P ISSN 2086-3128 | E ISSN 2502-180x

Economic Journal of Emerging Markets

Accredited by Kemenristekdikti No.: 36a/E/KPT/2016

Volume 10 Issue 2, October 2018, Pages: 121-212

Economic Journal of Emerging Markets

http://journal.uii.ac.id/index.php/JEP/

Editorial Office

Faculty of Economics, Universitas Islam Indonesia
Condong Catur, Depok, Sleman, Yogyakarta, Indonesia, 55283
Phone: +6274-881546, 883087, Fax +6274-882589
E-mail: ejem.economicjournal@gmail.com

Economic Journal of Emerging Markets (EJEM) is published by Center for Economic Studies, Faculty of Economics, Universitas Islam Indonesia, in a collaboration with the Indonesia Regional Science Association (IRSA), three times a year. Since 2012, it publishes two issues per year on April and October. EJEM is a forum for scientific works concerning economic studies in emerging markets.

Economic Journal of Emerging Markets

http://journal.uii.ac.id/index.php/JEP

Table of Content Volume 10 Issue 2, October 2018

Economic Journal of Emerging Markets

http://journal.uii.ac.id/index.php/JEP

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

Decomposition total factor productivity of Indonesian rice production

Joko Mariyono

Program Studi Magister Manajemen, Universitas Pancasakti, Tegal - Indonesia
e-mail: mrjoko28@gmail.com

Article Info

Article history:
Received : 24 November 2016
Accepted : 19 June 2018
Published : 1 October 2018

Keywords:
rice farming, econometric approach, total productivity, decomposition

JEL Classification:
O13, O33, Q18

DOI:10.20885/ejem.vol10.iss2.art1

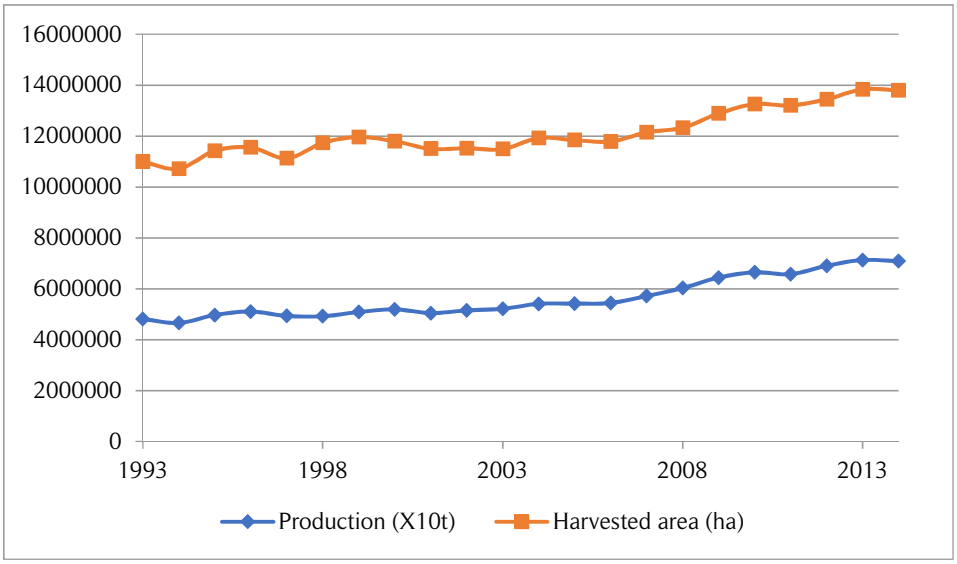
Abstract

This paper analyzes the growth of total factor productivity of paddy farming efforts. Total productivity is decomposed into four parts: the advancement of technology, technical efficiency, allocative efficiency and the effect of business scale. If each component of productivity growth is known, strategies to increase rice production can be determined. This paper uses secondary data published by the Indonesian Statistics Agency. The analyses were performed using an econometric approach. The results show that growth in total factor productivity declines with a declining rate. The positive contributors to the growth of total factor productivity are the change in the technical and business scale effects; whereas the negative contributors are the technical and allocative efficiency. The growth in rice production is mainly due to the use of inputs and other factors such as the expansion and increase in cropping index. The growth in total factor productivity can be increased by improving technical and allocative efficiencies.

Introduction

In Indonesia, rice is a strategic commodity. Either a shortage or a highly fluctuated price of rice in the domestic market will distract political stability. Rice is important as a staple food and represents the largest caloric intake for more than 250 million people, despite the fact that corn, cassava, soybean and sweet potato are important supplementary food. Rice is needed to supply calorie, while vegetables, as the complement of rice, is also important to supply vitamins and micro nutrients (Mariyono, 2016). For that reason, Indonesian government has applied policies to maintain stability of domestic rice market.

The dynamics of rice production and harvested area during last two decades is described in Figure 1. The growth rate of production is about similar to the growth rate of harvested areas, meaning that the productivity of rice is relatively stagnant.



Source: Indonesian Statistical Agency (2016)

Figure 1. The dynamics of rice production in Indonesia

P ISSN 2086-3128 | E ISSN 2502-180X

Indonesian rice production faces a challenge of population growth leading to an increase in demand for food. This requires continually increase in agricultural productivity; despite the increased growth rate of agricultural land conversion (Mariyono, Harini, & Agustin, 2007). Increase in intensive agricultural productivity is still important because it has a number of substantial effects. First, it releases resources that can be used by other sectors thereby generating economic growth. Second, higher levels of agricultural productivity result in lower food prices that increase consumers' welfare. And third, in the context of an open economy, productivity growth improves the competitive position of a country's agricultural sector. Mariyono and Sumarno (2015) identify the importance of intensive agricultural productivity in relieving rural poverty alleviation. Against this background, it is clear that productivity measures provide a key indicator of the performance of a country's agricultural sector.

The aims of most productivity studies have been to monitor the performance of the agricultural sector and finally to help policymakers to design optimal policies to enhance productivity. This paper aims to determine the drivers of productivity growth of rice production in Indonesia.

Most of the previous studies on growth which develop the neo-classical Solow-Swan models make the strong assumption that producers operate on full technical efficiency, using best practice methods and state-of-the-art technology. However, for various reasons, producers often do not operate on their frontier or use best practice agricultural methods. The economy therefore does not operate as it would if all technological and methodological innovations had been fully diffused throughout it. In this interpretation, innovation drives technological change captured in the production technology. The issue of diffusion would then arise in the form of the presence of firms producing at points inside the production possibility frontier. Stochastic frontier estimation techniques would be needed to measure the extent to which such sub-frontier behaviour is occurring. In this formulation, observed movements of the frontier – measuring technological change — comprise the combined impacts of the invention, innovation and diffusion processes.

Fox, Grafton, Kompas, and Che (2006) propose a method for analysing the productivity of resource-based firms through the decomposition of productivity from a profit function. This is a deterministic approach that needs no functional form of the production function. The applicability of deterministic approaches to cases of agricultural production is questionable, however, due to the stochastic nature of agriculture.

By using a frontier technique, Kalirajan (2004) proposes a method of decomposition of agricultural total factor productivity that has been applied in Chinese agriculture. The same technique is used in decomposing total factor productivity in Indian agriculture. The differences between these methods originate in the specification of the production function and the stochastic model.

Regardless of the differences in specification, however, there remains the strong assumption in all these studies that every producer is allocatively efficient. The studies have furthermore not accounted for returns to scale of production technology. Thus, both the effects of allocative efficiency and scale resulting from input growth are neglected. By comparison, Bauer (1990) proposes an approach to decompose total factor productivity which has theoretical and empirical advantages on these grounds. In this approach, total factor productivity is decomposed into technological change, returns to scale and economic efficiency. This approach has been applied empirically to estimate total factor productivity in US airlines.

Technically, the approach of Bauer (1990) is superior to the approach of others in terms of accuracy and consistency in decomposing total factor productivity. Bauer (1990) decomposes total factor productivity into technological progress, economic efficiency and scale effect. The last term is not found in the other models. In addition, the efficiency term estimated in Bauer's (1990) approach has also accounted for the weakness of technical efficiency estimated in, which assumes allocatively efficient producers.

Regardless of the procedure used, there is a larger debate around the role of total factor productivity in determining major discrepancies in economic growth across countries. Felipe and McCombie (2003) see problematic as the use of a production function to estimate and interpret total factor productivity as a rate of technological progress. This is because the production function estimation is usually estimated with data in value terms, rather than physical quantities. The production function estimated with such data will generate coefficients which are exactly the same as factor shares if the production function takes a Cobb-Douglas technology form. Consequently, there is no difference between growth accounting and econometric estimation.

Research Method

In general, there are two models of measuring productivity growth. The first method requires the functional form of production technology, while the second requires no functional form. Within the first method, there are two basic approaches to the measurement of productivity. The first approach is the growth accounting approach, which relies on neoclassical production theory under constant returns to scale for the proposition that the output

elasticities with respect to inputs are equal to the corresponding factor shares (Mariyono, 2013). Total factor productivity is thereby calculated as an arithmetic residual after share-weighted input growth rates are subtracted from the growth rate of output. The second approach is the econometric approach, which estimates the parameters of elasticity from time series data and infers the magnitude of total factor productivity as an econometric residual after allowing for the estimated effects of all measurable inputs on output. For both of these approaches, much attention has focused on the difficulties of appropriately measuring both inputs and outputs.

This paper uses econometric approach to decompose total factor productivity (TFP). Graphically, productivity growth can be decomposed as shown in Figure 2.

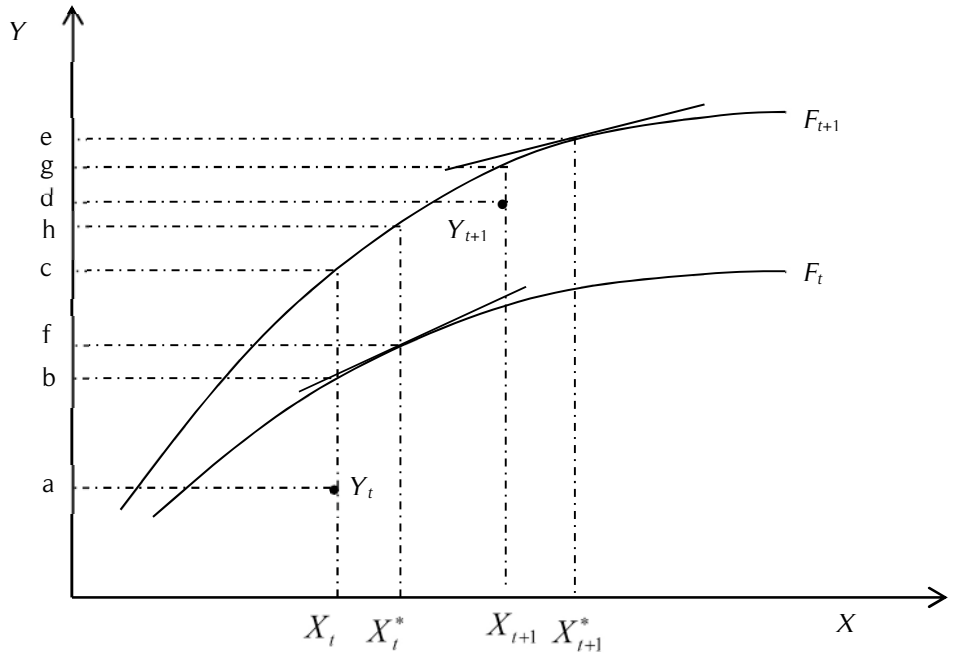


Figure 2. Decomposition of productivity growth

Let Y be a single output produced using a single input X with production technology F. At time t, suppose the allocatively efficient level of input use is X_t^* where the marginal product of the input is equal to the relative price of the input. At time $t+1$, the allocatively efficient level is X_{t+1}^* where the marginal product of the input is equal to its relative price. The relative price at time t, is not always the same as that at time $t + 1$. The output growth is decomposable as follows:

$$\dot{Y} = d - a = (b - a) + (f - b) + (c - f) + (h - c) + (d - h)$$
$$= \big((b - a) - (g - d)\big) + \big((f - b) - (e - g)\big) + \big((c - f) + (h - c)\big) + (e - h)$$
$$= \Delta TE + \Delta AE + TC^* + \dot{X}^* \quad (1)$$

Total factor productivity growth is output growth unexplained by input growth, and then total factor productivity growth is expressed as:

$$T\dot{P}F = \Delta TE + \Delta AE + TC^* + \Delta SE \quad (2)$$

Where ΔSE is change in scale effect. Scale effects result from input growth, which is due to returns to scale. When the production technology exhibits constant, increasing or decreasing returns to scale, the effect will be zero, positive or negative correspondingly.

In a mathematical approach, to decompose productivity growth, a stochastic production function is used. The deterministic production frontier with input X and Z, technology parameter vector β, time trend t as a proxy for technological change, and output-oriented technical inefficiency $u \geq 0$ is represented as:

$$Y_{it} = f(X_{it}, Z_{it}, t;\ \beta) exp\{-U_{it}\} \quad (3)$$

Total factor productivity growth is defined as the growth in output which is unexplained by growth in inputs, that is:

$$T\dot{F}P == \dot{Y} - S_x\dot{X} - S_z\dot{Z} \quad (4)$$

Technical efficiency is expressed as $\varphi_{it} = \frac{Y_{it}}{f(X_{it},Z_{it};\beta)} = exp\{-U_{it}\} \leq 1$, which allows it to vary over time. A primal measure of the rate of change in technical efficiency is given as:

$$\dot{\varphi} = \frac{\partial \varphi_{it}}{\partial t} = \frac{\ln \exp\{-U_{it}\}}{dt} \quad (5)$$

$\dot{\varphi}$ can be interpreted as the rate at which a producer shifts towards or away from the production frontier, keeping everything else constant. Taking the log and totally differentiating equation (3) and then differentiating with respect to t, we have:

$$\dot{Y} = \frac{\partial \ln(\cdot)}{\partial t} + \frac{\partial f(\cdot)}{\partial X}\frac{X}{f(\cdot)}\frac{\partial \ln X}{dt} + \frac{\partial f(\cdot)}{\partial Z}\frac{Z}{f(\cdot)}\frac{\partial \ln Z}{dt} + \frac{\partial \ln \exp\{-U\}}{\partial t} \quad (6)$$

Where $\dot{Y} = \frac{\partial lnY}{\partial t}$ is output growth, $f(\cdot) = (X, Z, t; \beta)$ is the deterministic kernel of the stochastic production frontier, $\frac{\partial \ln(\cdot)}{\partial t}$ is the rate of technological change, $\frac{\partial \ln X}{\partial t} = \dot{X}$ is the growth rate of input X, $\frac{\partial \ln Z}{dt} = \dot{Z}$, is the growth rate of input Z, $\frac{\partial f(\cdot)}{\partial X}\frac{X}{f(\cdot)} = \theta_X$ is output elasticity with respect to input X, $\frac{\partial f(\cdot)}{\partial Z}\frac{Z}{f(\cdot)} = \theta_Z$ is output elasticity with respect to input Z, $\frac{\partial \ln \exp\{-U\}}{dt} = -\frac{\partial u}{\partial t} = \dot{\varphi}$ is the rate of change in technical efficiency. Substituting the expression for $\dot{Y}$ into equation (4) yields:

$$TF\dot{P} = \Delta TC + (\theta - 1)\left(\frac{\theta_X}{\theta}\dot{X} + \frac{\theta_Z}{\theta}\dot{Z}\right) + \left(\frac{\theta_X}{\theta} - S_X\right)\dot{X} + \left(\frac{\theta_Z}{\theta} - S_Z\right)\dot{Z} + \dot{\varphi} \quad (7)$$

Where $\theta = \theta_X + \theta_Z$ is the scale elasticity that provides a primal measure of returns to scale of the production frontier.

Data and model

This paper uses panel data during 1999-2014 consisting of 23 provinces in Indonesia. The total number of observations used is 368. The database is established from various publications of the Indonesian Statistical Bureau (BPS) and Indonesian Agricultural Reports.

The stochastic frontier translog production technology is specified as:

$$\ln Y_{it} = \beta_0 + \sum_{k=1}^{5}\beta_k \ln X_{kit} + \frac{1}{2}\sum_{k=1}^{5}\sum_{j=1}^{5}\beta_{kj} \ln X_{kit} \ln X_{jit} + \sum_{k=1}^{5}\beta_{kt} t \ln X_{kit} + \beta_t t + \beta_{tt} t^2 + v_{it} - u_{it} \quad (8)$$

The full translog production technologies captures more accurate estimates and more precise technical efficiency, which will be subsequently used for calculating decomposition of productivity growth of rice production.

Result and Discussion

A result of this study is mostly derived from the full translog production function estimated at the potential level, or the frontier, as shown in Table 1. Some of coefficients are positive and some others are negative. With respect to time trend, Indonesian rice production faces input augmenting technical change, except for use of pesticide; and there is technological regress with increasing rate. This analysis does not make interpretation related to individual coefficients. But, all coefficients will be used for calculating output elasticity with respect each input. The mean output elasticity is calculated at average level of input uses and time trend during the period, which is divided four-yearly. The mean output elasticity is shown in Table 2.

The mean output elasticity with respect to productive inputs: seed and fertilizers, the output elasticity is negative in the first period. This is an indication that both inputs were overused. After those periods, there was agricultural policy change, that is, the goal of rice production has considered economic aspect, such that high production was no longer the main objective.

Table 1. Estimated *translog* production frontier

	Coefficients	Std. Error	z-ratio	(p>z)
Constant	1.9928	12.1424	0.16	0.870
S	3.8081	4.0204	0.95	0.344
F	0.3819	0.6944	0.55	0.582
P	0.7554	0.7427	1.02	0.309
C	0.4573	0.2861	1.60	0.110
L	-0.3848	1.3598	-0.28	0.777
1/2 S*S	-0.2094	0.2934	-0.71	0.475
1/2 F*F	-0.0126	0.0182	-0.69	0.488
1/2 P*P	0.0208	0.0106	1.95	0.051
1/2 C*C	-0.0017	0.0022	-0.79	0.431
1/2 L*L	0.1406	0.0639	2.20	0.028
S*F	0.2976	0.1659	1.79	0.073
S*P	-0.0473	0.1314	-0.36	0.719
S*C	0.0344	0.0632	0.54	0.586
S*L	-0.4074	0.3309	-1.23	0.218
F*P	0.0810	0.0234	3.46	0.001
F*C	0.0519	0.0136	3.81	0.000
F*L	-0.1532	0.0825	-1.86	0.063
P*C	-0.0220	0.0125	-1.77	0.077
P*L	-0.0731	0.0610	-1.20	0.231
C*L	-0.0738	0.0180	-4.10	0.000
S*t	0.0621	0.0305	2.04	0.042
F*t	0.0066	0.0089	0.74	0.458
P*t	-0.0024	0.0057	-0.43	0.671
C*t	0.0019	0.0015	1.22	0.222
L*t	0.0041	0.0121	0.34	0.736
t	-0.2759	0.1249	-2.21	0.027
t*t	-0.0020	0.0007	-2.96	0.003
μ	0.2665	0.1254	2.12	0.034
η	0.0123	0.0030	4.06	0.000
γ	0.9750	0.0135	72.22	0.000
Log-likelihood	538.50024			
Likelihood test (χ^2)	730.57			

Source: Author's analysis

Table 2. Mean elasticity of rice production with respect to each input,1999-2014

Period	Seed	Fertilisers	Pesticides	Compost	Labour	Scale
1999-2002	-0.2290	-0.0251	0.0150	0.0437	0.1045	-0.0908
2003-2006	-0.1595	0.0283	0.0662	0.0084	0.0401	-0.0164
2007-2010	-0.0213	0.0169	0.0300	-0.0039	0.0836	0.1052
2011-2014	0.1470	-0.0299	-0.0026	-0.0185	0.2069	0.3029

The mean elasticity is calculated at average input used and time trend during each period

Scale elasticity, which is the sum of mean output elasticity with respect to all inputs (Kumbhakar & Lovell, 2000), is very small (even negative) at the two first periods. This is somehow not a puzzling phenomenon. This is because the aggregate production function is assumed to exhibit CRS (Mariyono, 2013); such that it is allowable to estimate production function is an intensive form. In many cases of agricultural production technology, output elasticity with respect to land is likely to be very high.

Table 3. Source of productivity growth of rice production during 1999-2014

Period	Technical change	Scale effect	Technical efficiency	Allocative efficiency	TFP
1999-2002	0.0159	0.4725	-0.0028	-0.7174	-0.2318
2003-2006	0.0129	0.7231	-0.0029	-0.7899	-0.0569
2007-2010	0.0057	-0.1016	-0.0031	0.0234	-0.0756
2011-2014	-0.0117	-0.0285	-0.0032	-0.0164	-0.0598

Table 3 shows the TFP growth. Rate of technical change is decreasing. Technological change in Asian agriculture (Teruel & Koruda, 2004) and particularly in Indonesia (Mariyono, 2009; 2015) was exceptional when the Green Revolution started, but it was decreasing afterward. According to (Kalirajan, Mythili, & Sankar, 2001), the decreasing growth in technical change is due partly to environmental degradation; and this has been causing a high value of dead weight lost in Indonesia (Mariyono, 2014). Scale effect fluctuated overtime because it is dependent on output elasticity and growth rate of input use. Technical efficiency has negative growth. This means that farms in each region became less technically efficient. Rate of change in allocative efficiency in two first periods is very high. This is reasonable since at the time, economic factor has not been a goal. The goal at those periods was high production. Thus the level use of input tended to be higher than what was allocatively efficient.

The four components have driven total productivity growth of rice production, which is on average, declining at a decreasing rate. The fact that rice production steadily increase was not due to TFP growth. But, the increase in rice production is mostly driven by growth in input use, expansion of agricultural land (Mariyono, 2015). Since the components of productivity growth are decreasing, there is still enough room to increase TFP growth by enhancing technical and allocative efficiency. Shapiro (1983) and Belbase and Grabowski (1985) suggest that efforts to improve efficiency may be more cost-effective than introducing new technologies as a mean of increasing agricultural productivity. Using more advanced and improved agronomical technology is alternative to increase productivity through higher efficiency (Mariyono, 2016).

Conclusion

TFP of rice production in Indonesia grows negatively, but the rate of slowdown tends to decrease very slowly. It seems that growth in rice production during the period is due mostly to growth of input, expansion of land and increase in cropping intensity. The TFP is decomposed into four components: technical change, scale effect, technical efficiency, and allocative efficiency. Technical change and scale effect have contributed positive growth. In contrast, technical and allocative efficiency contribute negative growth. Technical and allocative efficiencies are reasonable options to increase TFP because both components are less costly than introduction of new technology.

References

Bauer, P. W. (1990). Decomposing TFP growth in the presence of cost inefficiency, nonconstant returns to scale, and technological progress. *Journal of Productivity Analysis*, *1*(4), 287–299. https://doi.org/10.1007/BF00160047

Belbase, K., & Grabowski, R. (1985). Technical efficiency in Nepalese agriculture. *Journal of Development Areas*, *19*(4), 515–525.

Felipe, J., & McCombie, J. S. L. (2003). Some methodological problems with the Neoclassical analysis of the East Asian Miracle. *Cambridge Journal of Economics*, *27*(5), 595–721.

Fox, K. J., Grafton, R. Q., Kompas, T., & Che, T. N. (2006). Production and capacity reduction: The case of fishery. *Australian Journal of Agricultural and Resource Economics*, *50*(2), 189–206.

Kalirajan, K. (2004). An analysis of India's reform dynamics. *Oxford Development Studies*, *32*(1), 119–134.

Kalirajan, K. P., Mythili, G., & Sankar, U. (2001). *Accelerating growth through globalisation of Indian agriculture.* New Delhi: MacMillan.

Kumbhakar, S. C., & Lovell, C. A. K. (2000). *Stochastic frontier analysis*. Cambridge: Cambridge University Press.

Mariyono, J. (2009). Technological bias in Indonesian rice production: Why does agrochemical use increase over time? *Quarterly Journal of International Agriculture*, *48*(1), 47–65.

Mariyono, J. (2013). Environmentally adjusted productivity growth of Indonesian rice production. *Journal of Indonesian Economy and Business*, *28*(1), 1–22.

Mariyono, J. (2014). Dead weight loss associated with economic efficiency use of esticides in Indonesian rice production. *Economic Journal of Emerging Market*, *6*(2), 69–84.

Mariyono, J. (2015). Green revolution- and wetland-linked technological change of rice agriculture in Indonesia. *Management of Environmental Quality: An International Journal*, *26*(5), 683–700.

Mariyono, J. (2016). Impacts seed technology improvement on economic aspects of chilli production in Central Java–Indonesia. *Jurnal Ekonomi Pembangunan*, *17*(1), 1–14.

Mariyono, J., Harini, R., & Agustin, N. K. (2007). Impact of economic development and population growth on agricultural land conversion in Jogjakarta: A dynamic analysis. *Jurnal Ekonomi Pembangunan*, *8*(1), 50–61.

Mariyono, J., & Sumarno, S. (2015). Chilli production and adoption of chilli-based agribusiness in Indonesia. *Journal of Agribusiness in Developing and Emerging Economies*, *5*(1), 57–75.

Shapiro, K. H. (1983). Efficiency differentials in peasant agriculture and their implications for development policies. *Journal of Development Studies*, *19*(2), 179–190.

Teruel, R. G., & Koruda, Y. (2004). An empirical analysis of productivity in Philippine agriculture, 1974-2000. *Asian Economic Journal*, *18*(3), 319–344.

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

The inclusive economic development model in Sulawesi island

Rudy Badrudin[1]*, Manggar Wulan Kusuma[2], Ranti Yulia Wardani[3]

[1,2] YKPN School of Business, Yogyakarta, Indonesia
[3] Ph.D. Candidate at The International University of Japan's Graduate School of International Relations Niigata, Japan
Corresponding Author e-mail: rudybadrudin.stieykpn@gmail.com

Article Info

Article history:
Received : 4 June 2018
Accepted : 2 July 2018
Published : 1 October 2018

Keywords:
fiscal decentralization, inclusive economic development model

JEL Classification:
H72, H75, R11

DOI:10.20885/ejem.vol10.iss2.art2

Abstract

This study aims to determine whether there is an inclusive economic development in Sulawesi Island. Data used are secondary data sourced from the financial statements of the Local Government regency and city in Sulawesi Island in 2009-2016. The data analysis technique used is Partial Least Square which tested on nine different sample areas. The results showed that general allocation fund and own source revenue have positive effect on capital expenditure. The capital expenditure has positive effect on economic growth. However, the economic growth has negative effect on welfare of society and poverty.

Introduction

The regional autonomy is one tool that can be used to create the public decision-making process more democratic and provide better public services to delegate authority to the levels of government for spending. In the implementation of equitable development in each region, the regional autonomy system is one instrument that is considered effective. With the implementation of regional autonomy is expected to reduce the inequality between regions that are considered as a result of lack of fairness of a centralized system. Badrudin & Kuncorojati (2017) argues that with the holding of regional autonomy, the government policies will be better targeted, it is because for regional governments tend to better understand the circumstances and situation of the region, and the potential existing in the region rather than the central government.

Intergovernmental transfers is a common phenomenon that occurs in all countries of the world regardless of the system of government and even have become the hallmark of the most prominent of the financial relationship between central and local. The main objective is to transfer the implementation of fiscal externalities that arise across the region, improvement of the tax system, correction of fiscal inefficiency and fiscal equalization among regions.

To realize economic growth, Sulawesi provincial administration should be able to balance between revenue and budget regional. Economic growth can be realized if the fiscal decentralization in Sulawesi Island government can run well. Capital expenditure could be funded with block grants and revenue. If the capital expenditure in an area more dominant funded using public funds allocation, this region still relies on the transfer of funds from the central government. In the implementation of regional autonomy, regional government is able to manage its own finances, and to finance its capital expenditure are expected to rely more on the regional government of own source revenue. Then, if the economic growth of a region can be improved, it is expected to improve welfare of society and reduce poverty.

