series and cross section. Data panel is also able to overcome any unobservable heterogeneity in cross section (Wooldrodge, 2001).

Hurlin (2010) describe the terminology and notation of data panel as y_{it} through cross-section that can be countries, regions, consumers, individuals, and it has double index which is i as the cross section and t as time series

$$y_{it} = \propto + \beta' x_{it} + \rho' z_{it} + \varepsilon_{it} \quad (3.3)$$

Where x_{it} and z_{it} are exogenous variables $k_1 \times 1$ and $k_2 \times 1$. $\propto$ is constant, β and ρ are parameter vectors $k_1 \times 1$ and $k_2 \times 1$. ε_{it} is $i.i.d$ on i and t, with $v(\varepsilon_{it}) = \sigma_\varepsilon^2$. It is noted that z_{it} is not correlated with x_{it} (Baltagi and Kao, 2000). The estimation technique of data panel is divided into three types which are Ordinary Least Sqaure (OLS), Maximum Likelihood (ML), and Generalized Method of Moment (GMM).

4. Result and Analysis

As discussed earlier, the result and analysis will be provided in this section. The analysis of long-term impact is analyzed using System Generalized Method of Moment (Sys. GMM) to overcome the problem of relatively short observation and OLS estimation technique will be provided as a comparison. Descriptive statistics is available below:

Table 4.1 Descriptive Statistics

Variabel	Obs	Mean	Std. Dev.	Min	Max	Note
ln(gdp/labor)	320	14.1141	0.9869	11.5725	15.5785	No Interpolation
ln(fdi/gdp)	320	-1.2407	1.5184	-4.4950	1.7876	Interpolated Quadratic Match Sum Eviews 7
ln(ddi/gdp)	320	-1.3032	1.3982	-5.2096	2.5727	Interpolated Quadratic Match Sum Eviews 7
ln(kredit/gdp)	320	0.6435	2.5484	-7.0567	3.6204	No Interpolation
ln(apbn/gdp)	320	-22.9692	1.8737	-26.7361	-18.9779	Interpolated Quadratic Match Sum Eviews 7
ln(labor)	320	11.0532	2.0843	6.5209	13.9050	Interpolated Quadratic Match Sum Eviews 7
dummy	320	0.2500	0.4337	0.0000	1.0000	No Interpolation

Source: STATA 12 Output

The long-term influence analysis uses quarterly data from 2005 to 2012 using STATA 12. Nevertheless, some variables such as FDI, DDI, Government Expenditure, and labor is available annually, thus it needs to be interpolated using Quadratic Match Sum (Eviews-7). Data of sectoral GDP, FDI, DDI, loan, and government expenditure are constant price 2000.

The primary requirement of any variables estimated is to be free from classical assumptions such as multicollinearity, heteroscedasticity, and autocorrelation. In panel regression analysis, multicollinearity test is to observe any relationships among independent variables identified from Variation Inflation Factor (VIF) . if VIF > 10 or *tolerance* 1/VIF < 0.01, then it identifies the existence of multicollinearity, and it is prohibited to happen in a model. Furthermore, variables in a model cannot be heteroscedastic and auto-correlated.

Table 4.2. Multicollinearity test

Variabel	**VIF**	**1/VIF**
ln(fdi/gdp)	2.38	0.41975
ln(ddi/gdp)	3.93	0.25432
ln(kredit/gdp)	3.01	0.33242
ln(apbn/gdp)	66.9	0.01495
ln(labor)	79.21	0.01263
dummy	1.36	0.73791
Mean VIF	26.13	

Source: STATA 12 Output

According to the above table, the overall tolerance value of 1/VIF which is more than 0.01 indicates no multicollinearity from the chosen variables. Besides, no autocorrelations among variables observed as shown by the probability value F is higher than $\propto$ (0.05) indicating that it rejects null hypothesis. Nevertheless, the chosen variables contain heteroscedastic assumption as

the chi square probability value is smaller than $\propto$ which indicates rejection on null hypothesis (homoscedastic). However, the problems can be overcome using the Generalized Method of Moment estimation technique.

