

## DETERMINANT OF INDUSTRIAL CHEMICAL COMPARATIVE ADVANTAGE AND LABOR FORCE ANALYSIS TO INCREASE INDONESIA'S ECONOMIC GROWTH

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### Introduction

International trade represent very important component a State embracing open economics. International trade is oftentimes considered to be support machine of economic growth to a state. Growth of economic shows growth of production goods and service in a region in certain time (BPS, 2011). Strong emerging ascription among economist about important role of international trade reaching positive and sustainability level of economic growth. Economist known in 'Export Led Growth Hypothesis' school inform that a State can expand and develop with international trade (Saputra, 2006).

Indonesia also trading internationally to increase growth of its economy. Although Indonesia conduct bilateral trade with many States in the world, but in recent time bilateral trade of Indonesia and China are getting intens. Indonesia's export to China raise up specially in 2010 until 2011. Japan and United States was being the biggets partner trade of Indonesia, nowadays its position is shifted by China. Of exporting side, during period 2009-2014 showed high trend of Indonesia's export to China that is equal to 34%. China also represent biggets importing country to Indonesia. China's proportion of import started to increase in 2008 that is equal to US \$ 14.947,9 million and still going on come up in 2014 ( BPS, 2015).

High intensity of bilateral trade between Indonesia and China represent potential opportunity and challenge to Indonesia. To make it as opportunity, Indonesia has to recognize comparative advantage of its exporting product to China. First conception of comparative advantage told by David Ricardo the Classic economist was looked more rational than theory told by Hecsher-Ohlin. Hecsher-Ohlin concept explained that bilateral trade only based on abundance resource in each trade partner. But with concept comparative advantage hence see comparison of a country's export with other Nation's export in world.

Calculation of comparative advantage need information about amount of exported and imported product in bilateral trade. This research focus into manufacture industry at Industrial Chemicals category representing pre-eminent category in bilateral trade between Indonesia and China. Indonesia's product in Industrial Chemicals category has highest export proportion to China in the year 2014 compared to 22 the other Indonesia's manufacture industrial category. Indonesia's export proportion of Industrial Chemicals category was more than 31 percentage of total export to China in manufacture industry. The amount of Industrial Chemicals' export proportion was very different with proportion export of other industrial manufacture categories. This matter indicates that export product of Industrial Chemicals category is very needed by China.

**Table 1. Export Proportion in Manufacture Industry of Indonesia to China 2014**

No	Category	Export Proportion
1	Wood Products	0.053882055
2	Paper and Products	0.060737588
3	Furniture	0.008723791
4	Industrial Chemical	0.314160549
5	Rubber Products	0.021347854
6	Industrial Cement	0.001625235
7	Glass Products	0.002900882
8	Plastic Products	0.059307631
9	Footwear	0.022604818
10	Textiles	0.059671162
11	Other Chemical	0.047480855
12	Leather Products	0.010984410
13	Pottery, China, Earthenware	0.001250394
14	Wearing Apparel	0.014478643
15	Clay Products	0.002594780
16	Other Manufactured Products	0.021527990
17	Iron and Steel	0.006829131

18	Transport Equipment	0.015141492
19	Machinery, Electric	0.198709272
20	Machinery and Parts	0.058597371
21	Fabricated Metal Products	0.012918447
22	Professional, Scientific and Diagnostic Equipment	0.004178424
23	Printed Matter	0.000347230

Source: Analysis Result

Economic growth not only supported by its comparative advantage, but also supported by its labor force to develop the economy through international trade activity. Therefore, this research will study about determinant of comparative advantage and labor force to increase economic growth.

Ramstetter (2003) compares labor productivity and wages among nationality and ownership groups of foreign multinational corporations (MNCs) and local plants in Thai manufacturing for 1996, 1998, and 2000. Disaggregating foreign MNCs by nationality or foreign ownership share revealed a few significant differences in both labor productivity and wages that were not present in more aggregate specifications. In these cases, there was tendency about labor productivity development in Thailand manufacturing sector.

Ismail and Yussof (2003) investigates whether labour market competitiveness affects the inflows of foreign direct investment (FDI) into the ASEAN economies Malaysia, Thailand and the Philippines. The analysis is based on a regression model using time series data on FDI, wages, the labour force, skills, research and development expenditure, the interest rate and several variables critical for economic development. The study shows that the labour market determinants differ between countries in terms of their role in FDI inflows.

McErlean and Wu (2003) tests for regional agricultural labour productivity (ALP) convergence in China. The analysis indicates that ALP diverges between 1985 and 1992, but converges between 1992 and 2000. Further analysis shows that these findings can be explained by the different rates of agricultural out-migration in these two periods. We argue that these different rates of regional agricultural out-migration can be attributed to the different government policies and economic conditions before and after 1992. In particular, migrants from rural to urban areas found it easier to obtain both food and work in the post-1992 era.