This study aims to determine the development of an inclusive model of economic development in Sulawesi Island to see how the effects of general allocation fund and own source revenue on capital expenditure, the effect of capital expenditure on economic growth, and also see how the effect of economic growth on welfare of society and poverty. In this study, the hypothesis was tested using nine samples different areas by using the same model. In addition to the hypothesis tested in all regenciss and cities in Sulawesi Island, this hypothesis was also tested using samples each region or each province. This is done because in this study wanted to see if the test results would be different if the data is tested by using sample each province as compared to the overall samples, so that it can be seen each region in real conditions.

P ISSN 2086-3128 | E ISSN 2502-180X

The agency theory relating to solve two problems that may occur in relation to an organization, which is the agency problem that arises when the desire or purpose of the principal could not be fulfilled by the agent, and the problem difficult for the principal to verify what the agent actually is right or not. According to Lane (2013), agency theory can be applied in public organizations. There is a connection in agreements principal-agent that can be traced through the budget process, namely, voter-legislature, the legislature-the government, the minister of finance-budget users, the prime minister-bureaucrats, officials and service providers.

The problems facing the legislature can be interpreted as a phenomenon called agency problems. Agency problem involves at least two parties, the principal has the authority to take action, and the agent who received the delegation of authority from the principal. The government there is a connection in agreements principal-agent that can be traced through the budget process. General allocation fund is derived from the state budget funds allocated to financial equalization between regions and the financing needs of regional spending in the framework of the implementation of decentralization (Darwanto & Yustikasari, 2007).

According to Law No. 33/2004 on Financial Balance between Central and Regional Article 1, own source revenue aims to provide flexibility to local governments to dig funds in the implementation of regional autonomy. According to Kusumadewi & Rahman (2007), capital expenditure is the expenditure budget for the acquisition of fixed assets and other assets that benefit more than one year and aims to increase assets or wealth area, where the assets are will lead to more spending.

The phenomenon of flypaper implications that the transfer will increase the expenditures of regional government greater than the acceptance of the transfer itself. The flypaper as a result of the behavior of bureaucrats who transfer spend more freely than raising taxes derived from the original income is referred to as the greed of politicians. The economic growth is a study of the increased production of goods and services in economic activities. Economic growth is also a science that studies the increase in Gross Domestic Product (GDP) or Gross National Product (GNP) regardless of whether the increase in GDP or GNP was larger or smaller than the rate of population growth (Badrudin & Kuncorojati, 2017). If a country can provide economic goods, it is hoped that people can use so that the welfare of society is increasing and can reduce poverty.

The welfare of society is a way to associate welfare with social choices objectively obtained by summing the satisfaction of individuals in society. According to Badrudin & Kuncorojati (2017), the level of per capita income does not fully reflect the level of prosperity because of the weakness which is based on imperfections in the calculation of national income, each capita income and the weakness stems from the fact that the level of welfare of society is not only determined by income levels but also by other factors. Human Development Index (HDI) is a powerful tool to measure the level of welfare of society between countries and between regions.

The central government provides general grants to regional governments to finance the activities of regional expenditure. By this central and regional government wished to allocate it wisely, because it is not always able to supervise the performance of the central government, a regional government. It is difficult for the principal that the central government to verify what the agent, the regional gis right or not. If a regional government can allocate each of its funds effectively and efficiently, it will hopefully be able to fund its capital expenditure. Darwanto & Yustikasari (2007) proved that the general allocation fund has a real connection with capital expenditure. Siregar & Badrudin (2017) proved that the general allocation fund positive effect on capital expenditure. Based on the explanation, the hypothesis is formulated as follows:
H1: General allocation fund has positive effect on capital expenditure

Own source revenue must meet the elements of rationality, future oriented, can be used for in the future, and can be used as a benchmark for the success and failure of implementation of activities in a region. The province can increase revenue by allocating more resources that can be extracted from the province. Darwanto & Yustikasari (2007) argues that the region's ability to provide the funding coming from the region is highly dependent on the ability of the region to realize its economic potential for sustainable regional development. Darwanto & Yustikasari (2007) also proved that the own source revenue has a positive influence on the capital expenditure. Based on the explanation, the hypothesis is formulated as follows:
H2: Own source revenue has positive effect on capital expenditure

An area can achieve economic growth if the area can always improve the existing infrastructure in the region. The decision to increase capital spending is part of a desire to improve the quality and quantity of public services. If the quality and quantity of public services is increasing, it is expected to boost economic

growth in a region. Badrudin & Kuncorojati (2017) showed that the actual capital expenditure have a positive influence on economic growth. Based on the explanation, the hypothesis is formulated as follows:
H3: Capital expenditure has positive effect on economic growth

The economic growth is an important part in the development of a region that would later have an impact on welfare of society. With the quality of human capital, economic performance in an area believed to also be better. Therefore, in order to achieve good economic growth, the regional government must also consider the aspect of increasing the quality of its people, including in the context of the regional economy. Improving the quality of the public also will provide benefits in reducing inequality between regions, so that the imbalance that has been happening can be reduced and will further improve the welfare of society. Siregar & Badrudin (2017), Badrudin & Siregar (2015), and Sasana (2009) proved in research that significantly affect economic growth and have a positive relationship to the welfare of society. Based on the explanation, the hypothesis is formulated as follows:
H4: Economic growth has positive effect on welfare of society

The economic growth can be highly influential instrument in poverty reduction in the region. An area of increasing economic growth, is expected to reduce the level of poverty. The granting greater autonomy will give greater impact to economic growth. This is supported by Jonaidi (2012) which proves that there is a strong two-way relationship between economic growth and poverty and economic growth has a significant effect on poverty reduction. However, Manek & Badrudin (2016) proved that the economic growth no significant effect on decreasing the number of poor people. Based on the research of Jonaidi (2012), it can be concluded that economic growth has a negative effect on poverty in an area. Based on the description above, the hypothesis is formulated as follows:
H5: Economic growth has negative effect on poverty

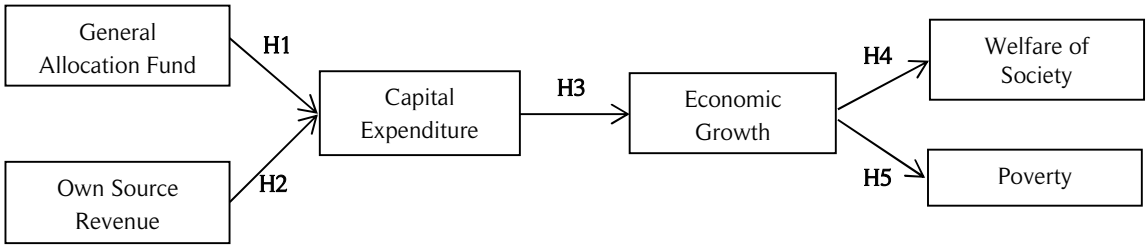


Figure 1. Theoretical Framework

Methods

In this study, the area that will be the object of research is the whole regencies and cities in Sulawesi Island. Sulawesi Island has six provinces, namely the province of Central Sulawesi, Southeast Sulawesi, North Sulawesi, West Sulawesi, South Sulawesi, and Gorontalo Province. The data used in this research is secondary data obtained from the Directorate General of Budget Ministry of Finance in the form of data realized budget from 2009-2016, GRDP, Human Development Index, and Percentage of Poor People of Sulawesi Island. The analysis technique used is the Partial Least Square ($\alpha = 0.05$). Tests conducted in nine samples of different areas but with same model.

Classification of variables is based on theoretical and empirical studies as a reference framework of thinking that consists of two variables are exogenous and endogenous. Exogenous variables are variables that affect the operation of a model economy and the variable is not affected by any relationship described by the model. Exogenous variables in this study is the general allocation fund and own source revenue. According to Law No. 33 of 2004, the general allocation fund has a definition that funds from the state budget allocated to the purpose of equalization of fiscal capacity among regions to fund the needs of the region in the implementation of decentralization, while own source revenue has a definition of regional income sourced from the local tax, the results of retribution, results management wealth separated areas, and others are legitimate, which aims to provide flexibility to local governments in funding in decentralization as a manifestation of the principle of decentralization.

Endogenous variables are variables that are influenced by exogenous variables. Endogenous variables in this study are: (a) an endogenous variable that has a meaning intervening variables that take effect when the exogenous variables affect the endogenous variables depend. Endogenous variables intervening in this

study are the capital expenditure and the economic growth. The capital expenditure by Government Accounting Standards has a definition of expenditure made in the context of capital formation that are adding fixed assets/inventory that benefit more than one accounting period, including the expenses for the maintenance cost nature maintain or increase its useful life, as well as increasing the capacity and quality of assets. Economic growth is described by the value of GRDP over prices come into force in a region. GRDP at current prices is the sum of the production value or the income or expenditure is assessed according to the prices prevailing during the year; (b) an endogenous dependent variable is the variable that is influenced by exogenous and endogenous variables intervening. Dependent endogenous variables in this study are the welfare of society and the poverty. According to Law No. 11 of 2009, the welfare of society is the fulfilment of the conditions of material, spiritual, social and citizens in order to live a decent and able to develop themselves, so that they can perform their social function. Public welfare in this study illustrated with HDI value of an area. The HDI is how residents can access development results in obtaining income, health, education, and so forth. The poverty is described by percentage of poor people.

Results Discussion

Sulawesi is one of the island which is crossed by the equator line in the quarter north of the island so most of Sulawesi Island is located in the southern hemisphere.

Table 1. Descriptive Statistic Analysis Results

Descriptive Statistic	General Alloca-tion Fund *	Own Source Revenue *	Capital Expenditure *	Growth (%)	Welfare of Society	Poverty (%)
Mean	288,979	26,955	113,151	7.53	71.37	14.89
Maximum	647,300	619,593	419,034	17.65	80.17	77.69
Minimum	1,454	415	23,354	-6.62	63.17	4.70

Remarks: *) in millions of rupiah

Based on Table 1 it appears that the variable of general allocation fund had an average for all regencies and cities in Sulawesi Island for 2009-2016 amounted to Rp288,979 billion, the highest general fund allocation indicated by Makassar City, South Sulawesi Province in 2012 amounted to Rp647,300 billion, and general allocation fund indicated by the lowest common in Selayar Regency, South Sulawesi Province. The own source revenue had an average for all regencies and cities in Sulawesi Island for 2009-2016 amounted to Rp26,955 billion. The capital expenditure had average for all regencies and cities in Sulawesi Island for 2009-2016 amounted to Rp113,151 billion. If the views of the average for 2009-2016, capital expenditure in Sulawesi Island more funded using general allocation fund compared to use own source revenue. Judging from the results of descriptive analysis, average economic growth in Sulawesi Island is only 7.53%. This indicates that economic growth in Sulawesi Island is still not evenly distributed. This is indicated by the value of HDI as measured by welfare of society the range between 63.17 and 71.37 and the average ratio of poor people is 14.89%.

Inductive analysis using Partial Least Square (PLS) includes research goodness of fit model (inner model). Results of testing the goodness of fit model can be seen in Table 2 below:

Table 2. Goodness of Fit Model

APC = 0.179, p_value <0.001	Good if p_value<0.05
ARS = 0.063, p_value =0.032	Good if p_value<0.05
AVIF=1.072	Good if ≤ 5

Based on the test results, the Average value of Path Coefficient (APC) of 0.179 with p_value <0.001, it means that a significant APC values (<0.05). The significant value of APC can prove that endogenous and exogenous variables have a cause and effect relationship either directly or indirectly. The Average value R-Squared (ARS) obtained the results of 0.063 with p_value = 0.032, it means that the value of ARS significant because p_value <0.05. In this research model does not happen multicolinearity, proved from the Average Variance Inflation Factor (AVIF) of 1.072 whose value ≤ 5.

The results of the analysis of the data if the first hypothesis is done by using nine different samples. In Table 3, showing that in fact when this hypothesis was tested on a sample of all regencies and cities in

Sulawesi Island has a p_value <0.01 that the value is smaller than significance level of 5%, which means the relationship between fund general allocation with capital expenditure have a significant effect. Path coefficient of 0.11 (is positive) indicates that the general allocation fund have a positive effect on capital expenditure. Judging from the test results, H1 is supported when tested using samples in all regencies and cities Sulawesi. When H1 is tested using samples of Southeast Sulawesi Province turned out hypothesis is also supported. The results of path coefficient of 0.35 (is positive) and the p_value <0.01 indicates that in Southeast Sulawesi Province, general allocation fund have a positive effect on capital expenditure. This hypothesis is rejected when tested using samples of West Sulawesi, South Sulawesi, Central Sulawesi, North Sulawesi and Gorontalo Province. So, when H1 is tested with a sample of each area, the general allocation fund relation to capital expenditure mostly do not significantly. Special tests were conducted with a sample in Western Sulawesi and Southern Sulawesi Province, the general allocation fund have a negative effect on capital expenditure. This is shown by the path coefficients of -0.55 and -0.02.

Table 3. The Hypothesis Testing Results (H1)

No	Sample Region	Path Coefficient	P_Value	Prediction	Findings
1	Regency and City	0.11	<0.01	Positive	Supported
2	Regency	0.34	<0.01	Positive	Supported
3	City	0.26	0.01	Positive	Supported
4	West Sulawesi Province	-0.55	0.01	Positive	Rejected
5	South Sulawesi Province	-0.02	0.38	Positive	Rejected
6	Southeast Sulawesi Province	0.35	<0.01	Positive	Supported
7	Central Sulawesi Province	0.26	0.10	Positive	Rejected
8	North Sulawesi Province	0.18	0.08	Positive	Rejected
9	Gorontalo Province	-0.42	<0.01	Positive	Rejected

H1 tested by using samples of all regencies and cities in Sulawesi Island and Southeast Sulawesi Province sampled in the first hypothesis is supported. This means that the bigger the general allocation fund will cause the amount spent on capital expenditure will also increase. Large capital expenditure will be used to finance infrastructure development in an area. These results support to study of Siregar & Badrudin (2017) and Darwanto & Yustikasari (2007), which showed that the general allocation fund has a positive effect on the capital expenditure.

However, when seen from the results of Table 3 of nine samples area used only three sample areas that the results of analysis supported H1 that samples a whole area of the regency and city in Sulawesi Island, samples a whole area of the regency in Sulawesi Island, and the sample area in Southeast Sulawesi Province. While the results of the analysis of samples in 5 other regions reject H1. It can be concluded that the first hypothesis is rejected, the test results prove that the general allocation fund negative effect on capital expenditure. These test results support to Wandira, (2013) that the general allocation fund has a significant negative effect on capital expenditure. Based on agency theory, the principals believe that the central government on the performance of the agencies that the regional government in terms of allocation of block grants given by the central government. It is difficult for the principal to oversee and verify what the agent is right or not. The central government can not directly oversee regional government in each province in Sulawesi Island in the allocation of public funds in each region. It is shown from the test results H1 in Table 3, many hypothesis are rejected when tested using a sample area each province.

Table 4. The Hypothesis Testing Results (H2)

No	Sample Region	Path Coefficient	P-Value	Prediction	Findings
1	Regency and City	0.35	<0.01	Positive	Supported
2	Regency	0.07	0.13	Positive	Rejected
3	City	0.49	<0.01	Positive	Supported
4	West Sulawesi Province	-0.30	0.04	Positive	Rejected
5	South Sulawesi Province	0.46	<0.01	Positive	Supported
6	Southeast Sulawesi Province	0.36	<0.01	Positive	Supported
7	Central Sulawesi Province	0.23	0.20	Positive	Rejected
8	North Sulawesi Province	0.37	<0.01	Positive	Supported
9	Gorontalo Province	-0.42	<0.01	Positive	Rejected

Viewed as a whole by using a sample of all regencies and cities in Sulawesi Island, the test H2 is supported. Great path coefficient of 0.35 (is positive) indicates that the own source revenue has positive effect on capital expenditure, and the magnitude of the p_value of <0.01 shows that own source revenue had a significant association with capital expenditure. In Table 4 of the nine samples area used, the results of the second hypothesis testing using the area received five samples, so that test results can be concluded in this study received H2. This means that the larger the own source revenue in Sulawesi Island greater the amount of capital expenditure. If an area has a lot of own source revenue, then it could be used to fund capital expenditure. These results support to study of Darwanto & Yustikasari (2007) which showed that the own source revenue has positive effect on capital expenditure.

If the H2 testing performed on samples of each region, the result of hypothesis testing using a sample both areas throughout the regency in Sulawesi Island, West Sulawesi, Central Sulawesi, and Gorontalo Province are rejected. So, the own source revenue had a negative influence on capital expenditure. The increase in local own source revenue are not able to increase capital expenditure. This may happen if own source revenue owned these areas are not too many allocated to capital expenditure.

Based on the analysis that has been summarized in Table 5, the third hypothesis testing conducted on six samples received the result region. It can be concluded in this study, the third hypothesis is supported. When viewed as a whole, to be tested using a sample of the entire territory of the regency and city in Sulawesi Island, the third hypothesis is supported. The magnitude of the path coefficient of 0.29 (is positive) indicates that capital expenditure has a positive influence on economic growth, and magnitude of p_value <0.01 indicates that capital expenditure has a significant relationship with economic growth. This means that the more the amount of capital expenditure in all regencies and cities in Sulawesi Island can boost economic growth. According to Badrudin & Kuncorojati (2017) and Setiawan & Hakim (2013), capital expenditure is part of a local desire to improve the quality of public services, which is expected to boost economic growth in the region. More and more funds allocated to capital expenditure, the more budget spent for infrastructure development in the area so expect economic growth can be achieved.

Table 5. The Hypothesis Testing Results (H3)

No	Sample Region	Path Coefficient	P-Value	Prediction	Findings
1	Regency and City	0.29	<0.01	Positive	Supported
2	Regency	0.28	<0.01	Positive	Supported
3	City	0.52	<0.01	Positive	Supported
4	West Sulawesi Province	0.07	0.40	Positive	Rejected
5	South Sulawesi Province	-0.39	<0.01	Positive	Rejected
6	Southeast Sulawesi Province	0.10	0.14	Positive	Rejected
7	Central Sulawesi Province	0.43	<0.01	Positive	Supported
8	North Sulawesi Province	0.41	<0.01	Positive	Supported
9	Gorontalo Province	0.62	0.04	Positive	Supported

The nine samples of the region, the results of testing the third hypothesis is supported in six samples of the area. Using a sample of regencies and cities in Sulawesi Island third hypothesis is supported. Even when tested using samples of all regencies in the region of Sulawesi Island and sample the whole area of the city in Sulawesi Island results are also supported. However, when the third hypothesis was tested using a sample area of each province in Sulawesi Island, precisely the third hypothesis is from six samples of the province, the third hypothesis is supported when it was tested only in three samples provinces, namely Central Sulawesi, North Sulawesi, and Gorontalo Province. This proves, that the real economic growth in Sulawesi Island is the exclusive economic growth, because economic growth has not been evenly distributed across the province, one of them in all provinces in Sulawesi Island.

Seen in Table 6, if H4 is tested using a sample area all regencies and cities in Sulawesi Island, the H4 is rejected. Whereas if H4 is tested using a sample area of each province in Sulawesi Island, the results of six samples of the province, five samples received using the province. Of the nine samples used area, in the region of six samples fourth hypothesis is supported so that it can be concluded in this study received the fourth hypothesis that economic growth positively affects the welfare of society. The higher economic growth in the region will improve welfare of society. The fourth hypothesis results support to study of Siregar & Badrudin, (2017), Badrudin & Siregar, (2015), and Sasana (2009) which proved positive effect of the economic growth on the welfare of society.

Table 6. The Hypothesis Testing Results (H4)

No	Sample Region	Path Coefficient	P-Value	Prediction	Findings
1	Regency and City	0.05	0.12	Positive	Rejected
2	Regency	0.30	<0.01	Positive	Supported
3	City	-0.39	<0.01	Positive	Rejected
4	West Sulawesi Province	0.10	0.13	Positive	Rejected
5	South Sulawesi Province	0.47	<0.01	Positive	Supported
6	Southeast Sulawesi Province	0.43	<0.01	Positive	Supported
7	Central Sulawesi Province	0.40	<0.01	Positive	Supported
8	North Sulawesi Province	0.18	0.04	Positive	Supported
9	Gorontalo Province	0.39	<0.01	Positive	Supported

In Table 6 it can be seen if H4 tested as a whole by using a sample of all regencies and cities in Sulawesi Island, the H4 is rejected. This is indicated by the path coefficient value of 0.05 (is positive) and its large p_value of 0.12 indicating economic growth is not significant relationship with the welfare of society. It turned out that when viewed as a whole, in Sulawesi Island, economic growth was not able to improve the welfare of society. This could be due to economic growth in the respective provinces in Sulawesi Island are not evenly distributed in accordance with the test results H3. The results of this analysis shows that economic growth in Sulawesi Island is an exclusive economic growth.

Based on the results of the analysis are summarized in Table 7 of the nine samples of this region, there are six sample areas that states that the fifth hypothesis is supported, so it can be concluded that in this study the fifth hypothesis is supported. Based on the results of the analysis are summarized in Table 7, if the fifth hypothesis was tested using a sample area per province, the fifth hypothesis is supported when using the sample region in West Sulawesi, South Sulawesi, Southeast Sulawesi, Central Sulawesi, and North Sulawesi Province. Of the six provinces in Sulawesi Island, there are five provinces that showed hypothesis testing is supported.

Table 7. The Hypothesis Testing Results (H5)

No	Sample Region	Path Coefficient	P-Value	Prediction	Findings
1	Regency and City	0.09	0.01	Negative	Rejected
2	Regency	-0.40	<0.01	Negative	Supported
3	City	0.32	<0.01	Negative	Rejected
4	West Sulawesi Province	-0.65	0.01	Negative	Supported
5	South Sulawesi Province	-0.43	<0.01	Negative	Supported
6	Southeast Sulawesi Province	-0.52	<0.01	Negative	Supported
7	Central Sulawesi Province	-0.38	<0.01	Negative	Supported
8	North Sulawesi Province	-0.29	<0.01	Negative	Supported
9	Gorontalo Province	0.52	0.29	Negative	Rejected

Viewed as a whole, if the fifth hypothesis was tested using a sample of the entire territory of regencies and cities in Sulawesi Island, the fifth hypothesis is rejected. The fifth hypothesis testing using samples of all regencies and cities in Sulawesi Island shows the path coefficient value of 0.09 (is positive) indicates that economic growth has a positive effect on poverty, while economic growth is expected to have a negative effect on poverty. This means an increase in economic growth when viewed using a sample of the entire territory of the regency and city in Sulawesi Island can not reduce poverty. The results of this analysis shows that economic growth in Sulawesi Island is an exclusive economic growth. The fifth hypothesis results support to study of Manek & Badrudin (2016) but not align with the finding by Jonaidi (2012).

When tested on the whole regencies and cities five hypothesis is rejected, but when tested using samples per province mostly five hypothesis test result is supported. This suggests that overall economic growth in Sulawesi Island have exclusive economic growth. However, when the hypothesis is tested using five samples each province region turned out to show economic growth inclusive, namely sustainable economic growth and broad-based in various provinces to reduce income inequality. This means that there is the influence of mobility among economic actors between regencies and cities in each province. So that the correlation between the regency and the city was important, since regional autonomy.

Conclusion

Hypothesis 1 which states that general allocation fund has positive effect on capital expenditure is supported. This means that the bigger the general allocation fund will cause the amount spent on capital expenditure will also increase. Large capital expenditure will be used to finance infrastructure development in an area. Hypothesis 2 which states that own source revenue has positive effect on capital expenditure is supported. This means that the larger the own source revenue in Sulawesi Island greater the amount of capital expenditure. If an area has a lot of own source revenue, then it could be used to fund capital expenditure. Hypothesis 3 which states that capital expenditure has positive effect on economic growth is supported. This means that the more the amount of capital expenditure in all regencies and cities in Sulawesi Island can boost economic growth. The capital expenditure is part of a local desire to improve the quality of public services, which is expected to boost economic growth in the region. More and more funds allocated to capital expenditure, the more budget spent for infrastructure development in the area so expect economic growth can be achieved.

Hypothesis 4 which states that economic growth has positive effect on welfare of society is rejected. It turned out that when viewed as a whole, in Sulawesi Island, economic growth was not able to improve the welfare of society. This could be due to economic growth in the respective provinces in Sulawesi Island are not evenly distributed in accordance with the test results Hypothesis 3. Based on the results of economic growth in Indonesia is an exclusive economic growth so that economic growth is uneven, it will not be used to improve the welfare of whole society on the island of sulawesi island. Hypothesis 5 which states that economic growth has negative effect on poverty is rejected. This suggests that overall economic growth in Sulawesi Island have exclusive growth. This means that five samples each province region turned out to show economic growth inclusive.

The proportion of the magnitude of the path coefficients obtained each variable general allocation fund and own source revenue turned out path of general allocation fund is smaller than the path coefficient of own source revenue. So it can be said that the effect of general allocation fund on capital expenditure is stronger than the effect of own source revenue on capital expenditure. The regional government in setting policy budget more stimulated by a number of general allocation fund received compared with own source revenue areas. This proves the existence of flypaper effect in the regional government's response to the general allocation fund and own source revenue.

The testing hypothesis 1 to 5 different results for inter-regional tests such as regencies with cities and testing each province due to the influence of the location of the area. This is based on the position of the area whether in quadrant on Klassen typology that measures the economic strength of each region. Thus, the economic strength of each region will determine the successful implementation of regional autonomy in achieving inclusive economic growth as measured by the achievements of welfare of society and poverty.

References

Badrudin, R., & Kuncorojati, I. (2017). The effect of district own-source revenue and balance funds on public welfare by capital expenditure and economic growth as an intervening variable in Special District of Yogyakarta. *Jurnal Manajemen Dan Kewirausahaan*, *19*, 54–59.

Badrudin, R., & Siregar, B. (2015). The evaluation of the implementation of regional autonomy in Indonesia. *Economic Journal of Emerging Market*, *7*(1), 1–11.

Darwanto, & Yustikasari, Y. (2007). The influence of economic growth, local original income, and general allocation fund to allocation of capital expenditure budget. In *Simposium Nasional Akuntansi X*.

Jonaidi, A. (2012). Analysis of economic growth and poverty in Indonesia. *Journal of Economic Studies*, *1*(1), 140–164.

Kusumadewi, D. A., & Rahman, A. (2007). Flypaper effect on general allocation fund (DAU) and local original income (PAD) to local expenditure in regency/city in Indonesia. *Journal of Accounting Auditing Indonesia*, *11*(1), 67–80.

Lane, J.-E. (2013). The principal-agent approach to politics: Policy implementation and public policy-making. *Open Journal of Political Science*, *3*(2), 85–89.

Manek, M., & Badrudin, R. (2016). The effect of original income and balancing funds on economic growth

and poverty in Nusa Tenggara Timur Province. *Telaah Bisnis*, *17*(1), 81–89.

Sasana, H. (2009). The role of fiscal decentralization to economic performance in regency/municipality of Central Java Province. *Journal of Development Economics*, *10*(1), 103–124.

Setiawan, M. B., & Hakim, A. (2013). Human development index in Indonesia. *Jurnal Economica*, *9*(1), 18–26.

Siregar, B., & Badrudin, R. (2017). Degree of fiscal decentralization and flypaper effect: Evidence from Indonesia. *Advanced Science Letters*, *23*(9), 9013–9019.

Wandira, A. G. (2013). The effect of PAD, DAU, DAK, and DBH on modal spending. *Accounting Analysis Journal*, *2*(1), 44–51.