The long-term analysis utilizes the Generalized Method of Moment (Sys. GMM). It has more benefits compared to other estimation technique. In general Sys. GMM developed by Holtz-Eakin, Newey, and Rosen (1998, Econometrica 56: 1371-1395); Arellani and Bond (1991, Review of Economic Studies 58: 277-297); Arellano and Bover (1995, Journal of Econometrics 68: 29-51); and Blundell and Bond (1998, Journal of Econometrics 87: 115-143) becomes very popular for economists and social researchers. It is able to provide accurate output with the characteristics of small time series and large samples in data panel as well as able to overcome the classic assumption problems (multicoliinearity, heteroscedastic, and autocorrelation)

Model 1

$$\ln\left(\frac{gdp}{labor}\right)_{it} = ln\left(\frac{fdi}{gdp}\right)_{it} + ln\left(\frac{ddi}{gdp}\right)_{it} + ln\left(\frac{kredit}{gdp}\right)_{it} + ln\left(\frac{apbn}{gdp}\right)_{it} + ln(labor)_{it} + \varepsilon_{it} \quad (3.4)$$

Model 2

$$\ln\left(\frac{gdp}{labor}\right)_{it} = ln\left(\frac{fdi}{gdp}\right)_{it} + ln\left(\frac{fdi1}{gdp}\right)_{it} + ln\left(\frac{ddi}{gdp}\right)_{it} + ln\left(\frac{ddi1}{gdp}\right)_{it} + ln\left(\frac{kredit}{gdp}\right)_{it} + ln\left(\frac{kredit1}{gdp}\right)_{it} + ln\left(\frac{apbn}{gdp}\right)_{it} + ln\left(\frac{apbn1}{gdp}\right)_{it} + ln(labor)_{it} + \varepsilon_{it} \quad (3.5)$$

Where $\ln\left(\frac{gdp}{labor}\right)_{it}$ is the natural logarithm of gross domestic product per capita, $ln\left(\frac{fdi}{gdp}\right)_{it}$ is the proportion of natural logarithm of foreign direct investment to GDP, $ln\left(\frac{ddi}{gdp}\right)_{it}$ is the natural logarithm of the proportion of domestic direct investment to GDP, $ln\left(\frac{kredit}{gdp}\right)_{it}$ is the natural logarithm of the proportion of loan to GDP, $ln\left(\frac{apbn}{gdp}\right)_{it}$ is the natural logarithm of the proportion of government expenditure to GDP, and $ln(labor)_{it}$ is the natural logarithm of labor in the respective real sectors. Variables followed by 1 represents variables with one year lag behind.

Table 4.3. Panel Regression Model 1

Variables	**Model 1**							
	PLS		**FE**		**RE**		**GMM**	
ln(fdi/gdp)	0.0524	***	-0.0311	***	-0.0292	***	0.0521	***
ln(fdi1/gdp)								
ln(ddi/gdp)	-0.2494	***	0.0135		0.0040		-0.2458	***
ln(ddi1/gdp)								
ln(kredit/gdp)	0.0294	*	0.1330	***	0.1428	***	0.0331	***
ln(kredit1/gdp)								
ln(apbn/gdp)	-0.0846	***	0.1103	***	0.0735	***	-0.0897	***
ln(apbn1/gdp)								
ln(labor)	0.3007	***	0.0460	***	0.0606	***	0.2915	***
dummy	-0.0937	*	-0.0050		-0.0059		-0.0751	***

_constant	8.5955	***	16.0417	***	15.0110	***	8.5772	***
Prob F	0.0000		0.0000					
F Stat	257.83		38.88					
Prob Chi2					0.0000		0.0000	
Wald Chi2					201.19		34854.96	
Obs	317		317		317		317	
Groups			10		10		10	
R-sq	0.8331							
: within			0.4366		0.4291			
: between			0.0256		0.1015			
: overall			0.0279		0.1043			
Adj R-sq	0.8298							
Corr (u_1, Xb)			-0.2908		0.0000			
Parameter								
Moments								
Initial Weight Matrix								
Weight Matrix								
Sargan Test Prob							0.0000	

Source: STATA 12 Output

Table 4.4. Panel Regression Model 2

Variables	**Model 2**							
	PLS		**FE**		**RE**		**GMM**	
ln(fdi/gdp)	0.0251		-0.0209	**	0.0251		**0.0284**	***
ln(fdi1/gdp)	0.0330		-0.0066		0.0330		**0.0308**	***
ln(ddi/gdp)	-0.1947	***	0.0191		-0.1947	***	**-0.1943**	***
ln(ddi1/gdp)	-0.0808	**	-0.0192	*	-0.0808	**	**-0.0863**	***
ln(kredit/gdp)	-0.0040		0.1407	***	-0.0040		**0.0055**	
ln(kredit1/gdp)	0.0399	**	-0.0136	***	0.0399	**	**0.0373**	***
ln(apbn/gdp)	-0.1537	***	0.1056	***	-0.1537	***	**-0.1460**	***
ln(apbn1/gdp)	0.0786	***	0.0217	***	0.0786	***	**0.0666**	***
ln(labor)	0.3048	***	0.0456	***	0.3048	***	**0.2909**	***
dummy	-0.1042	*	-0.0122		-0.1042	**	**-0.0828**	***
_constant	8.7545	***	16.4347	***	8.7545	***	**8.7932**	***
Prob F	0.0000		0.0000					
F Stat	161.86		27.92					
Prob Chi2					0.0000		**0.0000**	
Wald Chi2					1618.58		**36430.5**	