Economic crisis destroyed South-East Asia economies in 1997-1998 which opening new chapter in liberalisation. According to agreement with International Monetary Foundation (IMF), Indonesia's government reformed its policy of trade significantly to lessen tariff and of non-tariff barrier and improve export. Ordinary tariff level decrease to 20% in average at 1994, and still degraded to become 9,5% at 1998, and degraded again become 7,5% at 2002 (WTO 1998, 2003). In that moment, government also abolish many trade barriers which influencing import permission, local payload scheme, trade monopolies, and marketing arrangement. Government also commit to abolish export tax step by step and abolish all other type of export barrier, such as collected province tax and trade quota between province and between sub-province. Government of Indonesia have also drawn up various deregulation to give legal protection international trade. For example regulation for all goods which imported have to attached by Origin Information Letter (<http://www.antaraneews.com>).

## Results and Discussion

Industrial Chemicals category consists 15 product types from low value added product to high value added product. Indonesia's most popular product from Industrial Chemicals category to be exported to China is Hydrocarbons, n.e.s and halogenated, nitr. Derivative which unfortunately represent product with low value added. Hydrocarbons, n.e.s & halogenated, nitr. Derivative Product can be used as input intermediate chemical industry with more sophisticated technology. Proportion export level of Indonesia to China at Industrial Chemicals category indicate that China very is requiring of the product (specially product of Hydrocarbons, n.e.s & halogenated, nitr. Derivative) for the development of China chemical industry.

Econometric estimation model in Industrial Chemical category is relied on Endogenous Growth Theory. Econometric model will use economic growth variable as dependen variable which influenced by Industrial Chemicals symmetric comparative advantage indicator. While symmetric comparative advantage indicator also influenced by its proportion export and import.

Unit root test using ADF implemented to endogenous variables of endogen in model, before running the model with Error Correction Model (ECM). At table below shows that all endogenous variables are stasioner in 1<sup>st</sup> difference. After result is known, the model is tested with cointegration test to determine most precise method in its analysis. There are two model to be used in regression analysis

### a. The first ECM

$$\Delta GDP_t = \alpha_0 + \alpha_1 \Delta LF_t + \alpha_2 \Delta RSCACHEM_t + \alpha_3 EC_t + \varepsilon_t$$

Cointegration test result for model above show that the model is cointegrated at lag 4.

Equation above estimated first with Ordinary Least Square (OLS) method to recognize its long term effect. Industrial chemical symmetric comparative advantage variable will symbolized as RSCACHEM. Both dependent variables

(LF/labor force and RSCACHEM) are significantly affect GDP in long term, but RSCACHEM effect is more dominant than LF. It shown from each variable probability value.

Short term estimation result indicates that variable of RSCACHEM has dominant influence (among the three dependent variables) to GDP. ECT coefficient value equal to 0.003360 means that difference between actual GDP value balance is accomodated less than 1 quarter.

b. The second ECM is

$$\Delta RSCACHEM_t = \alpha_0 + \alpha_1 \Delta MICHEM_t + \alpha_2 \Delta MXCHEM_t + \alpha_3 EC_t + \varepsilon_t \dots\dots\dots(5.2)$$

Result of cointegration test for equation 5.2 is indicating that the model is cointegrated at lag 7.

Variable MXCHEM is variable which shows Industrial Chemical export value of Indonesia to China while MICHEM is import value of Indonesia to China for Industrial Chemical products. Econometric result of MXCHEM indicates that MXCHEM has stronger effect on RSCACHEM than MICHEM. Both of variables are statistically significant to RSCACHEM on a long term.

Estimation result indicates that all dependen variables of equation 5.2 (MICHEM and MXCHEM) do not have significant influence in short term to RSCACHEM. ECT coefficient value is equal to 0.150582 means that difference between actual GDP value with its balance value to be accomodated less than 1 quarter.

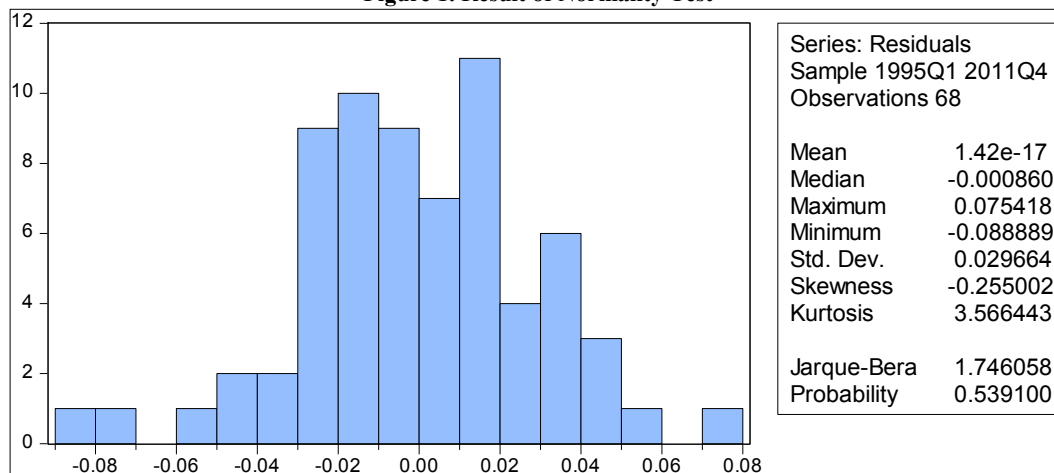
**Table 2. Resume of Estimation Result in Industrial Chemicals Category**