Economic Journal of Emerging Markets, 10(2) 2018, 137-147

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available at http://journal.uii.ac.id/index.php/jep

A feasibility study of establishing fiscal council in Indonesia

Haryo Kuncoro

Faculty of Economics, State University of Jakarta, Jakarta, Indonesia
Corresponding Author e-mail: har_kun@feunj.ac.id

Article Info

Article history:
Received : 31 March 2018
Accepted : 19 June 2018
Published : 1 October 2018

Keywords:
fiscal policy rule, credibility, time inconsistency, forecasting error, stationary data

JEL Classification:
E6, H3, H6

DOI: 10.20885/ejem.vol10.iss2.art3

Abstract

In this paper we address the quantitative measurement of credibility in fiscal policy in the case of Indonesia over the period 2001-2016. This preliminary paper focuses on the deviations of the actual budget balances from the projections about these balances in the preceding years. The objective is to extract from these data insights into the credibility of the government fiscal policies. We found that fiscal policy as conducted by government is not perceived as credible. The targets set forward by government are often not met and usually the divergence is on the negative side. Revenue and spending are overestimated, leading to a deficit bias and growing indebtedness of government. Those results suggest feasibility to establish the fiscal council with the independent power to conduct the credible fiscal policy in order to maintain fiscal sustainability in the long-term.

Introduction

In the recent years, fiscal policy has been received much attention considerably. In response to the global financial and economic crisis that started in 2008, for example, countries around the world embarked on an unprecedented level of intervention. Within months of the crisis, stimulus packages were announced, ranging for example from 1.4 percent of GDP in the UK to close to 6 percent of the GDP in the US, and over 12 percent of GDP in China (ILO, 2011).

At the same time, massive public spending, depressed economic activity, and reduced revenue are causing considerable fiscal pressure. According to the later IMF forecast, among advanced economies, public debt as a percent of GDP is expected to exceed 100 by 2010, 30 percentage points up from 2007 (IMF, 2010). As such, policymakers are urged to bring public expenditures under control, including scaling back programs introduced as part of stimulus measures.

For academicians, the above phenomenon is interesting when confronted to the monetary policy. After voluminous empirical and theoretical studies dedicated solely to the effect of monetary policy, the fiscal policy seems to be likely 'reborn' to contribute to the macroeconomic stabilization policy. While there is uncertainty about the magnitude of the effect of these fiscal measures on economic activity (Cimadomo, Kirchner, & Hauptmeier, 2010), these interventions pose major challenges to the long-term sustainability of public finances.

For policymakers, on the other hand, the reemerge of fiscal policy remains the question on how effective to control economic fluctuations. While the impact of monetary policy could be identified in the short-term, the fiscal policy works with longer lags by means that its impact might be observable in the long-term. However, there seems to be an agreement on the long-term benefits of government debt reductions, there is no unified view on the short-term effects of fiscal austerity (Jansen, Li, Wang, & Yang, 2008).

With regard the long-term impact, strengthening the credibility and predictability of fiscal policies is essential to develop an environment that is conducive to growth and rising incomes (OECD, 2012). Since credible fiscal plans aimed at restoring fiscal sustainability become increasingly essential, attention at an academic and policy level is growingly shifting towards the economic, political, and institutional factors that underpin such credibility.

As fiscal policy has consequences for economic agents and economic activity, it is important to formulate policy responsibly. If a country enjoys fiscal credibility, and if a fiscal deficit appears in the short term, private economic agents believe it will be rapidly corrected. They therefore do not expect that this country's fiscal solvency will be threatened, or that its public debt ratio will become excessive (Artus, 2014). Therefore, fiscal credibility has been widely mentioned as one of the most important fundamentals of macroeconomic policy.

P ISSN 2086-3128 | E ISSN 2502-180X

In the context of Indonesia, knowing the credibility of fiscal policy is important. Historically, the Indonesia's government has been implementing fiscal deficit relying on debts (foreign debts and later domestic debts) to promote economic growth. Given the substantial deficits for a long time, whether its impacts is a key political and economic issue. It also has been criticized due to excess burden in terms of interest payment (Kuncoro, 2011a), fiscal sustainability (Kuncoro, 2011b), persistent inflation (Snyder, 1985), external imbalance (Adji, 1998), and crowding-out private spending effects (Kuncoro, 2000).

Basically, the fiscal policy basically is said to be credible if there is a little difference between actual and projected fiscal measures (Naert, 2011). However, it is important to note that the basic economic assumptions that are used by government to set up the state budget are mostly beyond the government of control[1]. The difference between actual fiscal measures from the target, therefore, does not perfectly imply the lack of fiscal policy credibility. In contrast, the adjustments of state budget in the mid-year implicitly present the lack of time consistency. Hence, we need to explore further the fiscal policy credibility problem in the case of Indonesia.

To address the credibility problem, it is sometimes suggested to install fiscal councils on top of the fiscal rules. Fiscal councils with tasks in forecasting and assessing fiscal policy have been and are being introduced in more and more countries. Some economists want to go further however and propose to establish fiscal councils with independent powers to conduct fiscal policy within the borderlines that parliament lays down (Naert, 2011). Indonesia does not have fiscal council. The fiscal council fuctions are conducted by Ministry of Finance, i.e. Directorate of Taxes Affair and Directorate of Budgeting. The state financial law does not require having a fiscal council. Accordingly, it is also necessary to assess the possibility of these international tendencies in a country such Indonesia.

This paper enriches the literature on fiscal policy credibility in developing countries with focus on Indonesia. Therefore, fiscal policy in the rebalancing process is likely to require an increase in the credibility of fiscal policy in order to maintain fiscal sustainability.

The rest of the paper is organized as follows. In the next section, we briefly present the budgeting process and then followed by reviewing literature and previous empirical researches both in developed countries and developing countries including Indonesia. The forth section describes the dataset and empirical techniques used. Then, we present the main results of the empirical study. In the end, we conclude with a summary of key findings.

Fiscal policy basically concerns with the use of government revenue collection (taxation) and expenditure (spending) to influence the economy, or else it involves the government changing the levels of taxation and government spending in order to influence aggregate demand and the level of economic activity (see for example: O'Sullivan and Sheffrin (2003). It can be run by either discretionary policy or rule-based policy.

In the rules-based policy frameworks, policymakers announce in advance how policy will respond in various situations and commit themselves to following through. Conversely, as events occur and circumstances change, policymakers use their judgment and apply whatever policies seem appropriate at the time. The two types of policy basically have the same goal. The main different characteristic lies primarily on the approach to conduct.

However, there are some arguments why rules are preferred over discretion. The discretionary policy takes time to recognize, to implement, and to affect the economy. The political process cannot be trusted: politicians make policy mistakes or use policy for their own interests (Mankiw, 2013). The shocks lead to unnecessary fluctuations in output and employment. Consequently, the stabilizing policy could destabilize.

In addition, discretionary policy can be subject to dynamic inconsistency (Barro & Gordon, 1983; Kydland & Prescott, 1977). It arises when a policymaker prefers one policy in advance but a different one when the time to implement arrives. Relaxing the previous stance generates confusion that makes policy ultimately ineffective. On the other hand, a rule-based policy can be more consistent, because it is more transparent and easier to anticipate.

In general, fiscal policy rules formulation can be traced back to the government budget constraint. The government spending (G), as far as possible, can be financed by domestic revenues, R. If the domestic revenue is insufficient to cover G, the available financing option is debt (D) and/or money printing (seigniorage, S):

$$(R_t - G_t) = D_t + S_t \quad (1)$$

The fiscal rule as (1) helps to establish rules on the government budget: targets on the overall deficit, structural balance, ceilings on public debt or expenditure, rules for saving tax revenue in good times and disaving

[1] The mechanism of state budget formulation in Indonesia is nicely summarized by Blöndal et al. (2009).

in bad times. All of them can induce the fiscal discipline. Hence, fiscal rules are mechanisms to support fiscal sustainability and counter-cyclical fiscal policies (Gutierrez, 2012).

However, the fiscal plans may be distorted by the need to comply with ex-ante fiscal rules that require fiscal discipline only in terms of plans but not in terms of outcomes (Beetsma, Giuliodori, & Wierts, 2009). He illustrates that when forming their plans governments are under political pressure to be ambitious in terms of fiscal discipline as well as generous to the various groups in the voting population, the plans may differ from realized fiscal outcomes.

It should not come as a surprise then that official forecasts of economic growth used in projecting budgetary spending and taxing often are too optimistic. This leads to projected income that is higher than is realistic and projected spending that is lower than in reality. A structural forecast bias leads to persistent deficits and growing public debt. The deficit bias reflects a time inconsistency problem whereby the long-term discipline objective is systematically overlooked when short-term discretion is being used (Naert, 2011).

Those explanations above give the basic idea of the fiscal policy credibility. In short, fiscal policy is said to be credible if there is a little difference between actual and projected fiscal measures. That definition, however, seems to be government-centered. On the other side, the fiscal policy credibility could be evaluated from the economic agent's point of view. Baxter (1985) and Hauner, Jonáš, & Kumar (2007) argue that credibility is the idea living in the minds of market agents about how close the results of a policy will be to the announced policy. In this case, the fiscal policy is credible if it induces economic agent' confidence to support the policy.

In a broader sense, by covering both sides, the fiscal policy credibility could be justified from its effectiveness. Credibility and effectiveness however are by no means synonyms. In an environment of high inflation, for example, fiscal spending increases inflation expectations and borrowing costs, affecting fiscal policy effectiveness. In such uncertainty, the confidence effects are likely to be even more important and how agents respond will very much depend on a government's policy and credibility (Tang, Liu, & Cheung, 2010).

Furthermore, it does not necessary mean that discretionary fiscal policy is always not credible. Even though the discretionary fiscal policy does not refer to any planned fiscal policy, it might be credible if the fiscal policy effectively affects the economic activity. However, it is arguable whether the discretionary fiscal policy effectiveness is associated with policy credibility itself or policymaker credibility.

Drazen & Masson (1994) differentiate policy credibility and policymaker credibility. According to them, policy credibility is defined as the expectation that an announced policy will be carried out. A policymaker will renege on his commitment if circumstances are bad enough. Therefore, credibility reflects not only the policymaker's intentions, but also the state of the economy. They show how a 'tough' policy could yield benefits well into the future via enhanced reputation.

Some factors in deciding credible fiscal policy are nicely summarized by Kopits and Symansky (1998). However, any rule may entail a dilemma between flexibility and credibility. Too rigid a rule in the pursuit of credibility may lead to high costs in forgone flexibility. Even more, an excessively rigid rule may become altogether non viable. If this is the case, economic agents may anticipate the non sustainability of the rule and it will not lead to more credibility. In other words, an excessively rigid rule may limit flexibility and not enhance credibility; it may entail only costs and few benefits if at all. It would just be a bad rule (Perry, 2003).

While the credibility has an important influence on the fiscal policy effectiveness, empirical studies concerning this aspect ironically are still limited. The main problem is that the concept of credibility further remains unquantifiable. The second one is classic: forecasting the economic prospects in the future is more of an "art" than "science". In addition, any forecasting is more difficult with annual "point estimate" target than "interval estimate" target in the shorter periods (Clark, 2011).

Some researches use different methods to address this issue. The existing empirical studies can be categorized into two groups. The first group deals with the accuracy of fiscal projections in the uni-variate analytical frameworks (Annett, 2006; Artis & Marcellino, 2001; Beetsma et al., 2009; Brück & Stephan, 2006; Merola & Pérez, 2013; Naert & Goeminne, 2011; Pina & Venes, 2011; Strauch, Hallerberg, & von Hagen, 2004). In general, they focus only on actual deficits compared to the projected deficits in line with the Stability and Convergence Programs of Europe's Stability and Growth Pact.

The second group tries to explain the forecasting mistakes based on their own measures of credibility using multivariate analysis. Crain and Tollison (1993), for example, used political institution as a measure of credibility. They offer an extensive and robust test of the time-inconsistency theory of fiscal politics. Employing data of US states from 1969 to 1989, the results of their tests indicate the variables such as legislative stability and executive term limits have strongly predictable impacts on the volatility of various measures of fiscal policy.

Hallett, Kuhn, & Warmedinger (2012) suggested the use of real-time cash data to make accurate intra-annual forecasts of an economy's fiscal position and to issue early warning signals for the need to correct fiscal imbalances. Examples from Germany and Italy show that large corrections are often necessary early on to make the later adjustments acceptable in size and to keep debt ratios from escalating. They also found the differences between front-loaded and back-loaded adjustment schemes are likely to be vital for the time consistency and hence credibility of fiscal policy making.

Similar with Hallett et al., (2012); Kandil & Morsy (2014) used international reserves as a measure of credibility. They found that the presence of high reserves can mitigate this effect – discretionary fiscal policy can be counter-cyclical. They then examine the impact of fiscal policy on output under different scenarios. For high-reserves economies, there seems to be some stimulatory impact of fiscal policy in the short-run. For high-inflation economies, there is a contractionary impact in the short-run. For high-debt countries, the contractionary impact prevails both in the short and long-run.

In the case of Indonesia, the related studies focusing on the credibility of fiscal policy are scare. Abdullah, Warokka, and Kuncoro (2011) proposed the use of budgetary slack as a measure of time inconsistency. According to their study, budgetary slack is a common figure in any public sectors. However, as the excess of requirements for resources or understatement of productive capability, the difference of those magnitudes indicates the disability of government officials to take into account all chances and risks in the future. Taking the case of Jakarta province over the period of 2004-2007, their study provides the test of government policy consistency towards its campaigned programs.

In the national level, Kuncoro (2014) found that the credible fiscal policy reduces the volatility of government expenditure. Using the same approach, Kuncoro (2015) further proved that the credible fiscal policy plays an important role on the price stabilization. Unfortunately, Abdullah et al. (2011) took the case of local government which does not reflect the credibility of national fiscal policy. Meanwhile, Kuncoro (2014, 2015) did not explicitly examine first whether the fiscal policy is credible or not.

Research Method

Those empirical studies above provide some deeper perspectives to assess fiscal policy credibility in many aspects. In general, they focus on the developed countries which have difference characteristics in economic and political environments from the developing countries. The results of those studies seem to suggest that fiscal policy credibility might be an issue for emerging economies more than for developed ones. This inspires us to test the fiscal policy credibility in case of Indonesia.

This paper is in line with the previous studies and mainly closely related to Naert and Goeminne (2011), Abdullah et al. (2011), and Kuncoro (2014, 2015) even though it has some significant differences. First, we assess the fiscal policy credibility comprehensively by breaking down into revenue, expenditure, and overall fiscal balance. Second, we use descriptive statistics, inferential statistics, together with time series econometrics to address the quantitative problems.

The third distinction is that we cover more recent time periods in the single country at the national level data. This is because some of the conventional wisdom on the credibility of fiscal policy is based on aggregate (global) data even though policymakers are typically concerned with the recent behavior of fiscal policy outcomes at their own country level. Forth, we assess the feasibility of installing fiscal council. The ultimate objective of this approach is to get insight the credibility of government fiscal policies.

As noted by Naert & Goeminne (2011) assessing the quality of forecasts can be done using a multitude of techniques. For first preliminary results we opt to give a qualitative indication of forecast accuracy by presenting some descriptive statistics and by applying a graphical analysis. This method has the advantage of being straightforward; still it does not permit to test the statistical significance of the results.

In this paper, we assume that budgetary projections have to be regarded as the announcements of a political target. Analogously to Annett (2006) and Pina and Venes (2011) the credibility of fiscal policy (E_t) is measured as the difference between its actual budget balance in year t (A_t), and its most recent target for the budget balance for year t in t-1 (P_t), or thus:

$$E_t = A_t - P_t \quad (2)$$

Positive values of E_t mean a better-than-projected policy execution, yielding a higher surplus or a lower deficit. The negative values indicate that governments achieved results that were worse than projected or that forecasts were optimistic, that is, underestimations of the deficit or overestimations of the surplus.

In the similar way, we might construct the credibility of fiscal policy index (CI) as follows:

$$CI = \frac{A_t}{P_t} \times 100 \quad (3)$$

Based on this formula, the accuracy of fiscal policy is indicated by a score of 100. If the budget realization were less than what has been targeted before, the credibility index would be indicated less than 100. Meanwhile, if the budget realization exceeds the projected figures, the index will be more than 100.

The above methods merely based on the planned budget which is typically predetermined in the previous year. In fact there are many adjustments in the corensponding period. To accommodate them, we estimate the actual budget (*F*) using the key macroeconomic variable (*X*). In this case, we may construct a regression model linking the two variables.

Following methodology used by Akitoby, Clements, Gupta, and Inchauste (2006), we suppose there is a steady-state (or long-run path) relationship between actual budget and the key macroeconomic variable (*X*) given by:

$$F_t = C\ X_t^{\delta} \quad (4)$$

Equation (4) can also be written in linear form:

$$\text{Log } F_t = \text{Log } C + \delta \text{ Log } X_t + \mu_t \quad (5)$$

where μ_t is independent and identically distributed disturbance terms with mean 0 and variance σ^2. It also represents the forecasting error given available information of *X* in period *t*. Both C and δ are parameter to be estimated.

In cases where δ is insignificant, there is no steady-state relationship between fiscal variable and output, according to Aizenman and Marion (1993), therefore, the unexpected effect of fiscal policy can be calculated by fitting a first-order autoregressive process and ρ is best estimated by omitting the output variable such that:

$$\text{Log } F_t = a + \rho \text{ Log } F_{t-1} + \varepsilon_t \quad (6)$$

The credibility of fiscal policy can be identified by applying the conventional unit roots test to μ_t in (5) and ε_t in (6). We use Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) unit roots tests as follows:

$$\text{DF:} \quad \Delta \xi_t = \varphi + \lambda \xi_{t-1} + \nu_t \quad (7a)$$

$$\text{ADF:} \quad \Delta \xi_t = \varphi + \lambda \xi_{t-1} + \phi_i \Sigma \Delta \xi_{t-i} + \theta \text{ Trend} + \nu_t \quad (7b)$$

$$\xi \in (\mu_t, \varepsilon_t)$$

If the coefficient of λ is statistically significant, the fiscal policy is said to be credible, i.e. the associated fiscal variable is stationary, that is invariant to the mean as the expected value.

Since we concern with credibility, we need reliable and long span time series data on fiscal policy comprising revenue, expenditure, and, consequently, deficit. Unfortunately, the quarterly or monthly data of government budget are publicly unavailable. Data on monthly cash disbursement of functional government budget has never been released by Ministry of Finance to the public. In addition, the cash inflow of tax received only published only for some recent months.

Regarding to the limitation, in this paper we use annual data. This is because the planned budget is established once time even though then revised in the mid year. In the mid-year budget revision, the government does not always announce the new targeted budget. Therefore, we analyze the difference between the accumulation of actual budget (before and after budget revision) and the original planned budget. As comparison, we also analyze the quarterly data on government expenditure derived from the national income standard account based on expenditure approach. This is intended that our study will be comparable to similar studies in other countries.

The government revenue is divided into two grand categories, taxes and non taxes received excluded grants. The term government expenditure used in this study is central government general consumption or recurrent expenditure realization (mostly allocated onto wage/salary and goods/services purchase) and capital expenditure. Inclusively, we also assess the spending of transfer to regions. Deficits are the difference between government spending and government revenues.

The selected key macroeconomic variable is GDP. The GDP is used the main factor for government to set the state budget projection for the next year. The GDP data are available in quarter basis. Those variables are presented in 2010 constant price. The sample periods chosen for this study extend from 2001(1) to 2016(4). The total observation is 64 sample points. All of the data are taken from the Central Bank of Indonesia

(www.bi.go.id) and Central Board of Statistics (www.bps.go.id). Most of the results are calculated in econometric program Eviews 9.

Results and Discussion

Fiscal policy stance can be represented in many aspects. Nevertheless, the overall balance is the most important indicator to evaluate the fiscal policy. We begin our discussion with this measure. Figure 1 presents the evolution of total government revenue and total spending. It is notable that the expenditure always exceeds the revenue implying that the overall balance is deficit.

Looking at the magnitudes, the fiscal deficit was relatively stable primarily until 2008. In the relative term, the fiscal deficit was successfully maintained at less than 3 percent to GDP. However, it is also notable that there was a significant difference between the amount of deficits during pre- and post-global financial crisis periods. Since 2008, the trend of deficits has been increasing remarkably. In the beginning of crisis, the central government launched fiscal stimuli amounting 73.3 trillion Rupiah allocated mostly to social welfare to minimize the adverse economic impacts of global financial crisis.

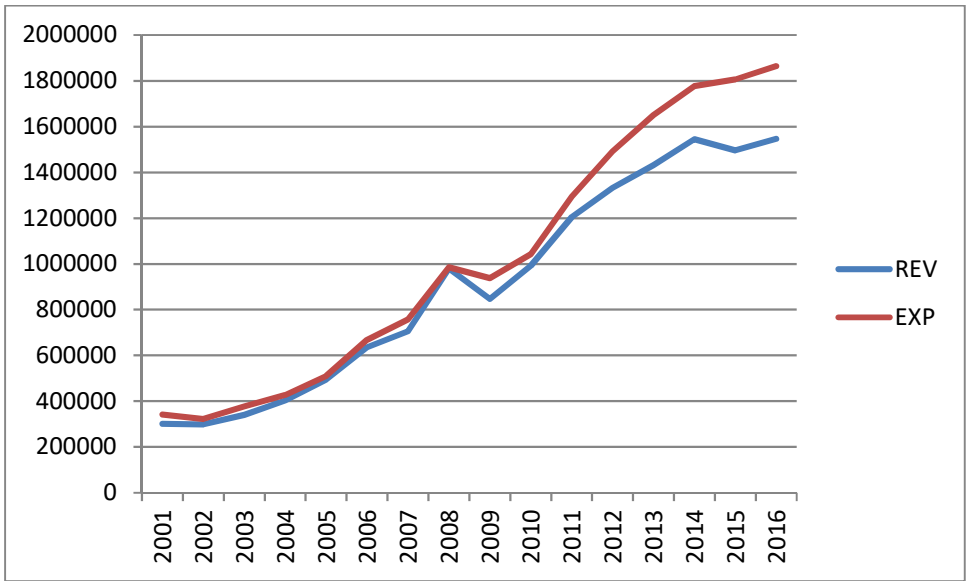


Figure 1. Total Government Revenue and Expenditure (in Billion Rupiah)

Table 1 report the average of difference between actual budget and planned budget for each revenue and expenditure in more detail. The total government revenue tends to be underestimated indicated by the negative value of the bias. Most of the bias is supported by taxes revenue. Accordingly, taxes are overestimated implying that the projected taxes revenue is greater than the actual one. It seems that government is not conservative to estimate the taxes revenue as found by Abdullah et al. (2011) in the context of budgetary slack in the lower-layer government.

Regarding to the expenditure, the government spending tend to be upward bias. The actual spending is far enough from the plan implying that government is very optimistic. When we break down into two grand categories, the conclusion does not alter. The negative bias holds for the central government spending and expenditure for transfer to regions. In general, those results are in line with Naert & Goeminne (2011).

The results of one-sample test are also presented in Table 1. Comparing mean value over standard deviasion supports the variability of taxes revenue, total government spending, and central government expenditure. In contrast, the realization of non taxes revenue and transfer to regions is relatively close to the projected budget. This result is plausible. The non taxes revenue refer to natural resources exploitation payment while the distribution of transfer to the regions is based on the certain formulae resulting the bias is the lowest.

The larger negative bias of expenditure than that of revenue leads to a deficit bias and growing indebtedness of government. The deficit bias is substantial, over than 19 trillion Rupiah on the average from the targeted budget. Refer to the result from Table 1 and Figure 1; we can say at this point that the state budget

is unsustainable but credible. This conclusion is consistent with Kuncoro (2011b) in the case of quarterly data for the longer time frame.

Our questions in mind are: what does really Table 1 imply? Does it mean that the fiscal policy in general is not credible? Does the fiscal policy become less credible when the results of the policy are better than projected? In our view the use of mean as the representative indicator of credibility is inappropriate. This is because the negative and positive values will cancel out. Consequently, the mean value tends to be approximated to zero and the conclusion would be misleading.

Table 1. Average of Difference between Actual Budget and Planned Budget, 2001-2016 (in billion Rupiah)

	Mean	t-test	Conslusion
Total Revenue	-38,587.38	-1.6856	Credible
Taxes	-46,634.19	-2.1572	Non Credible
Non Taxes	8,046.75	1.7328	Credible
Total Spending	-57,805.94	-3.6137	Non Credible
Central Government Spending	-48,681.88	-4.1343	Non Credible
Transfer to Regions	-9,124.00	-1.8906	Credible
Overall Deficit	19,218.56	1.8628	Credible

Note: conclusions are drawn at 95 percent confidence level

To avoid this arithmetical problem, we develop fiscal policy credibility index. Table 2 reports the fiscal policy credibility index, actual budget to projected budget ratio. The credibility index of total revenue is slightly lower than 100 implying that the projected revenue is greater than the actual one. This is in line with the mean value as found in Table 1. Only the non taxes revenue, which has greater than 100, confirms to the previous results.

The most credible fiscal policy is transfer to regions indicated by the value of index is closest to 100. This is contrast with the above result when we look at the average of difference between actual and planned budget, its mean value is negative. The overall deficit is also found to be inconsistent. The index is the lowest (75.85) suggesting that the projected deficit is underestimated meanwhile the mean value of difference between actual and planned budget is positive. The one sample test seems to support that the overall deficit is non credible.

Given those inconsistencies, we revisit with CV (coefficient of variance; that is the standard deviation to its mean ratio). Now we can set up the criteria: (1) the lower the CV, the higher the credibility and (2) the actual to planned budget ratio closer to 100, the higher the credibility. Based on those criteria, transfer to regions is the most credible (it has the lowest CV, 2.92 percent and the ratio is 98.56, almost 100) followed by total spending (CV: 3.75 percent and ratio: 95.42 respectively). The lowest credible is the overall deficit indicated by the highest CV, 40.65, percent and the lowest ratio, 75.85.

Table 2. Descriptive Statistics of Actual Budget to Planned Budget Ratio, 2001-2016

	Mean	Standard Deviation	CV (%)	Conclusion
Total Revenue	97.60	6.02	6.17	Credible
Taxes	96.27	6.16	6.40	Non credible
Non Taxes	102.74	7.95	7.74	Credible
Total Spending	95.42	3.58	3.75	Non credible
Central Government Spending	94.06	4.49	4.77	Non credible
Transfer to Regions	98.56	2.88	2.92	Credible
Overall Deficit	75.85	30.83	40.65	Non credible

Note: conclusions are drawn at 95 percent confidence level

So far, we have already discussed the credibility of fiscal policy in Indonesia based on the elementary descriptive statistics which does not allow any dispersion. Except overall balance, we have not achieved yet the unique conclusion regarding the credibility of each budget. To get the conclusive information, we move on to the inferential statistics by incorporating confidence level. As long as the test lies in the tolerated confidence level, the government that does better than planned does not suffer from a drop in credibility.

Since the total government expenditure is non credible, furthermore, we will check it again using econometrics of time series. As comparison, we employ government consumption expenditure data in the

national income account. The estimation result of a simple log-linear regression connecting government consumption expenditure and GDP (both in logarithmic forms) is presented in Table 3.

The national income can systematically explain the behavior of quarterly government consumption expenditure. The variation of government consumption expenditure is contributed by GDP for about 93 percent. Moreover, the partial and overall tests indicate the significance impact of GDP proven by t-statistic and F-statistic at 95 percent or even higher confidence level. Hence, the model can be used well to predict the 'projected' values of government consumption expenditure.

The national income positively determines the government consumption expenditure. The increase 1 percent in GDP will induce the increase in the government consumption expenditure on the average for about 1.3 percent. The conventional statistical test infers that the corresponding coefficient is elastic ($\delta > 1$) implying the increase in government consumption expenditure tends to be faster than that in GDP. Consequently, the projected value is higher than the actual one. Given this result, we can say that the government consumption expenditure is downward bias and thus non credible as previously found by the descriptive statistics.

The second part of the Table 3 performs the result of auto-regressive model. Posing the lag as explanatory variable, the corresponding coefficient is 0.66 and statistically significant suggesting the existence of dynamic stability. As expected, the magnitude is positive and less than unity indicating the high persistency of government expenditure in relation to the low partial adjustment actual value to the desired one.