Obs	310		310		310		**310**	
Groups			10		10		**10**	
R-sq	0.8441							
: within			0.4905		0.0001			
: between			0.0198		0.8977			
: overall			0.0204		0.8441			
Adj R-sq	0.8389							
Corr (u_1, Xb)			-0.3078		0.0000			
Parameter								
Moments								
Initial Weight Matrix								
Weight Matrix								
Sargan Test Prob							**0.0000**	

Source: STATA 12 Output

Table 4.5. Cross Specific Output Model 2

Sektor	Agriculture		Fishery		Mining		Industry		Electricity		Construction		Trade		Trans		Fin		Service
ln(fdi/gdp)	0.27	**	0.08	***	0.01		0.02		0.02	**	-0.06	***	-0.07		-0.05	*	-0.01		-0.02
ln(fdi1/gdp)	0.22	***	0.08	***	-0.01		-0.03		-0.02	***	-0.01		-0.05		-0.17	***	0.00		0.03
ln(ddi/gdp)	-0.11		-0.18	***	0.00		0.02		0.10	**	0.09	**	0.00		0.11		-0.02	**	0.00
ln(ddi1/gdp)	0.06		-0.14	***	0.01		0.01		0.00		-0.04	**	0.05	*	0.29	***	-0.01	**	-0.01
ln(loan/gdp)	0.49		0.03		-0.05		-0.03		0.06		-0.05		0.48	***	0.43	***	0.04		0.03
ln(loan1/gdp)	-0.03		0.00		0.02	**	0.16	**	0.04		0.10	***	-0.12		0.14	**	0.11	***	-0.01
ln(apbn/gdp)	-1.20	***	-0.20	**	0.04	**	0.13		-0.01		-0.38	***	-0.10	***	-0.03		0.16	***	0.25
ln(apbn1/gdp)	-0.22	*	0.00		0.06	***	0.02		0.04		-0.04	*	-0.02		0.29	***	0.07		0.18
ln(labor)	0.26	***	1.02	***	0.18		-0.05		0.10		0.96	***	0.02		0.04		0.11	**	0.00
dummy	0.53	***	-0.17	***	0.00		-0.01		0.07	***	0.00		-0.05	*	0.04		-0.02		-0.01
_constant	-23.03	***	1.38		14.87	***	19.16	***	11.17	***	-5.42	**	10.84	***	19.59	***	17.74	***	23.71

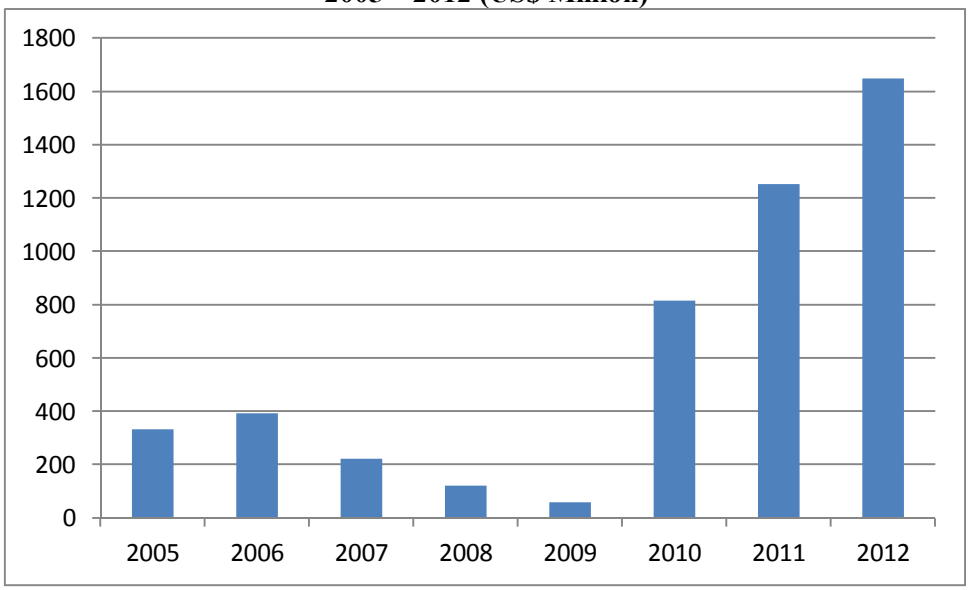
4.1. Empirical Findings

After statistically running the data using STATA 12 and Eviews 7, the analysis related to the long-term relationship between independent and dependent variables will be explained in this section.