Estimation Result	Long Term	Short Term
Dependent Variable: GDP		
LF	6.553234***	0.050559*
RSCACHEM	101315.1***	24322.35**
ECt	-	-0.00336**
Dependent Variable: RSCACHEM		
MICHEM	-0.696556***	-0.27706
MXCHEM	2.4444***	0.283606
ECt	-	-0.150582***

Source: Data analysis result

Classic assumption test imposed after all estimation result of ECM analyzed. Classic assumption test aim to ensure that estimator yielded by model is BLUE (Best Linear Unbiased Estimators). The first classic assumption test is normality which analysed normal distribution of residual ECM.

**Figure 1. Result of Normality Test**



Source: Data analysis result

Graph above shows that distribution of model residual is bell-shaped with value of Jarque-Bera equal to 1.746058. Statistical value of this JB value is relied on distribution Chi-Squares with degree of freedom 2. Probability value from JB statistical test result equal to 0.539100 means that model’s residual have normal distribution because statistical value of JB test near to zero.

Autocorrelation is detected using *Breusch-Godfrey Serial Correlation LM Test* with probability equal to 0.0010 which less than degree of significant 0.05 proving that model don't experience of the problem of autocorrelation. Result of Breusch-Godfrey Serial Correlation LM test can be seen at following tables.

**Table 3. Result of Breusch-Godfrey Serial Correlation LM Test**

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	7.951468	Prob. F(2,61)		0.0009
Obs*R-squared	13.85509	Prob. Chi-Square(2)		0.0010
Test Equation: Dependent Variable: RESID Method: Least Squares Date: 11/02/13 Time: 18:23 Sample: 1995Q2 2011Q4 Included observations: 67 Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-61.03033	190.8109	-0.319847	0.7502
D(LF)	0.579237	1.135758	0.510000	0.6119
D(RSCACHEM)	1214.732	10361.92	0.117230	0.9071
RESID01(-1)	-0.032579	0.030753	-1.059403	0.2936
RESID(-1)	0.344618	0.125921	2.736774	0.0081
RESID(-2)	0.235277	0.130193	1.807146	0.0757
R-squared	0.206792	Mean dependent var		6.79E-14
Adjusted R-squared	0.141775	S.D. dependent var		1107.906
S.E. of regression	1026.368	Akaike info criterion		16.79073
Sum squared resid	64259357	Schwarz criterion		16.98816
Log likelihood	-556.4893	Hannan-Quinn criter.		16.86885
F-statistic	3.180587	Durbin-Watson stat		2.043142
Prob(F-statistic)	0.012887			

Source: Data analysis result

Multicollinierity detected as relation among each independent variables in this research (Widarjono, 2007). Value in the following table showing the level of relation of each independent variables in ECM at Industrial Chemicals category. Multicollinierity detection result indicates that model don't experience serious multicollinierity.

**Table 4. Multicollinierity Test**

	GDP	LF	RSCACHEM	MICHEM	MXCHEM
GDP	1	0.910393	0.27629	0.887211	0.750935
LF	0.910393	1	0.556907	0.836805	0.912212
RSCACHEM	0.276290	0.556907	1	0.266673	0.741498
MICHEM	0.887211	0.836805	0.266673	1	0.643804
MXCHEM	0.750935	0.912212	0.741498	0.643804	1

Source: Data analysis result

If model has multicollinierity issue because of high correlation between independent variables, researcher given on to two choices which are letting multicollinierity in the model OR improve the model to be fixed from multicollinierity problem. Existence of multicollinierity in model remain to yield estimator which is BLUE. But multicollinierity issue will cause difficulty to obtain estimator with small standard error. Problem of multicollinierity usually arise if amount of observation is small. Eventhough improvement of model to eliminate multicollinierity can trigger the problem of autocorrelation.

**Conclusion**

1. Strong comparative advantage of Industrial Chemicals and high level of labor force improve economy growth in short term and also in long term. And comparative advantage of Industrial Chemicals is influenced by proportion export and chemical import proportion only on long term.

2. High Intensity of Indonesia bilateral trade with China in intra-industrial trade (Industrial Chemicals category) in long term can become opportunity and threat to economy of Indonesia. So government intervention still need to impose strong regulation on it.

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