However, the further statistical verification shows that the associated coefficient is different from unity. This implies that the lagged value, on the average, unequals to the current value indicating that the current value is not the best information to predict the future one. Consequently, the forecasting error, on the average, will not converge to zero. In other words, the actual value will be far from the predicting value implying non credible.

Table 3. Estimation Result of Government Consumption Expenditure, 2001(1)-2016(4)

	Log Linear			AR		
	Coeff.	t-stat	Prob.	Coeff.	t-stat	Prob.
C	-7.2372	-6.5876	0.0000	3.9901	3.4848	0.0009
Log (Y)	1.3317	17.2716	0.0000	-	-	-
Log G(-1)	-	-	-	0.6615	6.7758	0.0000
R			0.8279			0.4294
R-adj			0.8251			0.4201
SEE			0.1588			0.2851
F			298.3072			45.9110
DW			2.7054			2.6727

The series of residual which is generated from regression equations as presented in Table 3 can be considered as forecasting error. If the error terms have unit roots, the associated policy is said to be credible. Table 4 delivers the result of unit roots tests. The test is conducted twice with respect to intercept and intercept with time trend. The DF and ADF tests show that the residual series do not have unit roots at 5 percent significance level. The null hypotheses of non-stationary cannot be rejected which demonstrates the existence of a common trend in those series.

The stationary series implies that the behavior of the variables varies around to the mean value and invariant overtime (Enders, 2004). The occurrence of unit roots in the series gives a preliminary indication of shocks having permanent or long lasting effect, thus making it very difficult for traditional stabilization policies to survive. Conversely, the absence of unit roots in the series suggests that the series is far from expected value implying that the fiscal policy is not credible.

Table 4. Unit Roots Tests of Government Consumption Expenditure Credibility, 2001(1)-2016(4)

	Log Linear		AR		Conclusion
	t-stat	Prob.	t-stat	Prob.	
Intercept	-1.6599	0.4461	-1.5002	0.5267	Non Credible
Intercept and Trend	-2.3714	0.3903	-2.8153	0.1978	Non Credible

Note: conclusions are drawn at 95 percent confidence level

The downward bias of government expenditure can be explained as follows. First, the main problem is in the budget allocation and under-spending for some important activities such as infrastructures and social

spending. Even though the current literatures show that Indonesia's budget either a-cyclical (Akitoby et al., 2006; Baldacci, 2009) or counter-cyclical (Jha, Mallick, Park, & Quising, 2010) but the budget situation in 2014 is clearly pro-cyclical. While the economy is slowing down, because the government is not able to cut energy subsidy, the solution then cut the spending where mostly infrastructures.

Second is lack of flexibility of the allocation and hence limits to the fiscal space (Basri & Rahardja, 2011). Most government spending by the law is obligatory in nature. For example, education spending must be 20 percent of the total outlay. The other important expenditures transfer to the lower-layer governments (26.5 percent of net domestic revenues: domestic revenues minus energy subsidy), 10 percent of local fiscal transfer must be allocated to villages, and health (excluding salary) is 5 percent of spending.

The third deals with the institutional and political factors. Ikhsan (2014) identified that there is lack quality on the implementation (timing, procurement), poor governance and weak fiscal institution, power too much to the Parliament to approve and the line minister to execute the budget, and lack of technical knowledge at the Ministry of Finance. As a result, the government expenditure is less efficient than it should be. Eventually, it seems that establishing fiscal council is necessary for a country with low fiscal credibility like Indonesia.

Conclusion

In this paper we address the quantitative measurement of credibility in fiscal policy in the case of Indonesia over the period 2001-2016. This paper focuses on the deviations of the actual budget balances from the projections about these balances in the preceding years. The objective is to extract from these data insights into the credibility of the government fiscal policies. To the best our knowledge, this is the first study analyzing the credibility of fiscal policy in Indonesia. Therefore, we have to say that this is a preliminary study in nature.

We comprehensively used descriptive statistics, inferential statistics, and time series econometrics. We found that fiscal policy as conducted by governments is not perceived as credible. The targets set forward by the government are often not met and usually the divergence is on the negative side. Revenue and spending projections tend to be overestimated, leading to a deficit bias and growing indebtedness of the government.

Since overall balance is the most important indicator to evaluate the fiscal policy, we infer that fiscal policy in Indonesia as a whole is not credible. The credibility of fiscal policy will be worst, of course, when there is no budget revision in the mid year. Those findings imply that political and institutional factors remain the main obstacle in the short-run for government to conduct the credible fiscal policy. Therefore, those results suggest feasibility to establish the fiscal council with independent powers to conduct the credible fiscal policy to maintain fiscal sustainability in the long-term.

This preliminary study only focuses on the measurements of fiscal policy credibility. Since the overall deficit is a consequence of revenue and spending, the further research could be directed to analyze how the government forecast the revenue so the targeted government revenue is always underestimated. Similarly, deeper studies could be done to explain why the planned government expenditure is overestimated. Using the higher frequency data (hopefully monthly data), the next research is advisable to re-check those findings. Indeed, credibility is the hottest issue in the effectiveness of macroeconomic policy.

References

Abdullah, H. H., Warokka, A., & Kuncoro, H. (2011). Budgetary slack and entrepreneurial spirit: A test of government policy consistency towards Its campaigned programs. *World Journal of Social Sciences*, *1*(5), 175–187.

Adji, A. D. (1998). Do budget deficits rise current account deficits? Cases in ASEAN-5. *Jurnal Ekonomi Dan Bisnis Indonesia*, *13*(3), 15–28.

Aizenman, J., & Marion, N. (1993). Policy uncertainty, persistence, and growth. *Review of International Economics*, *1*(2), 145–163.

Akitoby, B., Clements, B., Gupta, S., & Inchauste, G. (2006). Public spending, voracity, and wagner's law in developing countries. *European Journal of Political Economy*, *22*(4), 908–924.

Annett, A. (2006). *Enforcement and the stability and growth pact: How fiscal policy did and did not change under Europe's fiscal framework* (IMF Working Paper Series WP/05/16).

Artis, M., & Marcellino, M. (2001). Fiscal forecasting: The track record of the IMF, OECD, and EC. *Econometrics Journal*, *4*(1), 20–36.

Artus, P. (2014). *How can we identify monetary credibility and fiscal credibility?* (Flash Structural Problems Economic Research No. 323).

Baldacci, E. (2009). *Neither sailing against the wind, nor going with the flow: a Cyclicality of fiscal policy in Indonesia* (IMF Country Report No. 09/231).

Barro, R. J., & Gordon, D. B. (1983). Rules, discretion, and reputation in a model of monetary policy. *Journal of Monetary Economics*, *12*(1), 101–121.

Basri, M. C., & Rahardja, S. (2011). Mild crisis, half hearted fiscal stimulus: Indonesia during the GFC. In T. Ito & F. Parulian (Eds.), *Assessment on the Impact of Stimulus, Fiscal Transparency, and Fiscal Risk* (pp. 169–211). ERIA Research Project Report 2010-01.

Baxter, M. (1985). The role of expectations in stabilization policy. *Journal of Monetary Economics*, *15*(3), 343–362.

Beetsma, R., Giuliodori, M., & Wierts, P. (2009). Planning to cheat: EU fiscal policy in real time. *Economic Policy*, *24*(60), 53–804.

Blöndal, J.R., Hawkesworth, I. and Choi, H. (2009). Budgeting in Indonesia. *OECD Journal on Budgeting*. *2009*(2), 1-31.

Brück, T., & Stephan, A. (2006). Do Euro zone countries cheat with their budget deficit forecasts? *Kyklos*, *59*(1), 3–15.

Cimadomo, J., Kirchner, M., & Hauptmeier, S. (2010). *Transmission of government spending shocks in the Euro Area: Time variation and driving forces"*, (ECB Working Paper No. 1219).

Clark, C. S. (2011). What is "credible" fiscal policy? The Canadian experience, 1983-2010: The view of a former practitioner. In *New Directions for Intelligent Government in Canada* (Papers in, pp. 101–126). Centre for the Study of Living Standards.

Crain, W. M., & Tollison, R. D. (1993). Time inconsistency and fiscal policy: Empirical analysis of U.S. States, 1969–89. *Journal of Public Economics*, *51*(2), 153–159.

Drazen, A., & Masson, P. R. (1994). Credibility of policies versus credibility of policymakers. *Quarterly Journal of Economics*, *109*(3), 735–754.

Enders, W. (2004). *Applied econometric time series* (2nd editio). New York: John Wiley & Son.

Gutierrez, M. (2012). *Countercyclical fiscal policies in an EAMU: a Challenges and fiscal framework implications", e, February.* (International Center for Globalization and Development). Santiago.

Hallett, A. H., Kuhn, M., & Warmedinger, T. (2012). The gains from early intervention in Europe: Fiscal surveillance and fiscal planning using cash data. *European Journal of Government and Economics*, *1*(1), 44–65.

Hauner, D., Jonáš, J., & Kumar, M. S. (2007). *Policy credibility and sovereign credit: a The case of the new EU e member states* (IMF Working Paper WP07/1).

Ikhsan, M. (2014). Making Fiscal Rules Enforceable", Paper presented in the , June 12. In *Fiscal Policy Rules and Fiscal Council: Experience and Prospects in the Asia-Pacific Region*. Tokyo: IMF Conference Institutions for Fiscal Credibility.

ILO. (2011). *A review of global fiscal stimulus* (Discussion Paper Series No. 5).

IMF. (2010). World economic outlook: Rebalancing growth. Retrieved from http://www.imf.org/external/pubs/ft/weo/2010/01/index.htm.

Jansen, D. W., Li, Q., Wang, Z., & Yang, J. (2008). Fiscal policy and asset markets: A semi-parametric analysis. *Journal of Econometrics*, *147*(1), 141–150.

Jha, S., Mallick, S., Park, D., & Quising, P. (2010). *Effectiveness of counter-cyclical fiscal policy: a Time-series e evidence from a developing e Asia* (ADB Economics Working Paper No. 211).

Kandil, M., & Morsy, H. (2014). Fiscal stimulus and credibility in emerging countries. *Eastern Economic*

Journal, *40*, 420–439.

Kopits, G., & Symansky, S. (1998). *Fiscal policy rules* (IMF Occasional Paper No. 162). Washington DC.

Kuncoro, H. (2000). Ekspansi pengeluaran pemerintah dan responsivitas sektor swasta. *Jurnal Ekonomi Pembangunan*, *5*(1), 53–63.

Kuncoro, H. (2011a). The cost of public debt services, the case of Indonesia. *International Journal of Advanced Economics and Business Management*, *1*(1), 14–24.

Kuncoro, H. (2011b). The Indonesia's state budget sustainability and its implication for financial system stability. *Romanian Journal of Fiscal Policy*, *2*(1), 36–53.

Kuncoro, H. (2014). Does the credible fiscal policy reduce its volatility? The case of Indonesia. *Journal of Applied Economic Sciences*, *9*(3), 382–393.

Kuncoro, H. (2015). Does the credible fiscal policy support the prices stabilization? *Review of Economic Perspectives*, *15*(2), 137–156. https://doi.org/10.1515/revecp-2015-0014

Kydland, F. ., & Prescott, E. C. (1977). Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy*, *85*(1), 473–491.

Mankiw, N. G. (2013). *Macroeconomics* (8th ed.). New York: Worth Publishers.

Merola, R., & Pérez, J. J. (2013). Forecast errors: Governments versus independent agencies? *European Journal of Political Economy*, *32*, 285–299.

Naert, F. (2011). Credibility of fiscal policies and independent fiscal bodies. *Review of Business and Economic Literature*, *56*(3), 288–309.

Naert, F., & Goeminne, S. (2011). Measuring credibility of fiscal policies. In *67th Congress of the International Institute of Public Finance University of Michigan*.

O'Sullivan, A., & Sheffrin, S. M. (2003). *Economics: Principles in action, upper saddle river*. New Jersey: Pearson Prentice Hall.

OECD. (2012). *Economic survey of Hungary 2012*. Paris.

Perry, G. E. (2003). *Can fiscal rules help reduce macroeconomic volatility in the Latine America?* (Policy Research Working Paper No. 3080).

Pina, Á. M., & Venes, N. M. (2011). The political economy of EDP fiscal forecasts: An empirical assessment. *European Journal of Political Economy*, *27*(3), 534–546.

Snyder, W. (1985). The budget impact on economic growth and stability in Indonesia. *Ekonomi Dan Keuangan Indonesia*, *33*(2), 21–34.

Strauch, R., Hallerberg, M., & von Hagen, J. (2004). *Budgetary forecasts in Europe, the track record of stability and convergence programs* (ECB Working Paper Series No. 307).

Tang, H. C., Liu, P., & Cheung, E. C. (2010). *Changing impact of fiscal policy on selected ASEAN countries* (ADB Working Paper Series No. 70).

Economic Journal of Emerging Markets, 10(2) 2018, 148-164

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available at http://journal.uii.ac.id/index.php/jep

Determinants of Global Palm Oil Demand: A Gravity Approach

Rini Yayuk Priyati *

The University of Western Australia and Universitas Terbuka, Indonesia
Corresponding Author e-mail: rpriyati@ecampus.ut.ac.id

Article Info

Article history:
Received : 16 January 2016
Accepted : 2 July 2018
Published : 1 October 2018

Keywords:
Palm oil, trade, gravity model

JEL Classification:
F14, Q17

DOI:10.20885/ejem.vol10.iss2.art4

Abstract

This paper reviews the determinants of global palm oil trade using the gravity model. This model helps to explain how the shift in demand for palm oil has affected trade flows among trading partners. We decompose the effects of growth in the regional markets, location, and the reduction in the palm oil price relative to other edible oils, on palm oil exports. We find that standard variables suggested by the gravity literature, such as the growth of GDP, GDP per capita, and location, are indeed important determinants of palm oil trade. Given the preceding results, we simulate whether the economic growth of Indonesia's trading partners can explain the growth in palm oil export demand from Indonesia. The simulation results for top ten Indonesia's trading partners suggest that the growth of palm oil imports is a great deal higher than the growth of income for all countries.

Introduction

Palm oil (PO) is a type of vegetable oil derived from oil palm (*Elaeis guineensis* Jacq.) fresh fruit bunch (FFB). Oil palm cultivation is found in tropical areas of Africa, South America, and South East (SE) Asia. The history of oil palm cultivation and trade began in Africa and was associated with the slave trade in the 16th century. However, the modern development of the PO industry in Africa has lacked behind SE Asia, particularly Indonesia and Malaysia, the two largest PO producers globally.

The vast growth in global PO demand is undeniable. In fact, PO is one of the fastest growing perennial crops in the world (Koh & Wilcove, 2008). However, the industrialisation of PO was only prominent after the 1980s. The global PO trade has increased more than five-fold from 1990 to 2015, or from 8.3 million tonnes to 45.1 million tonnes (USDA-FAS, 2016).

However, PO industry development is also one of the most controversial global problems, as it is argued to be one of the major sources of deforestation, particularly in biodiversity-rich countries like Indonesia and Malaysia. In 2013, the total area of global oil palm plantation was 18.1 million hectares, increased from 6.1 million hectares in 2013 (FAOstat, 2015).

The largest share of global PO demand comes from Asian countries, with India and China being the largest and second largest importers of PO. Together they account for more than 33 percent of the global PO export market. But, does the growth in these two markets account for the growth in Indonesia's PO exports?

To answer this question, we employ the gravity model. This model will help to explain how the shift in demand for PO has affected trade flows among trading partners. We will examine the effects of growth in the regional markets, location, and the reduction in PO price relative to other edible oils on PO exports. The second aim of this paper is to examine the role of income growth in top 10 Indonesia's palm oil importers, particularly China and India in determining PO demand from Indonesia.

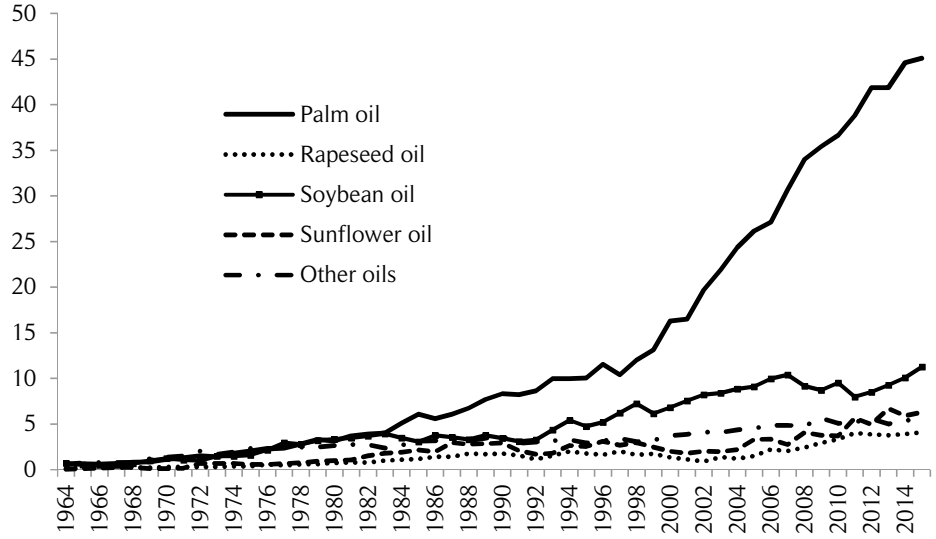
In the global edible oil market, PO is the most important traded vegetable oil, with import growth of 7 percent annually between 1990 and 2015. PO import shares of total vegetable oil imports have increased substantially, from around 41 percent in 1990 to around 64 percent in 2014. Meanwhile, import shares of soybean oil have gradually decreased from around 17 percent to around 14 percent over the same period.

Indonesia and Malaysia dominate the PO export market. Their combined export share is around 90 percent of the world's total demand. Since 2008, Indonesia has surpassed Malaysia in PO exports. In 1980, Indonesia's export share was only 6 percent, while Malaysia was 72 percent. Whereas in 2014, Indonesia's export share was 54 percent and Malaysia's was 37 percent. A significant growth in Indonesian PO exports

* The author would like to thank W/Prof. Peter Robertson and W/Prof. Rodney Tyers for their constructive comments.

P ISSN 2086-3128 | E ISSN 2502-180X

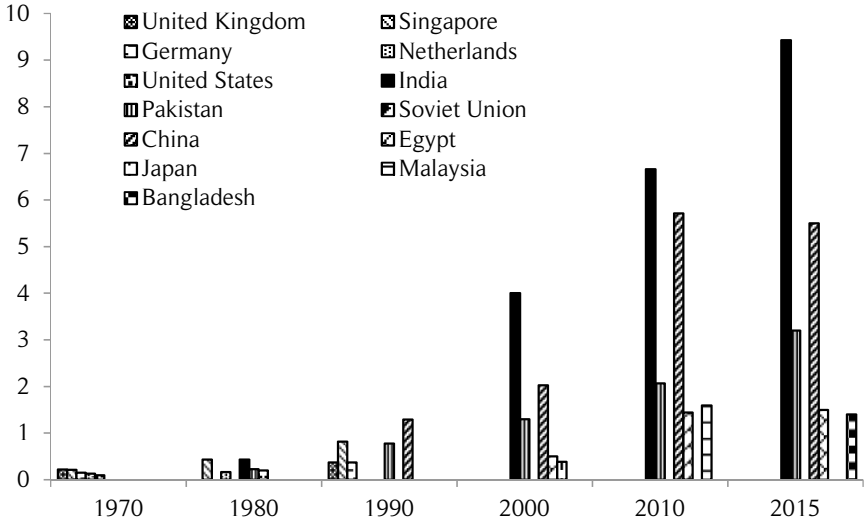
occurred after 1990. Meanwhile, the export share for the rest of the world has remained constant at around 10 percent since 2000.



Source: USDA-FAS (2016).

Figure 1. Major Vegetable Oil Imports, 1964–2015 (Million MT)

Figure 2 shows that there has been a major shift in the largest PO import countries since 1970. In 1970, PO imports were dominated by European countries, including the UK, Germany, and the Netherlands. Between 1980 and 1990, several European countries, including the Netherlands, Germany, the UK and the former Soviet Union, still played an important role in the PO market. After that, the market shifted to Asian countries.



Source: USDA-FAS (2016).

Figure 2. Top Five Palm Oil Imports, 1970–2015 (Million Metric Tonnes)

Recently, the largest market for global PO is Asia. Data from USDA-FAS (2016) shows that, in 2015, four out of the top five PO importers are located in Asia: India, China, Pakistan and Bangladesh. Since early 2000, India and China have been the largest importers of PO. India absorbed around 21 percent and China 12 percent of global PO imports in 2015. Another top importer is Egypt. These top five countries alone were responsible for more than 46 percent of global PO demand in 2015.

Strong population and economic growth is likely to increase demand for PO in many Asian countries, particularly India and China. Population growth will increase the total demand for PO, while economic growth will increase the average edible oil consumption, particularly since the average consumption in both countries is far below the world average. We estimated the annual per capita consumption of major vegetable oils for selected countries based on total domestic consumption from USDA data and total population data from World Bank. The results are available in Table 1.

Table 1. Per Capita Consumption of Major Vegetable Oils, 1990–2010 (kg/year)

Country	1990	2000	2010
China	5.74	10.71	20.92
India	5.75	10.55	12.92
Indonesia	11.75	19.97	32.92
US	28.69	25.38	38.12
World	11.05	14.95	22.10

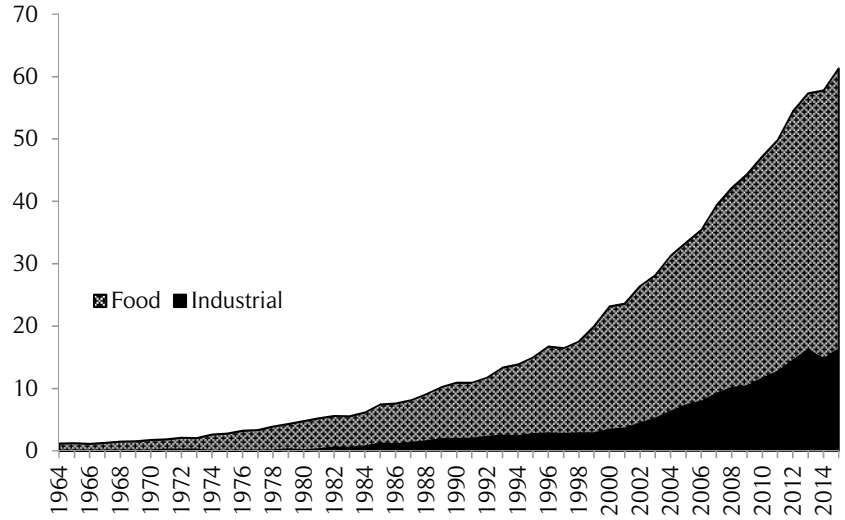
Source: (USDA-FAS, 2016) and (Word Bank, 2016).
Note: per capita consumption is author's calculation.

Major vegetable oils include coconut oil, cottonseed oil, olive oil, palm oil, palm kernel oil, groundnut oil, rapeseed oil, soybean oil and sunflower oil. Note that this estimation indicates the per capita of total domestic consumption. It does not separate oils for food and industrial consumption

Table 1 shows that per capita vegetable oil consumption has increased over time. The increase was particularly large in China with per capita consumption increasing almost four-fold during 1990–2010. Though not as significant as China, growth of per capita consumption in India is still considered high, more than doubling during the same period. However, these figures are still below the world average and below the Western average (for example, if compared with per capita consumption in the US). High per capita consumption in Indonesia might be misleading as it represents not only the actual consumption of PO, but also the PO processing industries in Indonesia.

Palm oil is predominantly served as edible oil. However, it can also be used for industrial purposes. Figure 3 shows the global consumption of PO for food and industrial uses. The figure shows that total consumption of PO increased more than five-fold between 1990 and 2015, from 11 million MT in 1990 to 61 million MT in 2015. However, the growth rate of industrial PO exceeded that for edible PO. During the same period, PO used for non-food industry grew by more than 700 percent, from 1.9 million MT to 16.3 million MT, while PO used for food increased by 400 percent, from 9 million MT to 45 million MT. In 1980, almost 100 percent of PO was served as food. In 2015, this had decreased to 73 percent.

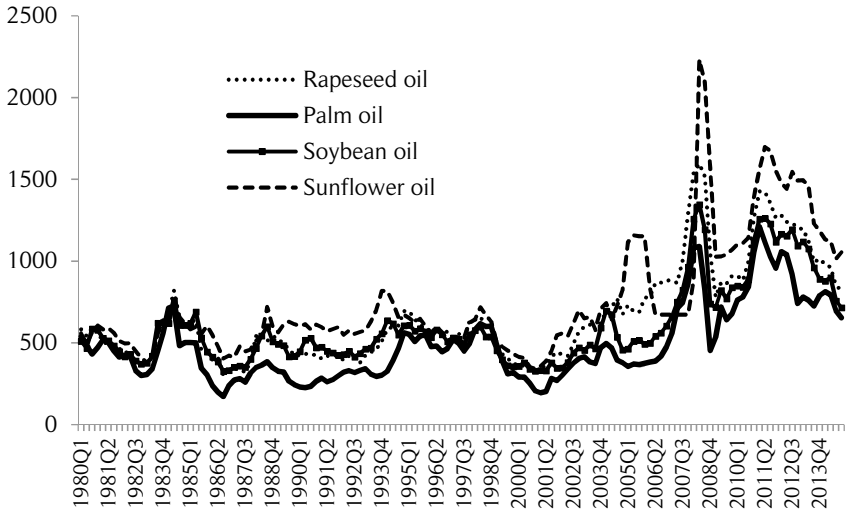
Though this figure does not mention in detail what the industrial purposes are, many believe that this is strongly correlated with the growing increase of the biodiesel industry, especially in European countries (Lam *et al*., 2009, Lam *et al*., 2009, Murphy, 2009). According to Mitchel (2008), biodiesel was responsible for approximately one-third of the increase in vegetable oil consumption in 2004–2007. In the early 19th century Europe, PO was predominantly used for soap, candles and heating (Henderson & Osborne, 2000). Nowadays, according to Gerasimchuk and Koh (2013), biodiesel feedstock in Europe increased by 365 percent from 2006 to 2012, equivalent to an increase from 0.4 million MT to 1.9 million MT, and an increase of 40 percent for electricity and heat generation from 0.4 million MT to 0.6 million MT. For comparison, the use of PO for other purposes, mainly food, increased by 6 percent (Gerasimchuk and Koh, 2013). This is important, since Europe is the largest producer of biodiesel (Tan *et al*., 2009, Zhou and Thomson, 2009). There is also a growing interest in biodiesel production in Asian countries, especially PO-based biodiesel in Indonesia and Malaysia (Mekhilef, Siga and Saidur, 2011, Santosa, 2008, Wirawan and Tambunan, 2006, Zhou and Thomson, 2009).



Source: (USDA-FAS, 2016).

Figure 3. Global Palm Oil Consumption for Food and Industrial Uses, 1964–2015 (Million MT)

One important reason for PO's growing popularity appears to be price. Compared with other vegetable oils, PO has the lowest price. Although the gap in price between PO and soybeans, its closest substitute, is not large, PO prices have been consistently below soybean prices over the past decades. The average price of PO was around 17 percent less expensive than soybean oil in 2010–2014, as shown in Figure 4. Being the least expensive edible oil is another reason for PO to gain the largest share of the market in Asia. Future demand is also expected to increase, particularly in some developing Asian countries, such as India, China, and Pakistan.



Source: (IMF, 2015), (UNCTADstat, 2015), and (Word Bank, 2015).
Note: Quarterly averages are author's calculations.

Figure 4. Major Vegetable Oil Quarterly Prices, 1980–2014 (US$)

The price of PO and other vegetable oils has fluctuated considerably since 2005. The PO price, like other commodity prices, experienced a significant increase during 2006 to 2008, but fell to its lowest level in the first half of 2009 and increased again after that. The decrease in PO price in 2008 was caused by a decrease in demand following the global financial crisis. Many also believe that this price decrease was related to the decrease in petroleum prices, as vegetable oils, including PO, were used as raw materials for biodiesel. Further

research concerning vegetable oils and energy markets can be found in Abdel and Arshad (2008), Peri and Baldi (2010), Priyati and Tyers (2016), Sanders, Balagtas and Gruere (2014), and Yu *et al*. (2006).