4.1.1. Foreign Direct Investment (FDI)

From the above table, it is seen that FDI performs positive and significant impact on growth. It indicates 1% increase in FDI will lead to the increase of growth by 0.0284% in the current year and 0.0308 in the lag 1 year with the level of confidence by 99%, respectively. Interestingly, FDI also performs positive and significant impact on growth of fishery sector indicating 1% increase of FDI will lead to the increase of growth of fishery sector by 0.0839% in the current year and 0.0751% in the lag 1 year with 99% level of confidence respectively. The significant impact of FDI on growth of fishery sector is led by the existing foreign investment in the form of sophisticated technology. It enables higher volume of production and quality of products, effective and efficient production process in the appropriate period. It can be seen from the graph below where FDI has significantly increased for years.

Graph. 4.1. Foreign Direct Investment of Fishery Sector, Indonesia 2005 – 2012 (US$ Million)



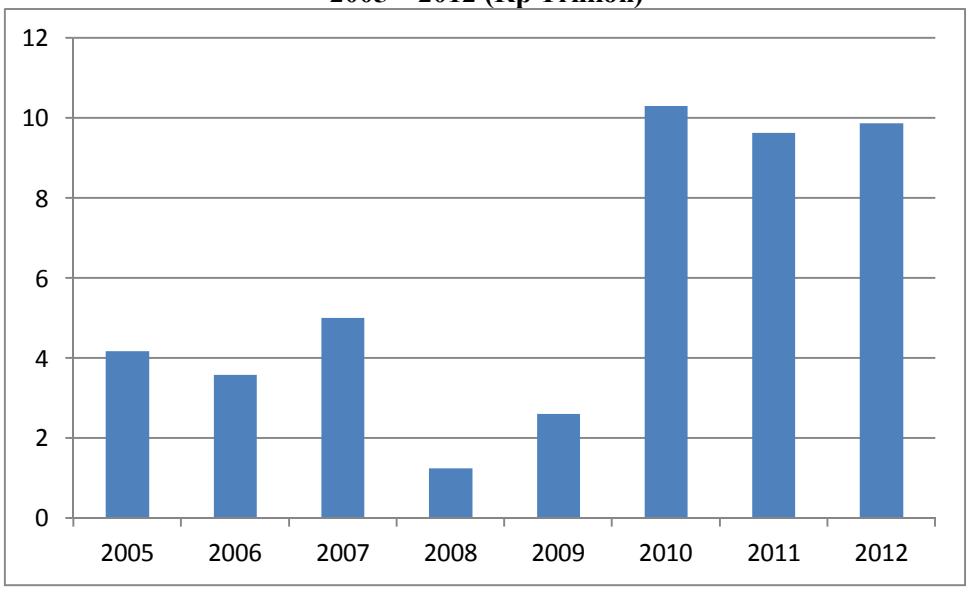
Source: BKPM 2013

The finding is in accordance to the several prior research such as Anwar and Nguyen (2010) arguing that FDI performed positive and significant impact on growth in all sectors, including fishery. The best practice can be seen from Vietnam that optimizes its FDI through a very strong support from the government in the form of bureaucracy efficiency and supporting the infrastructure. Vietnam has been successful in attracting more foreign direct investment for fishery sector up to US$ 310. The finding also confirms the research in the case of China conducted by Jianming and Ichihashi (2011) expressing that FDI performed a positive and significant impact on growth of fishery and agriculture sectors by 52.49% in 2008. The optimization of domestic market which has been the strategic steps of China for the recent years can be adopted in the case of fishery sector in Indonesia (Saparini, 2011).

4.1.2. Domestic Direct Investment (DDI)

From the above table, It can be seen that there is a very surprising fact where domestic direct investment performs a negative and significant impact on growth of the overall sectors. It indicates that 1% increase in DDI will lead to the decrease of growth by 0.1943% in the current year and 0.0863% in the lag 1 year with 99% level of confidence respectively. More surprisingly, it also happens in fishery sector where 1% increase of DDI will lead to the decrease of gorwth in fishery sector by 0.1778% in the current year and 0.1426% in the lag 1 year with 99% level of confidence respectively. If we see the graph below, domestic direct investment in Indonesia is relatively dynamic.