The main possible factors explaining why PO prices are very competitive are lower production costs and higher yields compared with other major vegetable oils. Unlike other oils, such as soybean, rapeseed or sunflower oil, which are annual crops, oil palms are a perennial crop with year-round harvesting. Palm oil incurs less production costs and less labour costs, since oil palm plantations are mostly found in countries like Indonesia and Malaysia where lower wages are paid to workers (Murphy, 2009a). According to Carter *et al*. (2007), the average production cost of PO in 2004–2005 was slightly above US$200, compared with more than US$300 for sunflower and soybean oils and more than US$500 for rapeseed oil.

Yield-wise, PO also appeared to have the highest productivity per ha compared with other vegetable oils. With an average yield of nearly 4 MT/hectare/year excluding palm kernel oil (PKO) which is also derived from oil palm fruits, the PO was more productive than other oils, which had a productivity of less than 0.5 MT/hectare/year (Johnston *et al*., 2009 and Murphy, 2009a).

Methods

The gravity model

Palm oil is generally shipped in bulk, because the unit price is relatively low. Asia is the most important market for Indonesian PO. In 2010, almost 70 percent of Indonesian PO was exported to Asian countries, with the largest and second largest being India (32 percent) and China (13 percent). In this case, proximity might be an important factor to determine the flow of PO trades. The fact that Indonesia and Malaysia are close to these large and rapidly growing markets may help explain the rapid growth in their PO exports. This is an interesting hypothesis that will form the basis of our gravity model.

The role of distance in international trade is commonly investigated by the gravity model. The traditional gravity model was introduced by Tinbergen (1962). He proposed that trade between two countries is determined in part by their sizes and distance. Size determines the volume of demand and distance explains the transportation cost.

The gravity model has been empirically successful in explaining international trade flows. The theoretical foundations of the gravity model have been discussed by Anderson (1979), Bergstrand (1985), Bergstrand (1989), and Deardorff (1998). This model is mainly employed for general trade, with an emphasis on trade agreements or free trade zones. Only a few specific commodities have been investigated using the gravity model. A few examples of the gravity model being employed with a specific emphasis in agricultural good trades are Lambert and Grant (2008), Hatab, Romstad and Huo (2010), Olper and Raimondi (2008), and Sarker and Jayasinghe (2007).

In its simplest form, the gravity equation can be written as:

$$M_{jit} = \alpha_0 Y_{it}^{\alpha_1} Y_{jt}^{\alpha_2} Dist_{ij}^{\alpha_3} \tag{1}$$

Where M_{jit} determines imports of country j to country i in year t, Y_{it} and Y_{jt} determine GDP of country i and j, and $Dist_{ij}$ is the distance between i and j. In our gravity model specification, we include several additional variables, such as per capita income of both country *i* and country *j* (*PY*), the relative price of PO over soybean oil (*RP*), importer-specific importer dummy variable (*D*), and interaction dummies for their incomes (*DY*). Taking the logarithms, the gravity model specification can be written as:

$$\ln M_{jit} = \alpha_0 + \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 \ln Dist_{ij} + \alpha_4 \ln PY_{it} + \alpha_4 \ln PY_{jt} + \alpha_5 RP_t + \alpha_6 D_{jt} + \alpha_7 D \ln Y_{jt} + \varepsilon_t \tag{2}$$

Where, Y_{it} is the GDP of exporter countries and Y_{jt} is the GDP of importer countries. Both exporters' and importers' GDPs are used to represent supply and demand factors, respectively (Egger & Pfaffermayr, 2003). Therefore, we expect both α_1 and α_2 to have positive signs. The distance between exporter and importer countries is represented by $Dist_{ij}$. Distance is used as a proxy for transport cost to export goods from one country to another. The greater the distance between two countries, the higher the transport cost, which also means the trade flow between those two countries will be lesser. So, the expected sign of α_3 is negative.

We also add per capita income growth of both exporter and importer countries and the relative price of PO over its closest substitute, soybean oil. Where, PY_{it} is per capita GDP of exporter countries, and PY_{jt} is per capita GDP of importer countries. The positive and statistically significant coefficient of exporter per capita

income (α_4) suggests that the good is capital intensive, otherwise it is labour-intensive. For importer countries, positive and statistically significant per capita GDP (α_5) suggests that the good is luxurious; otherwise it is a necessity (Bergstrand, 1989).

The first five variables are standard properties in the gravity model. To capture the substitution between PO and soybean oil, we have added relative price of PO over soybean oil $\left(RP_{\left(\frac{PO}{SBO}\right)t}\right)$. We assume people will shift from palm oil to soybean oil when the price of palm oil increases, and vice versa. Therefore, we expect a negative sign of α_5.

We also introduce the importer-specific effect; therefore, we add dummy variables for India and China as the countries of interest (D_{jt}). Additionally, we also include the interaction dummies of their incomes, which equals the multiplication of importer dummy and the log of income ($D_{jt} \ln Y_{jt}$) . Since we only have two dummies (China and India), there will be only two interaction dummies ($D_{CHN} \ln Y_{CHNt}$) and ($D_{IND} \ln Y_{INDt}$), as they are the two most important importers of PO from Indonesia and Malaysia, which imported around 33 percent of global PO in 2010.

Data

Throughout this paper, we will use Standard International Trade Classification (SITC) revision-3. Under this classification, PO is coded as 4222, while its disaggregated products, crude PO (CPO) and refined PO (RPO) are under 42221 and 42229 classifications, respectively. Palm kernel oil (PKO/4224), another product derived from oil palm fruit, is beyond the scope of this paper, since it is sold in different markets and used in different industries.

The model is estimated using annual import data reported by almost all countries (some are excluded because of the lack of data) importing PO that originated in Indonesia and Malaysia. The model only covers imports from Indonesia and Malaysia because they represent around 90 percent of global PO trade. The analysis will be carried out using SITC classification: 4222 for PO, 42221 for CPO, and 42229 for RPO. The imported country lists are in Appendix A1.

Table 2. Summary of Variables and Data Sources

m_{ij}	:	import of country j from country j measured in US$ (2000) constant price, data for export and import are obtained from UN-COMTRADE (http://wits.worldbank.org/wits/) and deflated by US import price indices obtained from US Bureau of Labour Statistics database (http://www.bls.gov/data/#prices).
y_i	:	constant GDP of country i, data obtained from World Development Indicator (WDI), The World Bank (http://data.worldbank.org/data-catalog/world-development-indicators)
y_j	:	constant GDP of country j, data obtained from WDI
py_i	:	constant GDP per capita of country i, data obtained from WDI
py_j	:	constant GDP per capita of country j, data obtained from WDI
$dist_{ij}$	:	distance between i dan j, obtained from Mayer and Zignago (2011) available at French Institute for Research on International Economy (CEPII) database, (http://www.cepii.fr/anglaisgraph/bdd/distances.htm)
$rp_{(PO/SBO)t}$	:	relative price of palm oil over soybean oil to capture the substitution effect between palm oil and soybean oil, data obtained from the World Bank commodity markets (pink sheet) (http://econ.worldbank.org/).
d_{IND}	:	dummy for India, 1=India, otherwise=0
d_{CHN}	:	dummy for China, 1=China, otherwise=0
$d_{IND}y_j$	:	Interaction dummy for India, $d_{IND}y_j = d_{IND} * y_j$
$d_{CHN}y_j$	:	Interaction dummy for China, $d_{CHN}y_j = d_{CHN} * y_j$
i	:	exporter countries (Indonesia and Malaysia)
j	:	importer countries (all countries#)

Note: # some countries are omitted because of data limitations.

We focus on the period between 1999 and 2011. We have chosen the starting year of 1999 because in 1998 the Indonesian government banned PO exports for several months as a result of the depreciation of the Rupiah following the Asian financial crisis in 1997. We use PO import data of country j from both Indonesia and Malaysia obtained from the United Nations Commodity Trade Statistics Database (UN-COMTRADE). Since the import data is in current value, we deflate it by the US import indices taken from the US Bureau of Labour

Statistics. The GDP and per capita GDP are in constant 2000 US dollars obtained from WDI, available from the World Bank website. Other variables and data sources are summarised in Table 2.

Results and Discussions

We estimate the gravity model on PO trade using panel data of two exporter countries (Indonesia and Malaysia) and 157 importer countries, over the period of 1999–2011. We include time fixed effects in model 2, model 3 and model 4 as in Egger and Pfaffermayr (2003) and Matyas (1997). Importer effect comes as importer-specific effects for India and China. However, since there are only two exporter countries included in this analysis, we exclude exporter fixed effects. The analysis will be carried out using ordinary least squares (OLS) and Poisson pseudo-maximum-likelihood (PPML). The first is a standard method used in the majority of gravity models in the relevant literature, and the latter is an alternative proposed by Silva and Tenreyro (2006). They argue that PPML estimation can be used to deal with zero trade problems and is found to be consistent even in the presence of heteroskedasticity (Silva & Tenreyro, 2006).

Table 3. Gravity Equation Estimates: Palm Oil (SITC 4222)

Variable	OLS				PPML			
	Model				Model			
	1	2#	3#	4#	1	2#	3#	4#
LnGDP:								
• exporter (Y_{it})	1.42***	−0.42	−0.40	−0.41	1.97***	3.03	3.01	3.00
	(0.21)	(2.33)	(2.33)	(2.33)	(0.22)	(2.09)	(1.99)	(2.01)
• importer (Y_{jt})	1.14***	1.14***	1.12***	1.12***	0.93***	0.93***	0.78***	0.79***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.04)	(0.04)
LnGDP per capita:								
• exporter (PY_{it})	0.87***	0.19	0.20	0.20	0.79***	1.19	1.20	1.19
	(0.09)	(0.86)	(0.86)	(0.86)	(0.09)	(0.77)	(0.74)	(0.75)
• importer (PY_{jt})	−0.80***	−0.80***	−0.78***	−0.78***	−0.67***	−0.67***	−0.49***	−0.49***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)
Ln distance ($Dist_{ij}$)	−0.77***	−0.78***	−0.76***	−0.76***	−0.62***	−0.62***	−0.61***	−0.61***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.07)	(0.07)	(0.07)	(0.07)
Ln relative price ($RP_{(PO/SBO)t}$)	−0.89	0	0	0	−0.83	1.63	1.60	1.67
	(0.09)				(0.68)	(7.55)	(7.22)	(7.21)
Dummy:								
• India (D_{IND})	−	−	0.75***	11.38	−	−	0.78***	3.99
			(0.27)	(9.27)			(0.25)	(7.99)
• China (D_{CHN})	−	−	0.48***	−9.13***	−	−	0.62***	−3.58
			(0.19)	(2.36)			(0.18)	(3.28)
Interaction dummy:								
• D_{IND}*$ln\ Y_{IND}$	−	−	−	−0.79	−	−	−	−0.24
				(0.70)				(0.60)
• D_{CHN}*lnY_{CHN}	−	−	−	0.66***	−	−	−	20.29
				(0.16)				(0.23)
constant	−14.72***	11.68	11.36	11.38	−19.38***	−35.17	−34.95	−34.71
	(3.23)	(33.83)	(33.83)	(33.85)	(3.12)	(31.05)	(29.59)	(29.88)
N	2537	2537	2537	2537	3668	3668	3668	3668
R^2	0.42	0.43	0.43	0.43	0.64	0.65	0.67	0.66
F-statistic	317.21	114.00	411.93	682.89				
RMSE	2.30	2.30	2.29	2.30				
Log pseudo-likelihood					−8.91e+07	−8.79e+07	−8.58e+07	−8.56e+07

Note: dependent variables are import values in natural logarithms (ln) for OLS and in levels for PPML. Figures in parentheses are robust standard errors.

#includes time fixed effect.Individual time fixed effect is not reported.

*** indicates that a coefficient is significant at the 1% level and **significant at the 5% level.

Table 3 presents the OLS panel and the alternative results from PPML for PO. Overall, the results of OLS and PPML are consistent with the general results in the gravity literature. That is, on average all the significant income coefficients are close to unity. The distance coefficients are between −0.78 and −0.61. In both tables, the first column (model 1) shows the model without time fixed effects; while all other three columns (models 2, 3 and 4) show the results with time fixed effects. The R^2 ranges between 0.42 and 0.43 for OLS and higher for PPML between 0.64 and 0.67. This means that PPML generally performs better than OLS. Also in

line with Silva and Tenreyro (2006), we found that the coefficient of most variables were lower in PPML compared with OLS.

The main result is that importers' GDP and GDP per capita variables are estimated to be strongly significant (p<0.01), and this is consistent across models. The importer's GDP coefficients for PO reported in Table 3 all have positive signs and are all close to unity. For PPML, importers' GDP coefficients are slightly smaller than OLS results, ranging from 0.78 to 0.93.

The elasticity reported for GDP per capita of importer countries was found to be negative and significant for PO both from OLS and PPML results. These results are also in line with Sarker and Jayasinghe (2007) who found that importer's GDP per capita was negatively correlated for oilseeds and vegetables in the European market. Our results suggest that PO imports will decrease by between 0.78 percent and 0.8 percent with every 1 percent per capita income increase when using OLS, and 0.49 percent and 0.67 percent when using PPML.

Our findings also prove that the bilateral distances between trading partners are negatively correlated in PO trade. The elasticities of distances are around −0.8 for OLS and around −0.6 for PPML. As mentioned earlier, PO imports used in this analysis come from Indonesia and Malaysia only, where almost 90 percent of global PO originates. For both countries, China and India constitute the most important importers of PO. In fact, in 2011, both China and India absorbed around 40 percent of total PO from Indonesia and Malaysia. The growth of both countries could be an important determinant of PO demand.

Table 4. Gravity Equation Estimates: Crude Palm Oil (SITC 42221)

Variable	OLS				PPML			
	Model				Model			
	1	2#	3#	4#	1	2#	3#	4#
LnGDP:								
• exporter (Y_{it})	1.82***	3.13	3.12	2.94	2.92***	5.10	5.09*	5.08*
	(0.36)	(3.93)	(3.90)	(3.91)	(0.44)	(3.75)	(2.82)	(2.81)
• importer (Y_{jt})	0.88***	0.88***	0.88***	0.88***	0.82***	0.82***	0.67***	0.67***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.04)	(0.05)
LnGDP per capita:								
• exporter (PY_{it})	−0.09	0.39	0.39	0.32	0.47***	1.30	1.32	1.31
	(0.15)	(1.45)	(1.44)	(1.44)	(0.15)	(1.39)	(1.07)	(1.06)
• importer (PY_{jt})	−0.74***	−0.74***	−0.72***	−0.72***	−0.68***	−0.68***	−0.40***	−0.40***
	(0.07)	(0.07)	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)
Ln distance ($Dist_{ij}$)	−0.56***	−0.56***	−0.55***	−0.55***	−0.79***	−0.79***	−0.78***	−0.78***
	(0.15)	(0.15)	(0.16)	(0.16)	(0.12)	(0.12)	(0.11)	(0.11)
Ln relative price	0.26	0	0	0	−1.44	6.46	6.52	6.89
($RP_{(PO/SBO)t}$)	(0.97)				(1.19)	(14.75)	(9.38)	(9.25)
Dummy:								
• India (D_{IND})		−	1.80**	−21.41**	−	−	1.68***	−4.62
			(0.39)	(9.95)			(0.25)	(6.09)
• China (D_{CHN})		−	−1.61***	−45.19***	−	−	−1.09***	−9.15
			(0.52)	(12.55)			(0.30)	(9.34)
Interaction dummy:								
• D_{IND}*$ln\ Y_{IND}$		−	−	1.73**		−	−	0.46
				(0.735)				(0.45)
• D_{CHN}*lnY_{CHN}		−	−	3.01***		−	−	0.55
				(0.86)				(0.64)
Constant	−12.53**	−31.53	−31.52	−28.78	−26.59***	−58.83	−59.54	−59.34
	(5.38)	(56.77)	(56.43)	(56.49)	(6.16)	(55.85)	(42.09)	(41.88)
N	1398	1398	1398	1398	3668	3668	3668	3668
R^2	0.24	0.24	0.25	0.25	0.33	0.34	0.74	0.74
F-statistic	58.35	21.51	59.23	130.93		−		
RMSE	2.82	2.83	2.81	2.81				
Log pseudo-likelihood					−6.88e+07	6.81e+07	−5.74e+07	−5.73e+07

Note: dependent variables are import values in natural logarithms (ln) for OLS and in levels for PPML.
Figures in parentheses are robust standard errors.
·includes time fixed effect.Individual time fixed effect is not reported.
*** indicates that a coefficient is significant at the 1% level and **significant at the 5% level.

To capture the importance of China and India, we included country specific effects for China and India as dummy variables in model 3 and model 4. In model 3, we found that both dummies for India and China are significant. The coefficients of Indian dummies for PO are 0.75 for OLS and 0.78 for PPML; for China, the

dummy coefficients are 0.48 for OLS and 0.62 for PPML. Overall, India has a bigger impact on PO trade than China. The OLS results suggest that India imports 2.12 (exp(0.75)) times more PO than non-India and non-China countries, and China imports 1.57 (exp(0.48)) times more PO than non-China and non-India countries.

We also repeat similar methodologies for disaggregated PO, namely CPO and RPO. The results can be observed in Table 4 and Table 5. In general, the coefficients and signs are expected to be not very different from PO. Since CPO is less expensive and bulkier than RPO, we expect that the distance coefficients will be higher in CPO than in RPO, importer's GDP will be higher in RPO, and importer's GDP per capita will be less negative in RPO. Based on the results, we can say that overall those hypotheses held. Distance coefficients were found to be more than 0.2 points higher in CPO than in RPO in PPML analysis, although they do not vary much in OLS. Importers' GDP elasticities are mostly found to be more than 1 in RPO and consistently less than 1 for CPO. Importers' GDP per capita elasticities were found to be consistently less negative for RPO in OLS results.

Table 5. Gravity Equation Estimates: Refined Palm Oil (SITC 42229)

Variable	OLS				PPML			
	Model				Model			
	1	2#	3#	4#	1	2#	3#	4#
Ln GDP:								
• exporter (Y_{it})	1.25***	−1.03	−1.00	−0.98	1.44***	0.61	0.59	0.56
	(0.22)	(2.39)	(2.38)	(2.38)	(0.23)	(2.18)	(1.55)	(1.51)
• importer (Y_{jt})	1.04***	1.04***	1.00***	1.00***	1.00***	1.00***	0.86***	0.86***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
LnGDP per capita:								
• exporter (PY_{it})	0.97***	0.12	0.13	0.14	0.98***	0.67	0.67	0.66
	(0.10)	(0.89)	(0.89)	(0.89)	(0.11)	(0.81)	(0.59)	(0.57)
• importer (PY_{jt})	−0.65***	−0.66***	−0.61***	−0.61***	−0.67***	−0.67***	−0.55***	−0.56***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.07)	(0.07)
Ln distance ($Dist_{ij}$)	−0.56***	−0.56***	−0.53***	−0.53***	−0.53***	−0.53***	−0.51***	−0.50***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.07)	(0.07)	(0.07)	(0.07)
Ln relative price	−0.96	0	0	0	−0.61	−3.50	−3.59	−3.42
($RP_{(PO/SBO)t}$)	(0.60)				(0.82)	(8.46)	(5.78)	(5.62)
Dummy:								
• India (D_{IND})		−	0.67**	29.42***		−	−0.16	29.16***
			(0.33)	(10.90)			(0.31)	(8.95)
• China (D_{CHN})		−	1.63***	−7.16***		−	0.86***	−4.95*
			(0.19)	(2.38)			(0.20)	(2.607)
Interaction dummy:								
• D_{IND}*Y_j		−	−	−2.14***		−	−	−2.18***
				(0.82)				(0.67)
• D_{CHN}*Y_j		−	−	0.61***		−	−	0.39**
				(0.16)				(0.18)
constant	−16.06***	16.78	16.19	15.95	−16.57***	−4.40	−3.73	−3.29
	(3.41)	(34.74)	(34.67)	(34.71)	(3.53)	(32.48)	(23.24)	(22.57)
N	2386	2386	2386	2386	3668	3668	3668	3668
R^2	0.38	0.39	0.39	0.39	0.65	0.67	0.82	0.84
RMSE	273.36	98.41	476.56	704.04				
Log pseudo-likelihood					−5.63e+07	−5.50e+07	−5.09e+07	−4.96e+07

Note: dependent variables are import values in natural logarithms (ln) for OLS and in levels for PPML.
Figures in parentheses are robust standard errors.
·includes time fixed effect.Individual time fixed effect is not reported.
*** indicates that a coefficient is significant at the 1% level and **significant at the 5% level.

Additionally, we also include models with country fixed effects both for exporters and importers and some additional dummy variables such as land border and common language, as shown in Table 6. The results are also consistent with general results in gravity model. However, we find that the coefficients of both importer's GDP and GDP per capita are consistently higher than model without country fixed effects. The elasticities of distances are also found to be a lot higher in models with country fixed effects. These results applied across all types of palm oil.

In all models across all disaggregated PO products, we found that importers' GDP was consistently significant. Therefore, we conclude that the growth of GDP has been a significant factor in explaining Indonesia's PO expansion.

Table 6. Gravity Equation Estimates: OLS Results with Country Fixed Effects and Additional Dummies

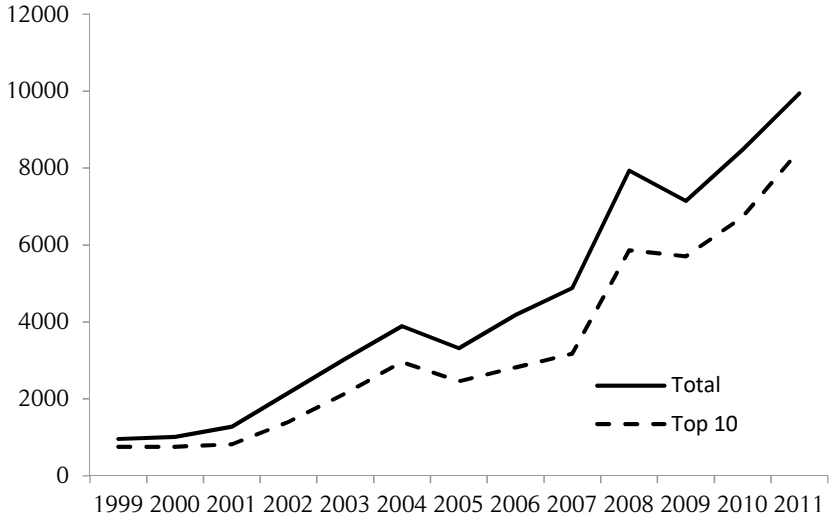
Variable	PO		CPO		RPO	
Ln GDP:						
• exporter (Y_{it})	0.71**	-1.76	1.00*	-3.57	1.10***	0.64
	(0.05)	(0.22)	(0.08)	(0.14)	(0.00)	(0.7)
• importer (Y_{jt})	2.64***	4.43***	1.81***	1.53	2.13***	3.64***
	(0.00)	(0.00)	(0.00)	(0.27)	(0.00)	(0.00)
LnGDP per capita:						
• exporter (PY_{it})		3.12		6.40*		0.23
		(0.13)		(0.06)		(0.92)
• importer (PY_{jt})		-2.03***		0.46		-1.75**
		(0.00)		(0.77)		(0.01)
Ln(dist)	-1.57**	-1.59**	-2.01	-1.96	-2.11***	-2.11***
	(0.04)	(0.04)	(0.14)	(0.15)	(0.01)	(0.01)
Ln relative price	-1.11**	-1.28***	-	-1.89**	-	-0.93*
($RP_{(PO/SBO)t}$)	(0.02)	(0.01)		(0.15)		(0.08)
Dummy:						
• border	1.74**	1.77**	-0.61	-0.41	2.06***	2.07***
	(0.02)	(0.0.02)	(0.76)	(0.84)	(0.00)	(0.00)
• common language	0.83**	0.82**	1.07	1.00	0.52	0.53
	(0.04)	(0.04)	(0.16)	(0.18)	(0.15)	(0.14)
Constant	-59.81***	-57.11***	-37.97***	18.47	-46.51***	-60.51***
	(0.00)	(0.01)	(0.01)	(0.63)	(0.00)	(0.01)
Exporter fixed effect	yes	yes	yes	yes	yes	Yes
Importer fixed effect	yes	yes	yes	yes	yes	yes
n	2537	2537	1398	1398	2386	2386
R^2	0.73	0.73	0.69	0.70	0.69	0.69

Note: dependent variables are import values in natural logarithms (ln).
Figures in parentheses are probabilities.
*** indicates that a coefficient is significant at the 1% level, **significant at the 5% level and *significant at 10% level.

Mostly backed by descriptive data, many papers mention the importance of India and China in determining global PO demand, such as Corley (2009) and Koh and Wilcove (2007). This comes from the fact that China and India alone are responsible for 40 percent of PO imports originating in Indonesia and Malaysia. Given the preceding results, a relevant question is whether the growth of Indonesia's trading partners can explain the growth in PO export demand. In particular, there has been rapid growth in China and India, which are the two of Indonesia's largest trading partners. To what extent does the growth of income of Indonesia's trading partners explain the boom in Indonesia's PO export demand? The estimated model 4 from PPML analysis for PO (Table 3) is used for simulating PO imports from Indonesia for the period 2000–201. We only include the significant coefficients for the simulations. The importer's GDP coefficient in this model is 0.79, meaning that a 1 percent increase in importer's GDP may lead to 0.79 percent of PO import from Indonesia.

For simplicity, we selected Indonesia's top 10 PO importers only. The selection is based on import data from 2011. Total imports from these countries accounted for 73 percent of total PO exports from Indonesia. India had the largest share, with nearly 40 percent, followed by China, with almost 20 percent. The total Indonesian PO imported by the top 10 countries can be plotted in Figure 5. We use the estimated coefficients for importer GDP (GDP_j) and importer's GDP per capita ($PGDP_j$) to estimate the share of PO trade for each top 10 country.

The simulated shares of PO imports from Indonesia to the top 10 countries based on importer GDP (GDP_j) and importer's per capita GDP ($PGDP_j$) for the period 2000–2011 are reported in Figures 6 (all top 10), Figure 7 (China), and Figure 8 (India). More complete simulation results are reported in Appendix A2.



Source: UN-COMTRADE (WITS, 2015).

Figure 5. Indonesia's Palm Oil Exports, 1999–2011 (Million US$)

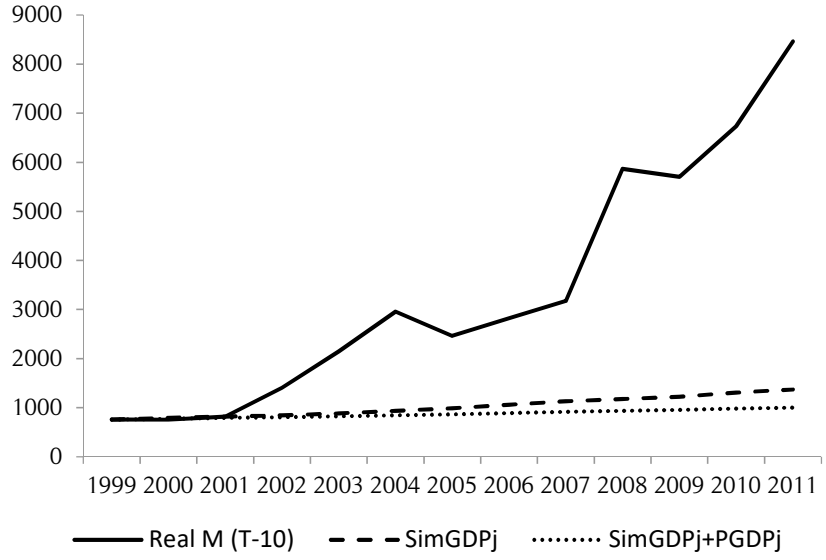


Figure 6. Palm Oil Real Import and Import Simulation for the Top 10 Countries (Million US$)

Overall, we find that GDP_j and the combination of GDP_j and $PGDP_j$ explain very little of the rapid growth in PO export demand from Indonesia. For instance, over the sample period, China's GDP grew by 131 percent, while the growth of China's PO imports from Indonesia was more than 800 percent. For India, the growth of GDP was 95 percent, while the actual growth of PO imports from Indonesia was more than 1000 percent.

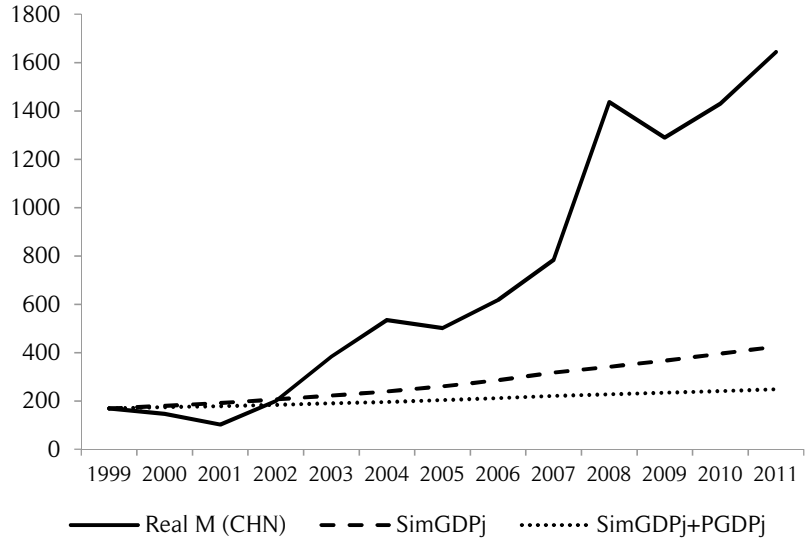


Figure 7. Palm Oil Real Import and Import Simulation for China (Million US$).

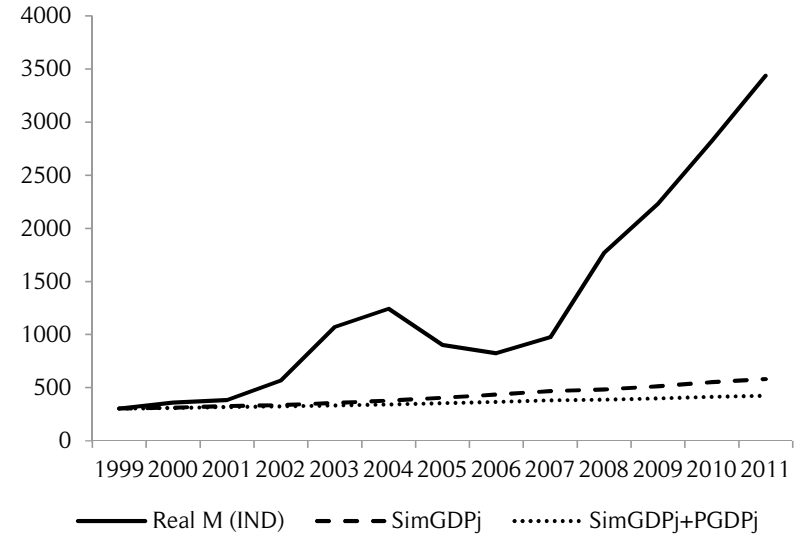


Figure 8. Palm Oil Real Import and Import Simulation for India (Million US$).

Figure 6 shows that, consistent with results for China and India, the actual PO imports from Indonesia to all countries are far more than the simulated PO imports explained by importer's GDP and importer per capita GDP. For example, the actual PO import to the top 10 countries was US$8.5 billion compared with only US$1.8 billion as projected by the growth in GDP (see Appendix A2).

These results suggest that income growth alone cannot be used to explain the boom in PO export demand. There are possibly other variables that explain the vast increase in global PO demand, including changing preferences, diversification in end uses and import tariff reduction, but those variables are not included in this research.

Conclusion

Global vegetable oil demand has increased very rapidly in the last decade, with PO now being the most produced vegetable oil, displacing soybean oil in 2007. Indonesia and Malaysia are the largest producers and exporters of PO, capturing a combined market share of around 90% in 2014.

In this paper, we employ gravity equations to observe the trade in palm oil market with only Indonesia and Malaysia as exporters and all other countries as their importers. The gravity model is widely used to investigate the role of distance and economic growth in international trade flows.

The results suggest that PO trade follows the general results in gravity literature. We find that importer GDP and importer per capita GDP variables are consistently significant in all models in both OLS and PPML used in this study. Our findings also prove that the bilateral distances between trading partners are negatively correlated in PO trades. However, we are unable to confirm the importance of relative price between palm oil and soybean oil in determining palm oil trade flows.

Given the large growth in China and India's GDP and their proximity to Indonesia and Malaysia, we also examine the impact of China and India in the model. We find that both dummies for China and India are positively correlated.

Furthermore, we do a simulation using the samples of top ten imported countries of Indonesia's palm oil. We, particularly, observe how the economic growth of importer countries affect the flow of palm oil trade. The simulation result for top ten Indonesia's trading partners suggest that the simulated palm oil trades explained by importer GDPs account for only 15 percent in average when compared to the actual trade flows. This result is also applied for China and India which both GDPs explain only 25 percent and 17 percent of their actual palm oil imports. There are possibly other variables that explain the vast increase in global PO demand, including changing preferences, diversification in end uses and import tariff reduction, but those variables are not included in this research.

References

Abdel, H., & Fatimah Mohamed Arshad. (2008). The impact of petroleum prices on vegetable oils prices: Evidence from cointegration tests. *International Borneo Business …*, *2008*(January 2000), 31–40.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American Economic Review*, *69*(1), 106–116. https://doi.org/10.2307/1802501

Bergstrand, J. H. (1985). The gravity equation in international trade: Some microeconomic foundations and empirical evidence. *The Review of Economics and Statistics*, *67*(3), 474. https://doi.org/10.2307/1925976

Bergstrand, J. H. (1989). The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*, *71*(1), 143. https://doi.org/10.2307/1928061

Carter, C., Finley, W., Fry, J., Jackson, D., & Willis, L. (2007). Palm oil markets and future supply. *European Journal of Lipid Science and Technology*, *109*(4), 307–314. https://doi.org/10.1002/ejlt.200600256

Corley, R. H. V. (2009). How much palm oil do we need? *Environmental Science and Policy*, *12*(2), 134–139. https://doi.org/10.1016/j.envsci.2008.10.011

Deardorff, A. V. (1998). Chapter title: Determinants of bilateral trade: does gravity work in a neoclassic world? Determinants of bilateral trade: Does gravity work in a neoclassical world?, *ISBN*, 0–226.

Egger, P., & Pfaffermayr, M. (2003). The proper panel econometric specification of the gravity equation: A three-way model with bilateral interaction effects. *Empirical Economics*, *28*(3), 571–580. https://doi.org/10.1007/s001810200146

FAOstat. (2015). Production. Retrieved from http://www.fao.org/faostat/

Gerasimchuk, I., & Yam Koh, P. (2013). The EU biofuel policy and palm oil: Cutting subsidies or cutting rainforest? *The International Institute for Sustainable Development*, (September), 20.

Hatab, A. A., Romstad, E., & Huo, X. (2010). Determinants of Egyptian agricultural exports: A gravity model approach. *Modern Economy*, *01*(03), 134–143. https://doi.org/10.4236/me.2010.13015

Henderson, J., & Osborne, D. J. (2000). The oil palm in all our lives: How this came about. *Endeavour*, *24*(2), 63–68. https://doi.org/10.1016/S0160-9327(00)01293-X

IMF. (2015). IMF primary commodity prices. Retrieved from https://www.imf.org/external/np/res/commod/index.aspx

Johnston, M., Foley, J. A., Holloway, T., Kucharik, C., & Monfreda, C. (2009). Resetting global expectations from agricultural biofuels. *Environmental Research Letters*, *4*(1), 014004. https://doi.org/10.1088/1748-9326/4/1/014004

Koh, L. P., & Wilcove, D. S. (2007). Cashing in palm oil for conservation. *Nature*, *448*(7157), 993–994. https://doi.org/10.1038/448993a

Koh, L. P., & Wilcove, D. S. (2008). Is oil palm agriculture really destroying tropical biodiversity? *Conservation Letters*, *1*(2), 60–64. https://doi.org/10.1111/j.1755-263X.2008.00011.x

Lam, M. K., Tan, K. T., Lee, K. T., & Mohamed, A. R. (2009). Malaysian palm oil: Surviving the food versus fuel dispute for a sustainable future. *Renewable and Sustainable Energy Reviews*, *13*(6–7), 1456–1464. https://doi.org/10.1016/j.rser.2008.09.009

Lambert, D. M., & Grant, J. H. (2008). Do regional trade agreements increase members' agricultural trade? *American Journal of Agricultural Economics*, *90*(3), 765–782. https://doi.org/10.1111/j.1467-8276.2008.01134.x

Matyas, L. (1997). Proper econometric specification of the gravity model. *The World Economy*, *20*(3), 363–368. https://doi.org/10.1111/1467-9701.00074

Mekhilef, S., Siga, S., & Saidur, R. (2011). A review on palm oil biodiesel as a source of renewable fuel. *Renewable and Sustainable Energy Reviews*, *15*(4), 1937–1949. https://doi.org/10.1016/j.rser.2010.12.012

Mitchel, D. (2008). *A note on rising food prices*. The World Bank. https://doi.org/10.1596/1813-9450-4682

Murphy, D. J. (2009a). Global oil yields: Have we got it seriously wrong? *Inform*, *20*, 499–500. https://doi.org/10.1088/1748-9326/4/1/014004.

Murphy, D. J. (2009b). Oil palm: Future prospects for yield and quality improvements. *Lipid Technology*, *21*(11–12), 257–260. https://doi.org/10.1002/lite.200900067

Olper, A., & Raimondi, V. (2008). Agricultural market integration in the OECD: A gravity-border effect approach. *Food Policy*, *33*(2), 165–175. https://doi.org/10.1016/j.foodpol.2007.06.003

Peri, M., & Baldi, L. (2010). Vegetable oil market and biofuel policy: An asymmetric cointegration approach. *Energy Economics*, *32*(3), 687–693. https://doi.org/10.1016/j.eneco.2009.09.004

Priyati, R. Y., & Tyers, R. (2016). *Economics price relationships in vegetable oil and energy markets price relationships in vegetable oil and energy markets. Annual Australiasian Development Economics Workshop*.

Sanders, D. J., Balagtas, J. V., & Gruere, G. (2014). Revisiting the palm oil boom in South-East Asia: Fuel versus food demand drivers. *Applied Economics*, *46*(2), 127–138. https://doi.org/10.1080/00036846.2013.835479

Santosa, S. J. (2008). Palm oil boom in Indonesia: From plantation to downstream products and biodiesel. *Clean - Soil, Air, Water*, *36*(5–6), 453–465. https://doi.org/10.1002/clen.200800039

Sarker, R., & Jayasinghe, S. (2007). Regional trade agreements and trade in agri-food products: Evidence for the European Union from gravity modeling using disaggregated data. *Agricultural Economics*, *37*(1), 93–104. https://doi.org/10.1111/j.1574-0862.2007.00227.x

Silva, J. M. C. S., & Tenreyro, S. (2006). The log of gravity. *Review of Economics and Statistics*, *88*(4), 641–658. https://doi.org/10.1162/rest.88.4.641

Tan, K. T., Lee, K. T., Mohamed, A. R., & Bhatia, S. (2009). Palm oil: Addressing issues and towards sustainable development. *Renewable and Sustainable Energy Reviews*, *13*(2), 420–427. https://doi.org/10.1016/j.rser.2007.10.001

Tinbergen, J. (1962). *Shaping the world economy: Suggestions for an international economic policy. Books (Jan Tinbergen)*. Twentieth Century Fund, New York.

UNCTADstat. (2015). *Free market commodity prices. United Nations Conference on Trade and Development*.

Geneva.

USDA-FAS. (2016). Production, supply, and distribution.

Wirawan, S. S., & Tambunan, A. H. (2006). The current status and prospects of biodiesel development in Indonesia: A review.

WITS. (2015). Trade data (UN Comtrade). Retrieved from https://comtrade.un.org/data/

Word Bank. (2015). *Commodity markets*. Retrieved from http://www.worldbank.org/en/research/commodity-markets

Word Bank. (2016). *World Bank Open Data*. Retrieved from https://data.worldbank.org/

Yu, T.-H., Bessler, D. A., Fuller, S., & Bessler, D. (2006). Cointegration and causality analysis of world vegetable oil and crude oil prices.

Zhou, A., & Thomson, E. (2009). The development of biofuels in Asia. *Applied Energy*, *86*(SUPPL. 1), S11–S20. https://doi.org/10.1016/j.apenergy.2009.04.028

APPENDICES

Appendix A1. List of Indonesia and Malaysia Trading Partners on Palm Oil Trades

Albania	Georgia	Nicaragua
United Arab Emirates	Ghana	Netherlands
Argentina	Guinea	Norway
Armenia	Gambia*	Nepal
Antigua and Barbuda**	Greece	New Zealand
Australia	Guatemala	Oman
Austria	Guyana**	Pakistan
Azerbaijan	Hong Kong, China	Panama
Burundi	Honduras**	Peru
Belgium	Croatia	Philippines
Benin	Hungary	Papua New Guinea
Burkina Faso	Indonesia**	Poland
Bangladesh	India	Portugal
Bulgaria	Ireland	Qatar**
Bahrain**	Iran, Islamic Rep.	Romania
Bosnia and Herzegovina	Iraq**	Russian Federation
Belarus	Israel	Rwanda
Brazil	Italy	Saudi Arabia
Barbados**	Jamaica	Sudan
Brunei	Jordan	Senegal
Bhutan	Japan	Serbia
Botswana**	Kazakhstan	Singapore
Central African Republic	Kenya	Solomon Island
Canada	Kyrgyz Republic	El Salvador
Switzerland	Cambodia	Suriname
Chile	Kiribati**	Slovak Republic
China	Korea, Rep.	Slovenia
Cote d'Ivoire	Kuwait	Sweden
Cameroon	Lebanon	Seychelles**
Congo, Rep.	Libya**	Syrian Arab Republic
Colombia	Saint Lucia**	Togo
Comoros	Sri Lanka	Thailand
Cape Verde**	Lithuania	East Timor*
Costa Rica**	Luxembourg**	Tonga*
Cyprus	Latvia	Trinidad and Tobago
Czech Republic	Macao	Tunisia
Germany	Morocco	Turkey
Djibouti	Moldova	Tanzania
Dominica**	Madagascar	Uganda
Denmark	Maldives**	Ukraine
Dominican Rep.**	Mexico	Uruguay
Algeria	Macedonia, FYR	United States
Ecuador	Mali	St. Vincent and the Grenadines*
Egypt, Arab Rep.	Malta**	Venezuela
Eritrea**	Mongolia	Vietnam
Spain	Mozambique	Vanuatu
Estonia	Mauritania	Samoa
Ethiopia (excludes Eritrea)	Mauritius	Yemen
Finland	Malawi	South Africa
Fiji	Malaysia*	Zambia
France	Namibia	Zimbabwe
Gabon	Niger	
United Kingdom	Nigeria	

Note: *trade with Indonesia only. **trade with Malaysia only.

Appendix A2. Simulation Results (Million US$)

Real data

	CHN	DEU	EGY	IND	ITA	MYS	NLD	PAK	RUS	TZA	Total
2000	146.84	74.02	11.06	357.88	7.22	9.54	102.91	4.29	10.52	30.62	754.90
2001	102.39	84.75	10.16	381.86	13.77	19.13	110.61	26.59	25.33	42.66	817.25
2002	199.89	116.53	6.81	568.32	11.59	115.45	182.45	108.45	43.53	52.31	1405.33
2003	384.11	111.96	1.73	1069.20	25.84	143.77	189.75	101.76	51.30	66.05	2145.47
2004	535.29	156.63	44.21	1242.50	60.39	336.91	233.15	226.43	54.84	68.94	2959.29
2005	501.43	148.67	33.44	902.56	66.38	134.52	219.46	288.59	98.36	68.94	2462.34
2006	618.73	155.47	178.68	824.34	77.63	224.22	226.98	309.43	96.81	106.87	2819.15
2007	783.16	237.96	74.23	974.75	85.75	196.28	304.36	345.78	90.07	79.31	3171.66
2008	1437.37	406.57	388.47	1770.77	314.63	463.21	571.92	383.81	94.56	33.92	5865.25
2009	1290.31	293.04	211.83	2229.89	395.05	545.85	490.15	112.89	81.16	56.17	5706.34
2010	1430.67	373.11	161.18	2823.77	421.00	780.54	434.60	31.01	210.33	65.35	6731.57
2011	1643.66	262.79	323.69	3436.91	394.70	1237.86	518.50	152.96	333.96	159.72	8464.75
Simulation: GDPj											
2000	185.17	57.54	7.31	316.50	22.43	74.05	123.86	4.86	8.58	2.72	803.02
2001	202.47	58.52	7.60	334.07	22.90	74.48	126.53	4.97	9.07	2.91	843.52
2002	223.22	58.52	7.80	348.73	23.02	78.99	126.64	5.15	9.55	3.14	884.76
2003	248.36	58.28	8.08	379.90	23.00	84.13	127.12	5.43	10.34	3.38	948.02
2004	276.62	59.04	8.45	413.45	23.45	90.55	130.30	5.88	11.17	3.68	1022.60
2005	311.86	59.49	8.88	456.68	23.70	95.97	133.29	6.39	11.97	3.99	1112.22
2006	356.55	61.96	9.56	504.32	24.28	102.28	138.37	6.83	13.07	4.29	1221.51
2007	413.72	64.23	10.32	560.00	24.74	109.73	144.46	7.27	14.33	4.63	1353.43
2008	458.45	65.01	11.16	584.46	24.42	115.66	147.38	7.40	15.17	5.02	1434.12
2009	505.94	61.29	11.74	638.65	22.92	113.54	141.56	7.70	13.85	5.36	1522.55
2010	565.23	63.83	12.42	707.35	23.38	122.73	144.24	8.05	14.52	5.79	1667.54
2011	624.42	65.97	12.67	761.88	23.50	129.81	146.14	8.27	15.22	6.20	1794.08
Simulation: GDPj+PGDPj											
2000	195.67	58.85	7.51	322.00	23.06	77.67	126.94	4.93	9.24	2.77	828.64
2001	226.00	60.47	7.91	348.42	23.87	77.03	130.85	5.04	10.18	3.04	892.81
2002	264.72	60.40	8.15	370.09	24.02	83.62	130.39	5.27	11.15	3.39	961.21
2003	314.96	59.95	8.53	422.74	23.85	91.47	130.74	5.69	12.80	3.77	1074.49
2004	375.43	61.29	9.07	482.19	24.45	101.94	135.98	6.42	14.66	4.27	1215.70
2005	456.65	62.11	9.72	564.13	24.74	110.80	141.06	7.29	16.54	4.78	1397.83
2006	568.63	66.61	10.86	659.90	25.67	121.67	150.11	8.05	19.27	5.30	1636.08
2007	725.89	70.88	12.20	779.31	26.35	135.25	161.21	8.82	22.56	5.91	1948.39
2008	858.38	72.46	13.72	828.64	25.62	145.97	166.28	8.96	24.89	6.62	2151.54
2009	1008.19	65.69	14.76	952.63	22.90	139.70	154.66	9.45	21.32	7.23	2396.54
2010	1208.67	70.46	16.02	1120.74	23.61	157.43	159.03	10.07	23.09	8.04	2797.16
2011	1422.35	74.56	16.35	1257.73	23.71	171.00	161.98	10.38	25.01	8.83	3171.89

Economic Journal of Emerging Markets, 10(2) 2018, 165-176

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available at http://journal.uii.ac.id/index.php/jep

Macroeconomic effect and risk-taking behavior in a dual banking system

Faaza Fakhrunnas[1]*, Wulan Dari[2], Mustika Noor Mifrahi[1]

[1]Department of Economics, Universitas Islam Indonesia, Yogyakarta, Indonesia
[2]Durham University Business School, Durham University, United Kingdom
Corresponding Author e-mail: fakhrunnasfaaza@uii.ac.id

Article Info

Article history:
Received : 12 June 2018
Accepted : 2 July 2018
Published : 1 October 2018

Keywords:
Risk-taking behavior, Macroeconomic Factors, Dual banking system

JEL Classification:
E00, E42, G00

DOI: 10.20885/ejem.vol10.iss2.art5

Abstract

This study aims to analyze the relationship between macroeconomic factors and risk-taking behavior in a dual banking system. Adopting a panel cointegration approach, this research posits macroeconomic factors as exogenous variables and risk-taking behavior as endogenous variables. With having 468 quarterly-observations consisting of 18 banks in Indonesia during 2010-Q4 to 2017-Q1, it finds that the risk-taking behavior of the banks has a long-term relationship with macroeconomic factors. Moreover, conventional bank has long-term relationship to macroeconomic nonetheless it results inversely to Islamic bank. In terms of bank-specified characteristics, bank size and equity to asset ratio are substantial factors for the banks' risk mitigation.

Introduction

In the last couple decades, Indonesia has experienced a dynamic economy, especially when the Asian and global crises occurred. The Asian Crisis also heavily affected several countries such as Malaysia, Thailand and South Korea. As a result, in 1997 those countries suffered economic turmoil, for instance in Indonesia whereby the Growth Domestic Product (GPD) declined by 13%, there was double digit inflation, and currency exchange rate slumped against the U.S. dollar after the government decided to instate a free floating currency exchange rate (Kutan, Muradoglu, & Sudjana, 2012). With this unstable economic condition, the Indonesian government liquidated 16 banks during the crisis. In the year 2008, the subprime mortgage crisis in the U.S. triggered a global crisis, influencing the world economy due to the systematic risk that affected the banking system (Aysun, 2016). However, the contagion effect from that situation mostly happened in European Countries having intense economic ties with the U.S.

A crisis which leads the financial institution to become bankrupt does not only ensue in a conventional system but also in Islamic financial systems (Bourkhis & Nabi, 2013). It has been verified that Islamic financial institutions are not immune. An example of this is in Turkey during the 2000-2001 period when Ihlas Finance House (IFH), as a special Islamic bank to finance the housing sector, was declared bankrupt (Kanten & Ulker, 2013). In that period Turkey, who applied a dual banking system, experienced a financial crisis where the GDP dropped, the inflation was high, and the lira weakened. The macroeconomic condition directly influenced the banking system, including IFH. In terms of internal factors, IFH had management and governance problem that worsened its performance. Both factors mentioned above became the main cause of the bankruptcy of IFH (Ali, 2007).

The interconnectivity of crisis and financial distress in the last two decades serves as evidence that macroeconomic factors hold a pivotal role in financial institution sustainability especially in the banking sector. Macroeconomic factors may stimulate the performance of banks but they may aggravate financial performance during certain unstable situations. In history of economic crises, macroeconomic variables will directly relate to banking performance either in the single banking system or dual banking system (Lin, Farhani, & Koo, 2016). Shingjergji (2013), who investigated the main macroeconomic variables in the Albanian banking, finds that there is a positive and significant relationship between interest rate and credit risk. This confirms previous studies Castro (2013), Farhan et al. (2012), and Ahmad & Bashir (2013), which indicate that interest rate affects the amount of bad debt in the case of floating interest rate. Therefore, the increase in the debt is caused by the increase in payment of interest rates and results in the rise of non-performing loans. The above arguments were drawn from research in conventional banking.

P ISSN 2086-3128 | E ISSN 2502-180X

Klein (2013) in his research studied the non-performing loans (NPLs) in parts of Europe for the period of 1998–2011. He found that the level of loan default was accredited to both macroeconomic circumstances and banks' specific factors. However, the latter set of factors was found to have a comparatively low descriptive power. With respect to inflation rate, when it is high, customers find it difficult to pay their existing loans because of the rising cost of capital, leading to a positive relationship between inflation rate and non-performing loan. Moreover, the significant relationship between inflation and the banks' performance points to a strong relationship to the real economy (Hajer Zarrouk, Ben Jedidia, & Moualhi, 2016).

Espinoza and Prasad (2010) show that NPL increases during periods of low growth. These empirical results support the view that both macro-factors and bank-specific characteristics determine the level of non-performing loans. In particular, they find strong evidence of a significant inverse relationship between real GDP and non-performing loans (Ranjan & Dhal, 2003). Eichler and Sobański (2016) demonstrated the impact of macroeconomic factors on bankruptcy risk of Eurozone banks. They found that lower economic growth leads to higher bankruptcy risk since in recession periods, bankruptcy rates increase substantially.

Moreover, the exchange rate channel points to the effects that monetary policy may have on capital flows and exchange rates, and therefore on foreign borrowing. A change in exchange rate will influence developments in financial stability as well (Karim, Al-Habshi, & Abduh, 2016). Seeberg (2015) explains that for open economies, a monetary policy tightening can attract excessive capital flows, leading to an appreciation of the exchange rate and thereby excessive borrowing in foreign currency. This may cause the financial system to become more vulnerable, as both national and international shocks may erode the repayment capacity of financial intuitions. Thus the exchange rate channel of monetary policy may increase the risk of financial instability.

Ghosh (2016) explains that macroeconomic variables will affect credit risk in a dual banking system in which Islamic banks tend to have counter-cyclical performance growth. This situation delineates that the Islamic bank will have less credit when the economy's growth increases. Referring to findings of different researchers, conventional banks has a negative relationship to economic growth in Organization of Islamic Conference (OIC) countries, while Islamic banks do not have any significant relationship because the size of Islamic banks remains small (Louhichi & Boujelbene, 2016). Research indicates that Islamic banks do not contribute to economic growth yet, and anything that may happen in terms of economic growth factors will not affect Islamic bank risk-taking behavior.

Furthermore, in Islamic banking research, the results show a different impact. For instance, Al Wesabi and Ahmad (2013) notice that interest rate is not statistically significant, but Adebola et al. (2011), who investigate Islamic banking sector in Malaysia, indicate the interest rate has a significant and positive impact related to credit risk. An increase in interest rates causes a heavy load on debtors' cash flow, which triggers loan payment delinquency or an increase of NPLs. This is supported by several studies (Gremi, 2013; Khemraj & Pasha, 2009; Farhan et al., 2012; Warue, 2013) which found that the interest rate has a strong positive relationship to the bank's NPL ratio. Interest rates and direct costs of borrowing are key factors that impact on the solvency of individuals and constitute the direct cost of borrowing. An increase in interest rates means higher loan installments to be paid and more opportunities for borrowers to have difficulty in paying their loans.

The unique characteristics of the bank also determine its performance (Sanwari & Zakaria, 2013). In terms of the size of a bank, it can be judged from the total assets of the bank. Banks with large assets possess the possibility to provide large amounts of credit. The greater the volume of credit provides an opportunity for the bank to reduce the level of spreads, which in turn will lower the level of lending rates (interest rate credit) so that banks will be more competitive in providing services to clients who need credit (Trad, Trabelsi, & Goux, 2017). The size of the company, according to Ranjan and Dhal (2003), will affect its ability to bear risks that may arise due to a variety of situations faced by companies associated with its operations. In addition to that, several studies conducted by Louhichi and Boujelbene (2016), Xiong, Ibbotson, Idzorek, and Chen (2010), and Megginson (2005) also suggest a negative relationship between these two variables of bank size and risk-taking behavior.

A firm with a higher ratio of equity capital, however, shows a negative and significant result for banks. Banks with higher equity on hand tend to have more prudent risk-taking behavior and thus, have lower loan-loss reserve, as stated by various researchers (Saurina Salas, Jimenez, & Lopez, 2007 and Berger, Klapper, & Turk-Ariss, 2009). Suhaila and Wan Mahmood (2008) conducted a study on the bankruptcy risk and capital structure revealed that higher levels of long-term debt will result in more reduction in the optimal use of short-term debt and higher levels of liquid asset holding. The results also show that there was a negative relation between bankruptcy risk and level of capital.