Graph 4.2. Domestic Direct Investment of Fishery Sector, Indonesia 2005 – 2012 (Rp Trillion)

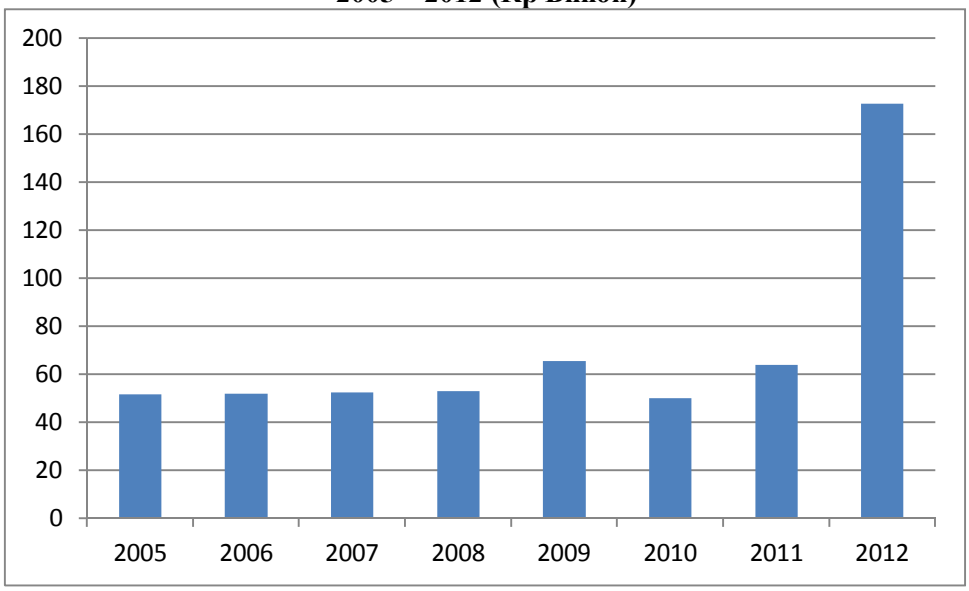


Source: BKPM 2013

4.1.3 Loan Facilities

Loan data that is used in the research Is the one distributed to marine and fishery sector facilitated by the Financial Consultant of Bank Partnership (*Konsultan Keuangan Kemitraan bang/KKMB*). Aggregately, loan performs positive but insignificant impact on growth in the current year, but it becomes positive in the lag 1 year indicating that 1% increase of loan in the prior period will lead to the increase of growth by 0.0373% in the current year with 99% level of confidence. Special for the fishery sector, it loan performs positive but insignificant impact on growth of fishery sector indicating 1% increase of loan will increase insignificantly growth of fishery sector by 0.0256% (from loan in the current year) and 0.0008% (from loan in the lag 1 year). The result has been confirmed by the Ministry of Fishery of Indonesia expressing that the amount of loan distributed is not sufficient as still few of them who can meet the requirement to get the facilities.

Graph 4.3. Loan Distribution for Fishery Sector, Indonesia 2005 – 2012 (Rp Billion)