From the Indonesian viewpoint, the macroeconomic effect may lead to more complicated repercussions in regards to the dual banking system that is currently being applied. To capture risk taking behavior in a dual banking system comprehensively and obtain the new perspective of the relationship between risk-taking behavior and macroeconomics factors', this study aims to investigate that relationship in the long-term perspective to fully capture the future situation. This paper will firstly present a introduction and the methodology. This will be followed by the results and discussion, and finally the conclusion and policy recommendations will be presented.

Research Method

This study evaluates eighteen banks in Indonesia, consisting of nine conventional banks and nine Islamic banks in Indonesia, whereby each Islamic bank utilized in this research for the sample of the study was previously an Islamic banking unit in a conventional bank. Indonesia is chosen as the medium of the study due to its unique characteristic of having a dual banking system. Moreover, Indonesia is one of leading countries in the Islamic banking industry as well as having numerous Islamic banking accounts (Ernst and Young, 2016). The data covers a six-year period based on quarterly data from 2010-Q4 to 2017-Q1. The year of 2010 was selected as the beginning of the retrieved data due to the fact that most Islamic banks were established during that year in Indonesia (OJK, 2015). At that time, many conventional banks released their Islamic banking units as fully-fledged Islamic bank. The data was collected from the central bureau of statistics and the central bank of Indonesia website, and it is supported from individual banking reports. Overall, the sample consists of 468 quarterly-observations.

Table 1. Research Variables

Variable	Measurement
NPLF	The ratio of non-performing loan or financing to total loan or financing on a quarterly basis
Z-score	The mean return on assets plus the capital ratio divided by the standard deviation of asset return
BI_Rate	The number of BI Rate at the end of each quarter
Inf	The number of inflation rate at the end of each quarter
Ln_GDP	The log of GDP's number on a quarterly basis
ER	The number of exchange rate at the end of each quarter
Ln_size	The log of the bank size based on a quarterly basis
ETA	The equity to asset ratio of the bank based on a quarterly basis

Based on previous studies, this research employs several variables to measure the long-term relationship between macroeconomics variables and risk-taking behavior. This research will employ panel data analysis and posit risk-taking behavior as the dependent variable. To proxy the risk as a dependent variable, this research has two models, which are:

$$\mathrm{NPLF}_{it} = \beta_0 + \beta_i \mathrm{BI\_Rate}_{it} + \beta_2 \mathrm{Inf}_{it} + \beta_3 \mathrm{Ln\_GDP}_{it} + \beta_4 \mathrm{ER}_{it} + \beta_5 \mathrm{Ln\_size}_{it} + \beta_6 \mathrm{ETA}_{it} + \varepsilon_{it} \quad (1)$$

and

$$Z - score_{it} = \beta_0 + \beta_i BI\_Rate_{it} + \beta_2 \mathrm{Inf}_{it} + \beta_3 \mathrm{Ln\_GDP}_{it} + \beta_4 ER_{it} + \beta_5 \mathrm{Ln\_Size}_{it} + \beta_6 \mathrm{ETA}_{it} + \varepsilon_{it} \quad (2)$$

where,

NPLF_{it} = Non Performing Loan or Financing for bank *i* in year *t*
Z-score_{it} = Bankruptcy risk for bank *i* in year *t*
$\mathrm{BI\_Rate}_{it}$ = BI rate for bank *i* in year *t*
Inf_{it} = Inflation rate for bank *i* in year *t*
$\mathrm{Ln\_GDP}_{it}$ = Gross Domestic Product for bank *i* in year *t*
ER_{it} = Economic growth for bank *i* in year *t*
$\mathrm{Ln\_Size}_{it}$ = Size for bank *i* in year *t*
ETA_{it} = Equity to asset ratio for bank *i* in year *t*
ε_{it} = Error-term

Regarding the measurement of the long-term relationship among variables, this study applies panel unit roots and the panel cointegration technique to estimate the effect of macroeconomic variables on risk-taking behavior in a dual banking system. To perform the panel cointegration, the assumption of the test must be applied in which all the variables have to be stationary at the first difference. As suggested by Zulkhibri et.al (2015), this test can be employed in Im, Pesaran and Shin W-stat (IPS), ADF-fisher and PP-Fisher tests. The null hypothesis for all the unit roots tests mentioned before is non stationary.

Then, the panel cointegration test may be conducted by adopting the Pedroni panel cointegration which permits for individual effects across different cross-sections utilizing a heterogeneous panel test (Pedroni, 2004). Pedroni tests consist of panel rho-statistic, panel PP-statistic and panel ADF-statistic. Moreover, Pedroni tests have the second type, in which the result of the test can be compared to the group mean of the panel test.

After the panel cointegration analysis, Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) are applied to measure the relationship of each variable. Panel data with considerable heterogeneity across individual members can be accommodated by adopting those tests (Pedroni, 2000). By adopting FMOLS and DOLS tests, serial correlation and endogeneity of the regressor are not prohibited to apply. The general model of the estimation suggested by Pedroni (2000) is as follows:

$$y_{it} = \alpha_{it} + \beta x_{it} + \mu_{it} \quad (3)$$

$$x_{it} = x_{it-1} + \varepsilon_{it} \quad (4)$$

y_i and x_i are dependent and independent variables which have cointegration for each member of the panel in which β is the cointegration vector if y_{it} cointegrated in the first difference. Moreover, α means a specific fixed effect in the cointegration relationship is allowed while ε_{it} (μ_{it}, ε_{it}) is a symbol of vector error process.

Result and Discussion

Unit root test result

As the beginning of conducting the panel cointegration test, a panel unit roots test is necessary to be applied to reveal the characteristics of the data and to ensure that all variables are stationary in the first difference (Pedroni, 2004). According to Table 2. entitled Panel Unit Root Test of Conventional and Islamic Banks, which considers individual intercept then individual intercept and trend, it shows that some variables such as Z-score and ETA are stationary at level including Ln_size based on the ADF test. Moreover, when the panel unit root in the first difference is tested, all variables are stationary at the first level. Similarly, that condition is also experienced by all variables of conventional and Islamic banks while for individual intercept and individual intercept and trend are selected. This result indicates that all variables of conventional and Islamic banks fulfill the requirement of the panel cointegration test assumption.

In Table 3, by applying individual intercept, the Z-score and ETA are stationary in the first difference even though the degree of significance is different. Furthermore, all variables are stationary at the first level. Most variables are significant in the 1% level. Based on individual intercept and trend, it exhibits that all variables are stationary at the first difference when tested by PP. The test result of conventional banks' variables indicates that it meets the assumption of cointegration to have stationarity in the first difference. For the Islamic banks' variable in Table 4, the results of the tests are mostly similar to its counterpart. Adopting individual intercept, in the first difference, all variables can reject the null hypothesis due to their stationarity, with most variables being significant in the 1% level. All variables are stationary at the first difference when individual intercept and trend is employed. Although IPM and ADF test results showed that BI Rate is not stationary at the first difference, the PP test concludes that all variable remains stationary at the first difference. According to all the tests' results, these results comply with the assumption of cointegration test to have the level stationarity at the first difference (Pedroni, 2004).

Table 2. Panel Unit Root Tests of Conventional and Islamic Banks

Variable	Individual Intercept						Individual Intercept and Trend					
	At Level			firstDifference			At Level			firstDifference		
	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP
NPLF	1.15	30.4	40.8	-9.9***	170.1***	336.5***	1.53	28.5	46.2	-9.48***	155.3***	906.7***
ZSCORE	-3.24***	69.3***	71.6****	-8.80***	146.5***	368.3***	-2.38***	57.2**	83.6***	-6.01***	101.4***	899.9***
BIRATE	1.14	16.6	10.8	-3.70***	63.7***	146.1***	5.44	3.01	1.5	-1.15	36.5	104.8***
INF	0.01	24.2	56.6**	-8.79***	142.8***	408.5***	3.14	8.24	28.4	-5.93***	94.3***	332.0***
LN_GDP	0.63	19.7	23.2	-64.7***	1282.6***	331.5***	-47.68***	1450.1***	150.0***	-65.5***	4741.0***	311.0***
ER	2.12	11.8	7.78	-11.01***	182.0***	262.5***	1.36	16.6	19.7	-8.57***	132.9***	206.7***
LN_SIZE	-1.83	63.3***	85.1	-9.96***	167.5***	167.5***	0.01	38.4	63.4	-10.1***	160.4***	1159.0***
ETA	-21.7***	376.3***	445.9***	-20.7***	361.4***	557.5***	-20.7***	333.9***	919.2***	-17.9***	284.0***	1519.1***

Notes: The optimal lag length is based on Schwarz information criteria which are automatically selected. The Null hypothesis for all tests is non-stationary in which *, ** and** denote as significant at 1% level, significant at 5% level and significant at 10% level

Table 3. Panel Unit Root Tests of Conventional Banks

Variable	Individual Intercept						Individual Intercept and Trend					
	At Level			firstDifference			At Level			firstDifference		
	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP
NPLF	1.31	11.9	16.1	-7.01***	82.8***	156.5***	1.95	8.15	16.6	17.13***	79.5***	469.2***
ZSCORE	-2.26**	35.4***	31.5**	-7.63***	89.7***	198.4***	-2.07**	31.5**	50.0***	-5.96***	66.5***	712.2***
BIRATE	0.80	8.33	5.42	-2.61***	31.8**	73.0***	3.85	1.50	0.79	-0.81	18.2	52.4***
INF	0.01	12.1	28.3	-6.22***	71.4***	204.2***	2.22	4.12	14.20	-4.19***	47.1***	166.0***
LN_GDP	0.44	9.88	11.6	-45.7***	641.3***	165.7***	-33.7***	725.0***	75.0***	-46.3***	2370.5***	155.5***
ER	1.50	5.92	3.89	-7.78***	91.0***	131.2***	0.99	8.32	9.86	-6.05***	66.4***	103.3***
LN_SIZE	-0.09	23.2	48.5***	-8.66***	103.4***	177.3***	-0.91	25.50	51.4***	-8.24***	91.5***	939.3***
ETA	-18.4***	224.3***	243.0***	-15.4***	190.5***	286.6***	-17.2***	199.2***	460.7***	13.4***	150.7***	554.7***

Notes: The optimal lag length is based on Schwarz information criteria which are automatically selected. The Null hypothesis for all tests is non-stationary in which *, ** and** denote as significant at 1% level, significant at 5% level and significant at 10% level

Table 4. Panel Unit Root Tests of Islamic Banks

Variable	Individual Intercept						Individual Intercept and Trend					
	At Level			firstDifference			At Level			firstDifference		
	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP	IPM	ADF	PP
NPLF	0.31	18.5	24.7	-7.10***	87.1***	180.0***	0.21	20.3	29.6**	-6.26***	75.6***	437.9***
Z-score	-2.32**	33.9**	40.1***	-4.80***	56.7***	172.4***	-1.28*	25.6	33.4**	-2.54***	34.9***	185.0***
BI_Rate	0.80	8.33	5.42	-2.61***	31.8690**	73.1***	3.85	1.50	0.79	-0.81	18.2	52.4***
Inf	0.01	12.1	28.3*	-6.22***	71.4***	204.2***	2.22	4.12	14.2	-4.19***	47.1***	166.0***
Ln_GDP	0.44	9.88	11.6	-45.7***	641.3***	165.7***	-33.7***	725.0***	75.0***	-46.3***	2370.5***	155.5***
ER	1.50	5.92	3.89	-7.78***	91.0***	131.2***	0.99	8.32	9.86	-6.05***	66.4***	103.3***
Ln_size	-2.53***	40.3***	47.4***	-5.28***	62.4***	141.2***	1.01	12.3	10.7	-5.95***	67.6***	234.8***
ETA	-13.4***	165.1***	207.9***	-14.4***	177.2***	271.5***	-13.3***	150.5***	371.8***	-12.3***	138.6***	839.9***

Notes: The optimal lag length is based on Schwarz information criteria which are automatically selected. The Null hypothesis for all tests is non-stationary in which *, ** and** denote as significant at 1% level, significant at 5% level and significant at 10% level

Table 5. Cointegration Tests for All Models

Pedroni Tests	Conventional and Islamic Bank		Conventional Bank		Islamic Bank	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
			Within Dimension			
Panel v-statistic	-0.31	-2.03	-2.79	-2.31	-0.29	-0.66
Panel rho-statistic	2.14	3.18	2.08	2.00	1.53	2.63
Panel PP-statistic	-28.5***	-1.52*	-3.10***	-2.51***	-20.5***	0.14
Panel ADF-statistic	-7.17***	-3.40***	-3.09***	-2.94***	-6.21***	-0.42
			Between Dimension			
Group rho-statistic	4.13	4.28	3.30	2.71	2.69	3.43
Group PP-statistic	-17.6***	-1.59**	-1.96**	-2.61***	-8.86***	0.15
Group ADF-statistic	-4.97***	-3.37***	-1.75**	-3.22***	-5.15***	-0.83

Notes: All tests utilize Pedroni tests which have null hypothesis as no cointegration in which *, ** and** denote as significant at 1% level, significant at 5% level and significant at 10% level

Cointegration test result

As explained by Pedroni (2004), cointegration tests will delineate the long-term relationship among the variables. The null hypothesis of a cointegration test is no cointegration. Based on Table 5. entitled Cointegration Test for All Models, Model 1 for the conventional and Islamic bank indicates that NPLF has a long-term relationship to the macroeconomics factors(Lin et al., 2016)(Lin et al., 2016)(Lin et al., 2016)(Lin et al., 2016)(Lin et al., 2016)(Lin et al., 2016)(Lin et al., 2016). It can be seen from the Pedroni tests that, in these results, four out of seven tests are significant at 1% level either within dimension or between dimensions. This result also indicates that the NPL of the banks is affected by macroeconomic variables for long-term relationships (Lin et al., 2016). Bankruptcy risk denoted by Z-score in Model 2 has a similar result to NPL, which considers the Pedroni tests. Several tests such as Panel PP-statistic and Panel ADF-statistic show the significance of the cointegration test.

The cointegration relationship by the two models shows that the risk-taking behavior by the bank will correlate to macroeconomic variables like inflation, central bank interest rate, economic growth and exchange rate. The change of each macroeconomic variable may influence the risk-taking behavior of the bank (Karim et al., 2016). The conventional banks strongly affect the long-term relationship due to their asset and market share domination in the dual banking system (Alam, 2012). As the market leaders of the banking industry, conventional banks have the same long-term relationships as all banks. This result illustrates the strong influence of conventional banks to drive the banking industry in a dual banking system. For the cointegration result, four out of seven Pedroni tests in Model 1 conclude that the p-value is less than 10% as the maximum benchmark of significant level. This means that the null hypothesis is rejected and the alternative hypothesis can be taken as the conclusion that a long-term relationship between NPLF and macroeconomic variables exists, for which this result is supported by Lin et.al (2016). Model 2, which explains the relationship between bankruptcy risk and macroeconomic variables, reflects the long-term relationship among the variables. Therefore, as concluded by Karim et.al (2016), the risk-taking of conventional banks will depend on the dynamic of macroeconomic conditions. The risk management of the conventional banks must examine the macroeconomic dynamic indicators. Regarding the history of financial crises, the bankruptcy risk that haunted conventional banks experiencing financial distress conditions might start from macroeconomic turmoil (Eichler & Sobański, 2016).

For Islamic banks, the results of NPLF describe the long-term relationship with macroeconomic variables (Lin et al., 2016). The Pedroni tests of Islamic banks state that four out of seven tests are significant at 1% level. The long-term relationship between NPLF and macroeconomic variables may illustrate the characteristic financing activity performed by Islamic banks. From the supply side, Islamic banks may consider macroeconomic conditions while giving financing to debtors, where it may affect the financing program of Islamic banks (Bourkhis & Nabi, 2013). Uniquely, in model 2, Islamic banks do not have long-term relationship with macroeconomic variables. The Pedroni test results show that there is no single test which has statistical significance in any level. The result represents no long-term relationship between bankruptcy risk and macroeconomic variables. Based on this result, bankruptcy risk in Islamic banks may be affected by not only macroeconomic variables, but it may be dominated by other factors. The non-domination of macroeconomics factors may be caused by unique characteristics of Islamic banks which must comply with Sharia law, promoting equity based financing, against interest rates and any speculation in economic transactions (Sanwari & Zakaria, 2013).

Additionally, the different nature of risk-taking behavior in Islamic banks compared to conventional banks may generate different treatment of risk management on the part of the banks (Bourkhis & Nabi, 2013; Sanwari & Zakaria, 2013). Thus, a proper risk-taking management pattern may need to be found to accommodate the unique nature of Islamic banks. Islamic banks may be more robust during financial distress such as a financial crisis that may be experienced in a dual banking system. The robustness of Islamic banks may be rendered by its different risk-taking behavior, which has different sensitivity to macroeconomic factors. Surely, this characteristic of Islamic banks may require more attention from policy makers such as the central bank, in making different policies for Islamic banks due to their unique nature.

FMOLS and DOLS test result

The result of FMOLS and DOLS will reveal the relationship between two variables whether it has a positively significant relationship or vice versa. When the conventional and Islamic banks are grouped as one sample, BI_Rate has negative significance to the NPLF at 10% level. It shows that if the number of BI_Rate increases, the NPLF will decrease. This may happen due to high cost of borrowing faced by the debtors then they choose not to borrow money from the bank. This evidence assures that interest rate constitutes a crucial variable for banks (Nursechafia & Abduh, 2014). The less amount of money lent to the debtor may decrease the rate of NPLF. Moreover, the test concludes the dependent variable which also represents financial soundness has a significant relationship to the exchange rate (Karim et al., 2016).

Furthermore, this relationship indicates that a combination of sample between conventional and Islamic banks, which is dominated by conventional banks in terms of asset size, has a high exposure to exchange rate risk. The banks will be sensitive to a change of exchange rate. For example, in the Model 1 of DOLS test exhibits that an increase 1% value of exchange rate will rise 0.001% in NPLF's score. Conversely, an increase in the value of exchange rate will increase the bankruptcy risk. It is showed by in the Model 2 which represents an increase of Z-score while the value of exchange rate increase. Lin et.al (2016) argue that risk exposure may involve in foreign currency transaction where an increase in the exchange rate meaning that the local currency is depreciating which transaction cost of the bank may increase. The high involvement to foreign currency transaction will happen while the bank engages in open financial transaction including international market (Seeberg, 2015).

In terms of control variable for research Models 1 and 2, it can be seen that the financial structure of the bank is a matter observed from the asset value and the capital structure of the banks. The banks with higher asset value will have less NPLF due to their ability to manage the risk. Trad et al. (2017) explain that the big banks may have the possibility to diversify investment to create their portfolio. The excess assets of the banks may be exerted to create a considerable return with a certain level of manageable risk. This situation is illustrated by the FMOLS and DOLS test result. In Model 2, the bankruptcy risk and the bank size has a positive relationship. It implies there is less bankruptcy risk for the banks who have big assets. The higher value of Z-score highlights the lesser level of bankruptcy risk (Trad et al., 2017). The bigger size of the banks may enable it to enlarge its investment coverage to manage bankruptcy risk and make the bank resilient to financial sluggishness.

For the conventional banks as the object of the research, the NPLF has a negative relationship to the BI_Rate either in the FMOLS or DOLS test. This result shows that there is a strong correlation of BI_Rate to business activity performed by the conventional banks, which are mainly funding and lending money based on interest rate (Al Wesabi & Ahmad, 2013). Similarly, the negative relationship between those variables may be rendered by the demand point of view of the lender who may opt to "wait and see" due to the high cost of borrowing. The debtor may consider not borrowing money from the bank. Furthermore, inflation has a negative and significant relationship to the risk taking behavior of conventional banks. Zarrouk et al. (2016) state the high level of inflation may signal to the banks that the actual return generated by the banks will be less, due to the nature of inflation as a disincentive to the conventional banks' return. Therefore, banks may refrain from lending to the debtor. The negative relationship between bankruptcy risk and inflation in model 2 shows that the banks will generate more actual return while the inflation rate is low (Boyd, Levine, & Smith, 2001). Hence, the low level of inflation may enable the banks to be more sustainable in operating their business.

Table 6. FMOLS and DOLS Result for All Banks

Variables	Conventional and Islamic Bank				Conventional Bank				Islamic Bank			
	FMOLS		DOLS		FMOLS		DOLS		FMOLS		DOLS	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
BI_Rate	-0.78*	-0.101	-0.57	-0.07	-0.27***	0.06	-9.77**	1.49*	-1.05	-0.31**	-0.84	-0.24*
	(-1.72)	(-1.40)	(-1.31)	(-0.65)	(-4.52)	(0.39)	(-2.61)	(1.83)	(-1.27)	(-2.02)	(-1.08)	(-1.66)
Inf	-0.07	0.08**	-0.13	0.007	-0.15***	0.07	0.29	-0.97*	0.02	0.09	-0.07	-0.08
	(-0.33)	(2.25)	(-0.64)	(1.29)	(-5.37)	(0.95)	(2.17)	(-1.91)	(0.05)	(1.25)	(-0.19)	(1.19)
Ln_GDP	-4.25	2.015	-2.53	1.46	-4.99***	7.88**	-7.27	55.72**	2.88	-0.84	3.17	-0.08
	(-0.38)	(1.14)	(-0.25)	(0.59)	(-3.36)	(2.03)	(-0.68)	(2.62)	(0.14)	(-0.22)	(0.17)	(-0.02)
ER	0.001**	-0.0003***	0.001**	-0.0003***	0.0005***	-0.0004**	0.0008*	-0.002**	0.002*	-0.0002	0.002**	-0.003*
	(2.27)	(-4.06)	(2.38)	(-2.74)	(8.04)	(-2.17)	(1.72)	(-2.54)	(1.92)	(-1.18)	(2.17)	(-1.75)
Ln_size	-3.27***	0.67***	-3.16**	0.74***	-2.21***	-1.59**	-4.14***	-2.77*	-5.16***	0.91***	-5.18***	1.004***
	(-3.06)	(3.96)	(-3.11)	(2.98)	(8.008)	(-2.22)	(-4.05)	(-1.91)	(-3.28)	(3.16)	(-3.49)	(3.62)
ETA	-3.27	2.93***	14.36***	2.95*	-0.65	2.33**	25.05***	-0.03	33.42***	2.75	20.40*	2.67
	(-3.06)	(2.82)	(-3.11)	(1.87)	(0.72)	(0.99)	(2.80)	(-0.006)	(2.85)	(1.28)	(1.81)	(1.26)
Adjusted R-squared	0.285	0.926	0.282	0.926	0.577	0.917	0.948	0.98	0.347	0.803	0.346	0.805

Notes: All tests utilize panel dynamic analysis tests which have null hypothesis as no n-significant in which *, ** and** denote as significant at 1% level, significant at 5% level and significant at 10% level

The result of FMOLS and DOLS tests also provide evidence of the negative relationship between GDP to NPLF of conventional banks. This phenomenon defines the low level of NPLF rate while there are favorable economic conditions (Espinoza & Prasad, 2010). Therefore, the debtor is able to return the borrowed money to the conventional banks based on a pre-determined schedule. In model 2, the positive relationship between GDP and bankruptcy risk indicates that the number of Z-score will be higher while the value of the GPD is higher as well. The high Z-score represents the fact that the level of bankruptcy owned by the bank is lower. Alandejani & Asutay (2017) claim that a stable economic situation may establish the good performance of financial

institutions, for example in their operation of business activities. In terms of the relationship of exchange rate to risk-taking behavior, it is similar to the previous result when conventional and Islamic banks are grouped. This result also similarly supports the conclusions of Seeberg (2015), in that the banks may have high exposure to business activity related to exchange rate transactions. For conventional banks, the size and the capital structure of the bank will influence the performance of the bank in regard to risk taking behavior and the macroeconomic factors (Trad et al., 2017).

While the NPLF of conventional banks has a strong relationship to BI Rate, Islamic banks have no significant relationship to interest rate, which is a result also supported by Al Wesabi and Ahmad (2013). The variety of the Islamic banks' products may be the main reason why the relationship is not significant. Several products of Islamic banks are based on profit sharing such as *musharakah* and *mudarabah*, which will generate the return depending purely on the business activity (Lin et al., 2016). This kind of product, theoretically, will not have any relationship to interest rate. This finding is a signal that Islamic banks already operate funding and lending activities based on profit sharing. However, BI_Rate as the symbol of the interest rate in Indonesia has a negative and significant relationship to Z-score. This implies that an increase in interest rate will lower the Z-score, which means the possibility of going bankrupt becomes higher. This relationship may conclude that even though Islamic banks promote profit loss sharing products to the customer, Islamic banks still have limited alternatives to borrowing money while the bank has to manage liquidity asset, due to the fact that the size of Islamic banks is still low in the banking industry (Trad et al., 2017). Liquidity asset providers may come from conventional financial institutions including Islamic banks as the last resource of funding which will relate to interest rate when the bank performs lending activities.

Surprisingly, GDP does not have a significant relationship to the risk-taking behavior of Islamic banks (Karim et al., 2016), in which inflation has the same relationship. This result confirms the different conditions experienced by conventional banks in which conventional banks have a significant relationship to those two macroeconomic variables. The non-significant relationship with GDP means Islamic banks do not depend on the dynamic of GDP growth or degradation. The small size of Islamic banks may bec the main reason for this. Furthermore, this finding also confirms that the depositors of Islamic banks are still fewer compared to their counterpart. Regarding the bank characteristics, based on model 1 and 2 results show a significant relationship between NPLF and Z-score with bank size. The larger assets of the banks provide evidence of the banks' greater resilience to risk-taking behavior. This situation depicts good risk-management by the banks especially in managing risk-taking behavior due to their ability to create good stability and a good investment portfolio as part of the risk management instrument. This finding aligns with several studies by Louhichi & Boujelbene (2016), Xiong, Ibbotson, Idzorek, & Chen (2010), and Megginson (2005) that support the results of this study.

Conclusion

According to the results and discussion mentioned above, risk-taking behavior of conventional and Islamic banks has a long running relationship with macroeconomic variables. This result provides the insight for both banks that macroeconomic variables are some of the key factors which will determine the risk faced by the banks. However, conventional banks and Islamic banks have different responses to macroeconomic variables. Conventional banks have more exposure to interest rate compared to Islamic banks. This evidence shows that conventional and Islamic banks have a different nature in their business operations. Conventional banks tend to adopt interest rate as the benchmark to generate their returns, while Islamic banks prefer to apply profit loss sharing which is mainly performed in equity based financing such as *musharakah* and *mudharabah*. Furthermore, the non-significant relationship between risk-taking behavior in Islamic banks and GDP shows that the customers of Islamic banks are still fewer compared to their counterpart.

Finally, as the policy makers, the financial authorities in the dual banking system such as the central bank and financial service authority must pay attention to these different characteristics of the two kinds of banks. Hence, policy makers may not treat both banks equally. A different policy must be applied due to the different characteristics of each bank. Specific for the Islamic banks, policy makers may provide incentive for Islamic banks to spur more impressive development through the easing of rules for Islamic banks and by providing an Islamic banking industry ecosystem to make sure that the Islamic banks can comply with Sharia and remain competitive in the banking industry. For all banks, the policy makers may encourage the banks to increase their bank size due to the fact that large banks will make it easier to manage risk-taking behavior. Also, policy makers may recommend the banks to merge with the intention of promoting their resilience in facing turmoil from macroeconomics factors.

Acknowledgment

We gratefully acknowledge the support from Pusat Pengembangan Ekonomi (PPE) Universitas Islam Indonesia for providing research grant to this study.

References

Adebola, S. S., Wan Yusoff, W. S., & Dahalan, J. (2011). An ardl approach to the determinants of non-performing loans in Islamic banking system in Malaysia. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *1*(2), 20–30.