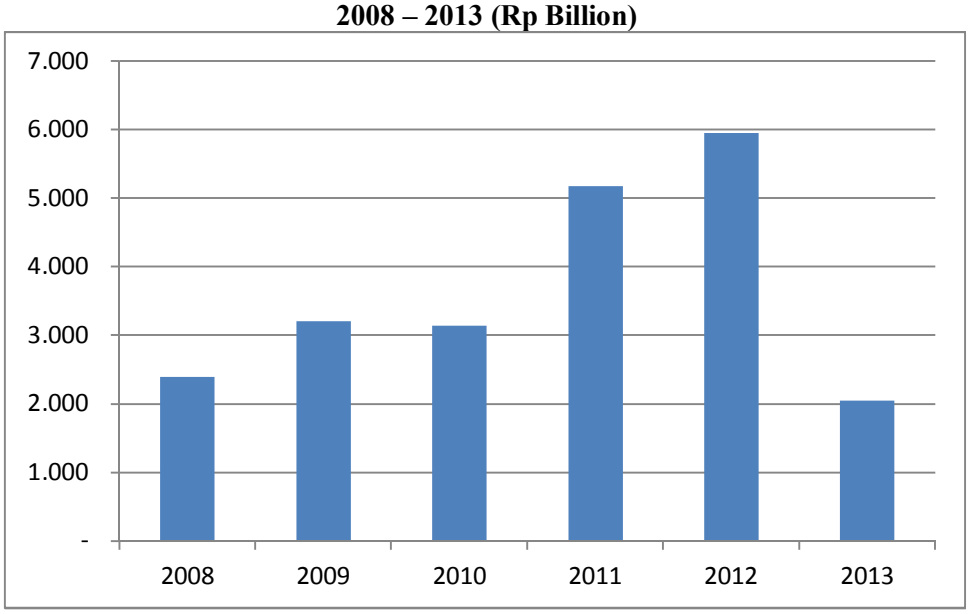


Source: Ministry of Fishery 2013

4.1.4. Government Expenditure (APBN)

The government of Indonesia has been allocating budget to develop the national fishery sector. Our empirical finding shows that the government expenditure performs different impact (on growth) between the one in the current year and lag 1 year. The increase by 1% of government expenditure will decrease the growth of fishery sector by 0.1460%, nevertheless 1% increase of government expenditure in the lag 1 year will increase growth by 0.0666% in the current year, with 99% level of confidence respectively. It indicates that the government expenditure will only give the positive impact after 1 year. Specifically on fishery sector, government expenditure surprisingly performs negative impact where 1% increase in the government expenditure will lead to the decrease of the growth in fishery sector by 0.1965% with 99% level of confidence. There has been a growing amount of the government expenditure for the last couple years as exhibited below.

Graph 4.4. Expenditure Realization for Fishery Sector, Indonesia 2008 – 2013 (Rp Billion)



Source: Ministry of Finance

These findings are not in line with the prior research such as those conducted by Alexiou (2009) expressing that government expenditure performed positive and significant impact on growth in the South Eastern Europe zone. Nevertheless, our findings are in accordance to the research done by Devarajan, Swaroop, and Zou (1996) stating that the government expenditure allocated to some real sectors performs negative impact on growth per capita. It was led by misallocation done by some developing countries. Indonesia as one of developing countries still faces the problem of less-productive sectors, including fishery. Many scholars have argued that the political will remains the obstacles to develop the national fishery sector.

4.1.5. Human Capital (Labor)

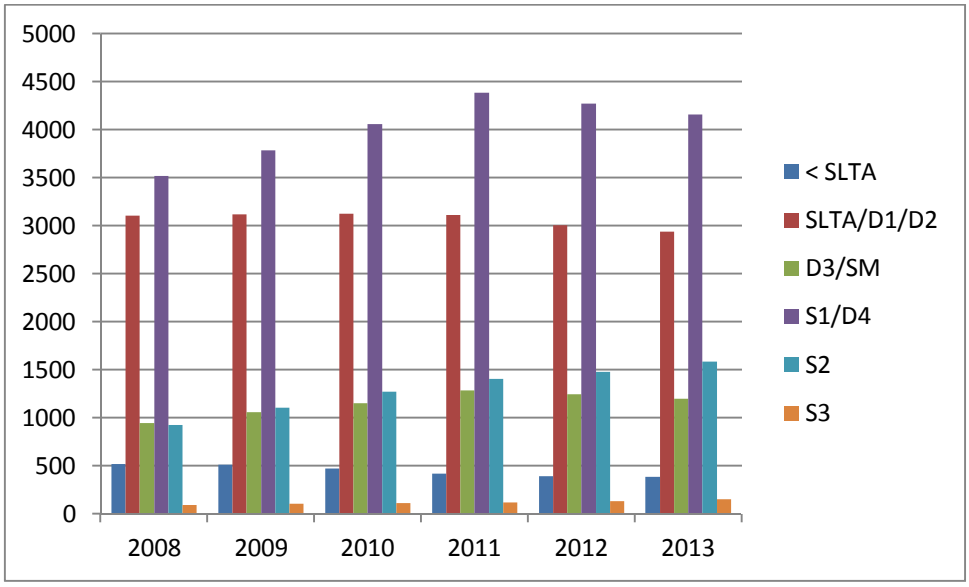
The paper utilizes the data of labor with minimum education background of senior high school. As expected, labor performs positive and significant impact on growth. Our empirical findings show that 1% increase of labor will lead to the increase of growth by 0.2909% with 99% level of confidence. The same result goes to the fishery sector indicating 1% increase of labor will increase the growth of fishery sector by 1.0193% with 99% level of confidence. It shows that in the context of Indonesia, human capital has been playing a very strategic role in developing the economy, including in fishery sector. Nevertheless, as shown in the above cross specific output table, labor in other several sectors performs no significant impact on growth. Thus, it should have been the primary concern of the government to improve the quality of Indonesian labor in the future. The result confirms the prior research conducted by Seren (2001)

arguing that human capital performs a positive and significant effect on growth in several countries. It is subsequently confirmed by Betyak (2012) to examine some determinants from the economic performance. He observed the following countries such as Portugal, Italy, Ireland, and Spain.

In the context of human capital of fishery sector, we conducted an interview with some fishermen in a coastal village called "Kampung Nelayan BNI" established to salting fish in Muara Angke (fish auction area). From the interview, we found many interesting things. Aggregately, there is 350 tons of fish entering Port Muara Angke. The high volume is not only led by the fisherman production, but also the supply from other areas such East Java and Lampung due to very high demand in DKI Jakarta. The amount of fish entering Muara Angke is directly sold to consumers and some are marinated.

In the micro aspect, we can analyze the dynamic of labor in the auction area which are 207 spots of facilities. The program that has been run by BNI for years is in the form of loan distribution to 12 households cooperated with Komira (the Muara Angke fishermen's cooperative). Interestingly, the loan is not in the form of money, it is the amount of fish that can be processed and sold again. The income will be used to repay the loan. Thus, their productivity improves and the consumptive habit decreases. Nevertheless, the management of income and expenditure of those fishermen still need a guidance to make their surplus income get higher value added through investment in the long-run. It is the responsibility of the government and private sectors to educate more people living in the coastal area.

Graph 4.5 Marine Institution Labor, Indonesia 2008 – 2013



Source: Ministry of Fishery 2013

4.1.6. Global Crisis Dummy (2008)

In 2008, the world faces the global financial crisis due to the sub-prime mortgage in the United States. The world suffered the impact of the crisis, including Indonesia. There was a significant decrease regarding demand from some importing countries. In this research, the impact of the crisis is presented in 2008 and 2009 where Indonesia's economy decreases by 0.0828% with 99% level of confidence. Nevertheless, the higher impact is experienced in the fishery sector where the growth decreases by 0.1729% with 99% level of confidence. All along, Indonesia's export has been dominated by shrimp, tuna, and cob with several export destinations such as Japan, the United States, and European Union suffering from the decrease of purchasing power. It led to the decrease of demand of fishery product of Indonesia, especially from the United States and European Union (Ministry of Fishery, 2013). As an opened country, Indonesia cannot be released from the negative impact due to global economic dynamic. The global

financial crisis started to significantly affect the economy in the quarter III 2008, and the second round effect experienced higher intensity leading to the negative growth on the macroeconomic performance in 2009 in all aspects, balance of payment, monetary sector, and fiscal sector.

4.2. Bidirectional Relationship Analysis

The paper employed the unit root test as the primary requirement before conducting the analysis. The test is intended to identify whether the data is stationary at the level. If so, then it is used the Vector Autoregressive (VAR). Otherwise (data is stationary at the first or the second difference), then we have test the cointegration. If the data is cointegrated, then it will be used Vector Error Correction Model (VECM), otherwise VAR will be preferred.

According to the output using STATA 12, it was found that all data is not stationary at the level which can be seen below.

Table 4.6. Unit Root Test-Augmented Dickey Fuller Test (ADF)

Variabel	Level	First Difference	
ln(gdp/labor)	-0.779	-7.356	***
ln(fdi/gdp)	-0.87	-3.587	***
ln(ddi/gdp)	-0.524	-4.191	***
ln(kredit/gdp)	0.104	-5.841	***
ln(apbn/gdp)	-2.033	-3.743	***
ln(labor)	-1.714	-3.432	***

Source: STATA 12 Output

As those variables are not stationary, thus it is employed Vector Error Correction Model (VECM) as the data is cointegrated. The output can be seen below.

Table 4.7. Granger Test-Vector Error Correction Model (VECM)

Dependen	Independen	Konstanta	Koefisien	
ln(gdp/labor)	ln(fdi/gdp)	-0.0100	0.0141	
ln(fdi/gdp)	ln(gdp/labor)	-0.7105	70.9156	***
ln(gdp/labor)	ln(ddi/gdp)	-0.0096	0.0136	
ln(ddi/gdp)	ln(gdp/labor)	-0.7020	73.2723	***
ln(gdp/labor)	ln(kredit/gdp)	-0.0130	0.0686	*
ln(kredit/gdp)	ln(gdp/labor)	-0.1899	14.5812	***
ln(gdp/labor)	ln(apbn/gdp)	-0.1899	14.5812	***
ln(apbn/gdp)	ln(gdp/labor)	1.0212	-93.5169	***
ln(gdp/labor)	ln(labor)	-0.0099	-0.0245	
ln(labor)	ln(gdp/labor)	0.4050	-40.7365	***

Source: STATA 12 Output

From the above table, it is seen that only loan and government expenditure that have bidirectional relationship with per capita growth. Our empirical findings show that 1% increase of loan would increase growth by 0.0686% with 90% level of confidence, where 1% increases of growth will lead to the increase of loan by 14.6% in the long-run with 99% level of confidence. Subsequently, 1% increase of the government expenditure will lead to the increase of growth by 14.6% with 99% level of confidence, and 1% increase of growth will lead to the increase of the government expenditure by 93.5%.

5. Conclusion

After providing detail information about the facts regarding fishery sector compared to others in Indonesia in terms of capital and capital, there are several parts necessarily important to further highlight as the core problems and solutions in the future.

From our empirical results, we can conclude that, from the capital aspect, foreign direct investment (FDI) is the only one giving positive and significant impact on growth in fishery sector compared to domestic direct investment (DDI), loan, government expenditure (APBN)b. Unfortunately, investors would only be attracted if the infrastructure is sufficient and business permission is relatively easy. Besides, there is bidirectional relationship between FDI and growth indicating when the economy is no longer promising, and then the interest of investment by investors will decrease as well. In order to optimize the capital aspect to encourage rapid growth, the government should put more attention in the form of re-managing the utilization of domestic direct investment, loan, and the government expenditure. Compared to the capital aspects with the various results, labor aspect (human capital) actually performs better impact in other sectors besides fishery, thus the government should prioritize the strategy to make the fishery sector grow faster.

5.2. Suggestion

According to the above conclusion, there are some strategic points to encourage rapid growth, especially in fishery sector including the optimization of capital, the increase of better production access to the fishermen, as well as increasing prosperity of those living in the coastal area. Nevertheless, it is necessarily important to emphasize that political will is needed as the fundamental aspect.

Firstly, Indonesia should optimize the role of capital by allocating it more on infrastructure expenditure so that capital sources such as domestic direct investment, loan, and the government expenditure would perform better impact in growth, especially for fishery sector. The hierarchy of bureaucracy should be efficient and effective. What currently happens is that the central government allocates the budget to be distributed several local governments. Unfortunately, the central governments are not responsible to the central government (including the budget that has been distributed to them) leading to some misallocation of the budget. The second one, the government should pay more attention on the quality of human capital/labor. They should have been equipped with sufficient knowledge and technology related to improve production. Focusing on fishery, Indonesia should establish more higher education/institution to support high quality of human capital in fishery sector in the future.

Moreover, it is necessary to build an integrated information center for fishermen to comprehensively understand the current situation of any location they are going to catch the fish. The information will contain the weather, concentration of where high amount of fish is located, including some information on how to get the fish had some value added. Furthermore, the role of the State Owned-Enterprise of the National Fishery should be optimized in order to implement the policy of food security, reducing import on fishery products, mitigating the risk of inflation impact, and maintaining stable prices of fishery products to give more profit to the fisherman. The Ministry of Fishery has claimed that the program has run for the last couple years called The National Fishery Logistic System (**Sistem logistik Ikan Nasional/SLIN**), however it has be to well-improved to generate higher and qualified output in the future.

The next program is digital fishery product as a mean to accommodate the classic problems of fishermen. All along, the products have been sold to the collector, not directly to the fish auction. It leads to the relatively low profit earned by the fishermen. The digital fishery product will give more information regarding the actual price demanded in the fish auction facilities. In the other hand, the information will also give more descriptions related to price fluctuations and can also be accessed in a website.

The program of modern fishermen village serves to integrate the public service infrastructures to enable fisherman spend less living cost. The facilities are given in the form of schools, health centers, gas station, and microfinance. The Ministry of Fishery said that the program has been established through Presidential Decree No. 10 2011 on Coordinating team on

Development and Expansion of the Pro People Program, or is frequently called as the Poverty Handling Program. The implementation of the program should be improved and supervised to increase the prosperity of the fishermen. The last program is the participation of universities related to further research and supervision in terms of increasing the volume of production, quality of the product, and the new practitioners in fishery sector.

At the end, there are many limitations in this paper. Further research is necessary to provide more accurate analysis related to the strategic steps to improve the quality of fishery sector in Indonesia. More inputs and critics are expected to get the higher quality of the research.

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