Ahmad, F., Abbas, Z., & Bashir, T. (2013). Explanatory power of macroeconomic variables as determinants of non-performing loans: Evidence form Pakistan. *World Applied Sciences Journal*, *22*(2), 243–255. https://doi.org/10.5829/idosi.wasj.2013.22.02.1863

Al Wesabi, H. A. H., & Ahmad, N. H. (2013). Credit risk of Islamic Banks in GCC countries. *The International Journal of Banking and Finance*, *10*(2), 95–112.

Alam, N. (2012). Efficiency and risk-taking in dual banking system: Evidence from emerging markets. *International Review of Business Research Papers*, *8*(4), 94–111.

Alandejani, M., & Asutay, M. (2017). Nonperforming loans in the GCC banking sectors: Does the Islamic finance matter? *Research in International Business and Finance*, *42*(Supplement C), 832–854. https://doi.org/10.1016/j.ribaf.2017.07.020

Ali, S. S. (2007). Financial distress and bank failure: Lessons from closure of Ihlas finans in Turkey. *Islamic Economic Studies*, *14*(1), 1–52.

Anderson, R. W., & Carverhill, A. (2010). *Liquidity and capital structure: The case of Thailand* (No. 6044).

Aysun, U. (2016). Bank size and macroeconomic shock transmission: Does the credit channel operate through large or small banks? *Journal of International Money and Finance*, *65*, 117–139. https://doi.org/10.1016/j.jimonfin.2016.04.001

Berger, A., Klapper, L., & Turk-Ariss, R. (2009). Bank competition and financial stability. *Journal of Financial Services Research*, *35*(2), 99–118. https://doi.org/10.1007/s10693-008-0050-7

Bourkhis, K., & Nabi, M. S. (2013). Islamic and conventional banks' soundness during the 2007-2008 financial crisis. *Review of Financial Economics*, *22*(2), 68–77. https://doi.org/10.1016/j.rfe.2013.01.001

Boyd, J. H., Levine, R., & Smith, B. D. (2001). The impact of inflation on financial sector performance. *Journal of Monetary Economics*, *47*(2), 221–248.

Castro, V. (2013). Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI. *International Advances in Economic Research*, *20*(1), 87–102. https://doi.org/10.1007/s11294-013-9444-x

Eichler, S., & Sobański, K. (2016). National politics and bank default risk in the eurozone. *Journal of Financial Stability*, *26*, 247–256. https://doi.org/10.1016/j.jfs.2016.07.008

Ernst and Young. (2016). World Islamic Banking competitiveness report 2016.

Espinoza, R. A., & Prasad, A. (2010). *Nonperforming Loans in the GCC Banking System and their Macroeconomic Effects* (224 No. 10).

Farhan, M., Sattar, A., Chaudhry, A. H., & Khalil, F. (2012). Economic determinants of non-performing loans: Perception of Pakistani Bank. *European Journal of Business and Management*, *4*(19), 87–99.

Ghosh, S. (2016). Macroprudential policies, crsisis and risk-taking; evidence from dual banking system in GCC countries. *Journal of Islamic Accounting and Business Reseacrh*, *7*(1), 6–27.

Gremi, E. (2013). Macroeconomic factors that affect the quality of lending in. *Research Journal of Finance and Accounting*, *4*(9), 50–58.

Kanten, P., & Ulker, F. (2013). The macrotheme review. *Multidisciplinary Journal of Global Macro Trends*, *2*(4), 144–160.

Karim, N. A., Al-Habshi, S. M. S. J., & Abduh, M. (2016). Macroeconomics indicators and bank stability: A case of banking in Indonesia. *Buletin Ekonomi Moneter Dan Perbankan*, *18*(4), 431–448.

Khemraj, T., & Pasha, S. (2009). The determinants of non-performing loans: An econometric case study of Guyana. *MPRA Paper*.

Klein, N. (2013). *Non-performing loans in CESEE : Determinants and impact on macroeconomic performance* (72 No. 13).

Kutan, A. M., Muradoglu, G., & Sudjana, B. G. (2012). IMF programs, financial and real sector performance, and the Asian crisis. *Journal of Banking and Finance*, *36*(1), 164–182. https://doi.org/10.1016/j.jbankfin.2011.06.015

Lin, H.-Y., Farhani, N. H., & Koo, M. (2016). The impact of macroeconomic factors on credit risk in conventional banks and Islamic banks: Evidence from Indonesia. *International Journal of Financial Research*, *7*(4). https://doi.org/10.5430/ijfr.v7n4p105

Louhichi, A., & Boujelbene, Y. (2016). Credit risk, managerial behaviour and macroeconomic equilibrium within dual banking systems: Interest-free vs. interest-based banking industries. *Research in International Business and Finance*, *38*, 104–121. https://doi.org/10.1016/j.ribaf.2016.03.014

Nursechafia, & Abduh, M. (2014). The susceptibility of Islamic Banks' credit risk towards macroeconomic variables. *Journal of Islamic Finance*, *3*(1), 23–37. https://doi.org/10.12816/0031476

Pedroni, P. (2000). Fully modified ols for heterogeneous cointegrated panels. *Advances in Econometrics*, *15*, 93–130.

Pedroni, P. (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the econometric press. *Econometric Theory*, *20*(3), 597–625. https://doi.org/10.1017/S0266466604203073

Ranjan, R., & Dhal, S. C. (2003). *Non-performing loans and terms of credit of public sector banks in India: An empirical assessment*. *Reserve Bank of India Occasional Papers* (Vol. 24). https://doi.org/10.1080/08039410.1994.9665960

Sanwari, S. R., & Zakaria, R. H. (2013). The performance of Islamic Banks and macroeconomic conditions. *ISRA International Journal of Islamic Finance*, *5*(2), 83–98. https://doi.org/10.12816/0002770

Saurina Salas, J., Jimenez, G., & Lopez, J. A. (2007). How does competition impact bank risk taking? *Federal Reserve Bank of San Fransisco Working Peper*, *No 23*.

Seeberg, A. R. (2015). *The risk-taking channel of monetary policy : Evidence from Norway*.

Shingjergji, A. (2013). The impact of macroeconomic variables on the non-performing loans in the Albanian banking system during 2005 - 2012. *Academic Journal of Interdisciplinary Studies*, *2*(9), 335–339. https://doi.org/10.5901/ajis.2013.v2n9p335

Suhaila, M. K., & Wan Mahmood, W. M. (2008). *Capital structure and firm characteristics: Some evidence from Malaysian companies*.

Trad, N., Trabelsi, M. A., & Goux, J. F. (2017). Risk and profitability of Islamic banks: A religious deception or an alternative solution? *European Research on Management and Business Economics*, *23*(1), 40–45. https://doi.org/10.1016/j.iedeen.2016.09.001

Warue, B. N. (2013). The effects of bank specific and macroeconomic factors on nonperforming loans in commercial banks in Kenya: A comparative panel data analysis. *Advances in Management and Applied Economics*, *3*(2), 1–7.

William L. Megginson. (2005). The economics of bank privatization. *Journal of Banking & Finance*, *29*(8–9), 1931–1980.

Xiong, J. X., Ibbotson, R. G., Idzorek, T. M., & Chen, P. (2010). The equal importance of asset allocation and

active management. *Financial Analysts Journal*, *66*(2), 22–30. https://doi.org/10.2469/faj.v66.n2.7

Zarrouk, H., Ben Jedidia, K., & Moualhi, M. (2016). Is islamic bank profitability driven by same forces as conventional banks? *International Journal of Islamic and Middle Eastern Finance and Management*, *9*(1), 46–66. https://doi.org/10.1108/IMEFM-12-2014-0120

Zarrouk, H., Jedidia, K. B., & Moualhi, M. (2016). Is Islamic bank profitability driven by same forces as conventional banks? *International Journal of Islamic and Middle Eastern Finance and Management*, *9*(1), 46–66. https://doi.org/10.1108/IMEFM-12-2014-0120

Economic Journal of Emerging Markets, 10(2) 2018, 177-186

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

Import competition and local labor markets: the case of Indonesia

Fina Sri Agustina

Department of Economics, Universitas Indonesia, Jakarta, Indonesia
Corresponding Author e-mail: finasriagustina@gmail.com

Article Info

Article history:
Received: 16 March 2018
Accepted: 21 June 2018
Published: 1 October 2018

Keywords:
import competition, local labor market, Indonesia

JEL Classification:
F66, J21, J40

DOI: 10.20885/ejem.vol10.iss2.art6

Abstract

This paper analyzes the effects of import competition on Indonesian local labor markets in term of manufacturing employment share, non-manufacturing employment share, unemployment rate, and wages. A rapid increase in globalization has caused many countries including Indonesia experiences a significant increase in imports, which leads to tougher import competition. Using data of imports from 430 districts in Indonesia in the period of 2007-2013, we find that import competition has negatively affected manufacturing employment share, non-manufacturing employment share, and wages. It also increases unemployment. Besides, the highest impact is mainly driven by imports of consumption goods.

Introduction

In the last two decades, the world has witnessed an increase in trade globalization. Many countries including Indonesia experienced a rapid increase in international trade. Under Indonesia's new competition law in 1998, Indonesia removed import restrictions and reduced import tariffs. There were five previous studies which mentioned the impact of import competition. According to Statistics Indonesia, the value of Indonesian imports increased significantly from 74,473 million U.S. dollars in 2007 to become 186,628 million U.S. dollars in 2013. However, during that period, the growth in workers who worked in manufacturing was very slow, and it even decreased in 2013. While those who work in the non-manufacturing sector steadily increased and wages slightly increased. Based on this, these are the research questions: Does a substantial increase in Indonesian imports affect Indonesian local labor markets regarding manufacturing employment share, non-manufacturing employment share, unemployment rate, and wages, and how significant is the impact? This paper investigates the impact of import competition on local labor markets in Indonesia.

Traditionally, the increase of trade globalization can benefit the countries involved. Due to trade openness, some industries may contract while others expand, however, the net results would be good for the economy as a whole. For example, the international trade which causes competition through imports tends to increase rivalry in industry and a decline in profits in many instances (Caves & Porter, 1978). However, participation in international trade eventually increases productivity (Sjöholm, 1999). Therefore, local companies, which must compete with foreign companies both in the domestic and international markets, will be forced to increase their productivity by increasing efficiency and adopting new technologies.

On the other hand, a decrease in profits, an increase in efficiency and adoption of new technologies can also lead to a reduction in the number of the firms' workers and wages. As another example, labor demand for Mexican worker decreases because of the negative impact of import competition (Caamal-Olvera & Rangel-Gonzalez, 2015). Furthermore, trade openness triggered import exposure which leads to a decrease of demand for an unskilled worker in economies, such as Mexico (Feenstra & Hanson, 1997), Chile (Pavcnik, 2003), and Indonesia (Kasaharaa, Liang, & Rodrigue, 2016). In other words, import competition may cause unemployment (Dutt, Mitra, & Ranjan, 2009; Hasan, Mitra, Ranjan, & Ahsan, 2012).

In Indonesia, there are five previous studies, that mention the impact of import competition. First, Amiti and Konings (2007) show that in term of productivity, input tariffs reduction positively affects Indonesian employment through import competition. Second, Amiti and Cameron (2012) found that reducing intermediate input tariffs, however, causes the wages to skill premium in Indonesia to decrease. Third, Kis-Katos and Sparrow (2015) found that a reduction in import tariffs on intermediate goods increased the competitiveness of firms

P ISSN 2086-3128 | E ISSN 2502-180X

and induced the increase of low and medium skilled labor participation as well as the rise in wages for the medium skilled in Indonesia. Lastly, Kasaharaa et al. (2016) argued that a decision of firms in Indonesia to start importing causes higher demand for skilled labor. All in all, even though these five studies have not directly analyzed the effects of import competition on the labor market in Indonesia, most of them are optimistic toward trade liberalization.

However, despite a general belief among many economists that trade openness would benefit the economy, it seems that there was an observable phenomenon, such as a decrease in manufacturing employment share and wages, and an increase of unemployment in the labor market due to increased imports. His implies that the rapid increase in trade openness cannot be matched with adjustments in the labor market so that in 2013 scholars challenged the traditional view of the effects of globalization trading on the labor market by using new measures of import competition. The pioneers were Autor, Dorn, and Hanson (2013) who investigated the impact of Chinese import competition on local labor markets in the United States in 2013. They developed a new measurement of import competition that allows us to measure the import exposure faced by individual local labor markets. They found that Chinese import competition increased unemployment, and reduced the manufacturing employment share and wages, while for non-manufacturing the impact was negative but insignificant.

Following Autor et al. (2013), four researchers in other countries tried to conduct the same study using the same measurement of import competition. However, two of them also included exports in their research, while the others are focusing only on imports. Research that includes exports was conducted by Balsvik, Jensen, & Salvanes (2014) and Dauth, Findeisen, & Suedekum (2014). They examined the impact of Chinese import competition on the local labor markets in Norway and Germany, respectively. Balsvik et al. (2014) included export market exposure with a slightly different measurement. While, Dauth et al. (2014) included export exposure by using the same formula as Autor et al., but they replaced import value from China to Germany with the export value from Germany to China. Balsvik et al. (2014)found that Chinese import exposure reduced the share of manufacturing employment in Norway; however, it increased the public employees and workers in other sectors, while wages were unaffected. Dauth et al. (2014) concluded that imports from China hurt manufacturing employment, while exports from Germany to China exhibit a positive effect. Besides, Dauth et al. (2014) also analyzed the impact of Eastern Europe import competition on local labor markets in Germany. They found that imports from Eastern Europe also negatively affect manufacturing employment, while exports from Germany to Eastern Europe positively affect manufacturing employment. However, the impact of German imports and exports from and to Eastern Europe was stronger than the effect of German imports and exports from and to China. They argue that this is evidence that is focusing only on China will give an incomplete picture.

Two other pieces of research that focused only on imports similar to Autor et al. are research conducted by Donoso, Martin, & Minondo (2014) in Spain and by Mendez (2015) in Mexico. Donoso et al. (2014) found that a substantial increase in imports from China negatively affected the manufacturing employment share in the labor markets of Spanish provinces. However, the increase in non-manufacturing employment offset this impact. Mendez (2015) found a negative impact on manufacturing employment share and unemployment in Chinese import competition. However, for non-manufacturing, the impact was also negative but insignificant. He also shows evidence that Chinese import competition has a small significant positive impact on wages. Like Autor et al. (2013), Donoso et al. (2014)and Mendez (2015), this paper focuses only on imports because we are interested in examining the impact of a significant increase in imports that began to exceed exports.

Based on the previous research, by using the new measurement of import exposure developed by Autor et al. (2013) and applying the same method as previous studies in those five countries, this paper examines how exactly import competition impacts on local labor markets in Indonesia. Furthermore, research that analyzes the effect of import competition on local labor markets in Indonesia still does not exist. Considering that understanding the impact of import competition on local labor markets is important as a policymaker consideration and given the lack of studies on the subject in Indonesia, this paper tries to fill this gap by conducting such research.

The structure of the rest of this paper will be as follows. Section 2 provides a brief explanation of the methodology, section 3 describes the data, section 4 presents our estimation results and discussion. Finally, section 5 concludes.

Research Method

This paper uses the same model and measurement of import exposure as Autor et al. (2013). However, the division of local labor markets is based on districts. Changes in exposure to import competition in the district are defined as changes in national imports of industrial products j during the period corresponding to the district

share of total national employment in the industry at the beginning of the period. Then, the number of changes in imports of all industries was scaled to the total employment in the district i at the beginning of the period. Mathematically, the changes of exposure to import competition can be written as the following:

$$\Delta exp_{it}^{ID} = \frac{1}{L_{it}} \sum_j \frac{L_{ijt}}{L_{jt}} \Delta M_{jt}^{ID} \quad (1)$$

Δexp_{it}^{ID} : The changes of exposure to import competition.
L_{it} : Total employment in district i in the start of the period.
L_{ijt} : The employment in district i in industry j in the start of the period.
L_{jt} : Total employment in Indonesia in industry j at the start of the period.
ΔM_{jt}^{ID} : Change of Indonesian imports in industry j from the start to the end of the period.

We construct our baseline model based on the theoretical framework of the previous research. Theoretically, the changes in wages and employment are affected by the changes in import exposure, which is measured as in equation (1). Furthermore, according to previous research conducted by Autor et al. (2013), Balsvik et al. (2014), and Mendez (2015, some demographic characteristics may also affect the changes of wages and employment in district i. Besides, local labor market outcomes are also affected by the growth of the working-age population (Donoso et al., 2014). Hence, we will control these variables when estimating the impact of import competition on local labor markets. All in all, the regression model is as the following:

$$\Delta y_{it} = \beta_1 \Delta exp_{it}^{ID} + X_{it}'\beta_2 + \varepsilon_{it} \quad (2)$$

Δy_{it} : 3-year changes of manufacturing employment share, 3-year changes of non-manufacturing employment share, 3-year changes of the unemployment rate, or 3-year changes of ln average wages in the region i from the start to the end of the period.
Δexp_{it}^{ID} : The change of exposure to import competition.
X_{it} : Control variables consist of growth of working age population, percentages of manufacturing employment, percentages of non-manufacturing employment, percentages of unemployment, ln average wages, percentages of working for an aged population with a college education, and percentages of employment among working age women in district i at the start of a period.

According to Autor et al. (2013), there is a possibility that the realized imports were caused not only by the growing productivity of exporter countries and the fall of trade costs but also industry import demand shock in the importing country. In the case that import shock is driven by domestic demand shocks, OLS estimation may understate the real impact of import competition. To overcome the problem of endogeneity using a strategy, the same as Author et al. (2013), with some adjustments. The variable of the change of exposure to import competition (Δexp_{it}^{ID}) is instrumented by the change of the world import exposure (Δexp_{it}^{w}) and the change of the non-Indonesia import exposure (Δexp_{it}^{O}). The first instrumental variable is constructed using data of world imports, while the second instrument is formulated using data of imports from world to other eight lower-middle-income countries in Asia.[1] The formula of the instrumental variable is as follows:

$$\Delta exp_{it}^{w} = \frac{1}{L_{it-1}} \sum_j \frac{L_{ijt-1}}{L_{jt-1}} \Delta M_{jt}^{w} \quad (3)$$

$$\Delta exp_{i}^{o} = \frac{1}{L_{it-1}} \sum_j \frac{L_{ijt-1}}{L_{jt-1}} \Delta M_{jt}^{o} \quad (4)$$

Basically, the formula is similar with the formula to calculate the change of exposure to import competition (Δexp_{it}^{ID}) except for two terms. Firstly, the change of realized Indonesian imports by industry (ΔM_{jt}^{ID}) is replaced by the change of realized world imports (ΔM_{jt}^{w}) and imports from the world to other lower-middle-income countries in Asia (ΔM_{jt}^{O}). Secondly, the level of employment lagged by one period. The idea behind the instrument variable is that the rise of the world economy leads to supply shocks and increased import penetration for all trading partners, not just for Indonesia. Therefore, using the world imports and import flows to other lower-middle-income countries in Asia as an instrument for local import exposure in Indonesia can identify the exogenous component of rising competitiveness in the world that is faced by lower-middle-income countries especially in the same region.

[1] The eight selected lower-middle-income countries are Cambodia, Philippines, Viet Nam, India, Pakistan, Bangladesh, Sri Lanka, and Bhutan. The eight countries are selected because they are the same lower middle-income country as Indonesia based on The World Bank country classification and their trade data for full sample period are available in UN Comtrade Database.

Moreover, that can clear the effects of possible shocks that simultaneously affect Indonesian imports and regional performance. We use two instruments because according to Soderbom (2009), having more instruments than strictly required to enable us to improve the precision of estimates and test the validity of the instrumental variables through an overidentification test. We use a lag of the employment by one period to overcome the problem of measurement error or reverse causality if workers or manufacturers had anticipated future trade exposure and take some anticipatory actions.

The estimation method that is used is two stages least squared (2SLS) with fixed effects. The district's time-invariant effects that are possibly correlated with regressors will be eliminated by using fixed effects to avoid bias estimators. Furthermore, robust standard errors are clustered on a province, and the model is weighted by the start of period district's share of national population.

Data

This research uses a panel data analysis covering 430 districts in Indonesia from 2007-2013, which is divided into two periods: 2007-2010 and 2010-2013. The data on employment, wages, and Indonesian imports are from Statistics Indonesia. The world import data and the data on imports from the world to eight selected lower-middle-income countries in Asia was obtained from UN Comtrade Database.[2] Besides, to distribute imports into several sectors of industry, we convert the import value from the Harmonized System Codes (HS) into the Standard Classification Codes of Indonesian Business Sector by using a concordance table from the publication *"KBKI correspondence widenganth KKI 1998/1999 KKI 1998 HS"* provided by Statistics Indonesia. While, the categorization of imported commodities into capital goods, intermediate goods, and consumption goods is based on the classification of Broad Economic Category (BEC). Furthermore, all the import values are inflated to 2009 U.S. dollars using the Personal Consumption Expenditures (PCE) deflator from the Bureau of Economic Analysis. The data used in this paper along with its sources can be seen in table 1.

Table 1. Summary of Data Source

Variable	Unit of Measurement	Data Source
Dependent variable		
3-year changes of manufacturing employment share	Percent	Statistics Indonesia
3-year changes of non-manufacturing employment share	Percent	Statistics Indonesia
3-year changes in the unemployment rate	Percent	Statistics Indonesia
3-year changes of ln average wages	Percent	Statistics Indonesia
Component to calculate the change of import exposure and instrumental variable		
Employment by industry and district	People	Statistics Indonesia
Total employment in Indonesia by industry	People	Statistics Indonesia
Total employment in Indonesia by a district	People	Statistics Indonesia
Indonesian import value	Thousand US$	Statistics Indonesia
Import value of 8 other lower-middle-income countries	Thousand US$	UN Comtrade
World import value	Thousand US$	UN Comtrade
Control variables		
% manufacturing employment	Percent	Statistics Indonesia
% non-manufacturing employment	Percent	Statistics Indonesia
% unemployment	Percent	Statistics Indonesia
ln average wages	Nat log point	Statistics Indonesia
% working age with a college education	Percent	Statistics Indonesia
% employment among women	Percent	Statistics Indonesia
Working-age growth	Percent	Statistics Indonesia

[2] The data are in the form of HS 6-digits that enable us to aggregate the value of imports into the sectors classification used in Indonesia.

Results and Discussion

Manufacturing employment

We start by examining the impact of import exposure on manufacturing employment share. The 2SLS regression of equation (2) on fixed effects with dependent variable 3-year changes of manufacturing employment share is presented in table 2.

Table 2. Change in Manufacturing Employment Share and Import Exposure, 2SLS Fixed Effects Estimates

Variable	Dependent variable: 3-year changes of manufacturing employment share			
	Model 1	Model 2	Model 3	Model 4
Δ Exposure:				
Total imports	-1.543**			
	(0.665)			
Capital goods		-3.190**		
		(1.307)		
Intermediate goods			-2.774*	
			(1.425)	
Consumption goods				-27.221***
				(10.443)
Controls:				
% manufacturing employment	-0.894***	-0.916***	-0.873***	-0.886**
	(0.170)	(0.171)	(0.176)	(0.172)
% working age with college education	-0.234	-0.254	-0.206	-0.254
	(0.165)	(0.163)	(0.167)	(0.165)
% employment among women	-0.039**	-0.041**	-0.037*	-0.041**
	(0.019)	(0.017)	(0.020)	(0.018)
Working age growth	-0.017	-0.016	-0.018	-0.017
	(0.024)	(0.024)	(0.025)	(0.024)
Observations	752	752	752	752
R^2	0.379	0.389	0.365	0.385

Source: Author's statistical results.
Note: Robust standard errors in parentheses are clustered on Province. Models are weighted by start of period district's share of national population. *p < 0.10, ** p < 0.05, *** p < 0.01.

Model 1 shows evidence of a negative relationship between the change of exposure to import competition and to manufacture employment share from 2SLS estimates. An increase of US$ 1,000 per worker in a district's total import exposure was associated with a 1.5% decline in manufacturing employment share. According to the regression results of model 2-4, the impact of import exposure on manufacturing employment is mostly driven by imports of consumption goods. It is most likely because consumption goods trigger direct competition since no further process is needed to enter the market directly. Furthermore, most firms in Indonesia produce consumption goods, so that their products compete with imports of consumption goods resulting in a high competition that can severely reduce the manufacturing employment share.

Although most of the Indonesian imports were intermediate goods, the impact of import exposure of these goods on manufacturing employment share was still the lowest compared to capital and consumption goods. According to the regression results of model 2-4, the impact of import exposure on manufacturing employment is mostly driven by imports of consumption goods. While increased imports of intermediate goods lead to the modest impact on manufacturing employment share. It is most likely because intermediate goods may be used as intermediate inputs for manufacturing firms in the district so that it does not increase the competition between imported goods and products produced by local manufacturing firms. On the other hand, consumption goods trigger direct competition since no further process is needed to enter the market directly. Furthermore, most firms

in Indonesia produce consumption goods, so that their products compete with imports of consumption goods resulting in a high competition that can severely reduce the manufacturing employment share.

The result in manufacturing is not an uncommon finding. Previous studies conducted by Autor et al. (2013), Donoso et al. (2014), Balsvik et al. (2014), Dauth et al. (2014) and Mendez (2015), found that import competition negatively affected the share of manufacturing employment. It means that our results confirm the findings of previous studies that manufacturing firms react to import competition by decreasing their employment.

Non-manufacturing employment

The 2SLS estimates of the relationship between exposure to import competition and non-manufacturing employment share are reported in table 3. The coefficient of the change of total import exposure was -2.9, this means that a US$ 1,000 increase in a district's total import exposure per worker is predicted to reduce the share of non-manufacturing employment by 2.9%. For each type of imported goods, the impact of import exposure on the non-manufacturing employment share was also negative. An increase of a US$ 1,000 per worker in import exposure of capital goods would increase the share of non-manufacturing employment by 6.8%. It was higher than the impact of intermediate goods import exposure which was 4.0%, however, compared to the impact of import exposure of consumption goods, the effect of capital goods import exposure was much lower.

Compared to the impact on manufacturing employment, the effects on non-manufacturing employment, in absolute value, is greater. If we look at the structure of employment in Indonesia, the share of non-manufacturing employment in Indonesia was higher than manufacturing employment. Most firms in Indonesia engaged in the non-manufacturing sector. Thus, it is likely that the affected workers and firms in non-manufacturing are also larger than in manufacturing. Overall, the evidence of the impact of import competition on the non-manufacturing employment share supports the results reported in the study conducted by Dauth et al. (2014) in Germany.

Table 3. Change in Non-Manufacturing Employment Share and Import Exposure, 2SLS Fixed Effects Estimates

Variable	Dependent variable: 3-year changes of non-manufacturing employment share			
	Model 1	Model 2	Model 3	Model 4
Δ Exposure:				
Total imports	-2.856***			
	(0.981)			
Capital goods		-6.765***		
		(2.089)		
Intermediate goods			-4.045*	
			(2.089)	
Consumption goods				-62.351***
				(16.619)
Controls:				
% non-manufacturing employment	-1.115***	-1.127***	-1.090***	-1.144***
	(0.045)	(0.041)	(0.053)	(0.044)
% working age with college education	0.891***	0.848***	0.936***	0.833***
	(0.246)	(0.258)	(0.235)	(0.253)
% employment among women	-0.142***	-0.147***	-0.143***	-0.138***
	(0.038)	(0.038)	(0.040)	(0.036)
Working age growth	-0.014	-0.012	-0.017	-0.012
	(0.027)	(0.027)	(0.026)	(0.027)
Observations	752	752	752	752
R^2	0.533	0.544	0.523	0.548

Source: Author's statistical results.

Note: Robust standard errors in parentheses are clustered on Province. Models are weighted by start of period district's share of national population. *p < 0.10, ** p < 0.05, *** p < 0.01.

The unemployment rate

The detailed 2SLS estimates of the impacts of import exposure on non-manufacturing employment are presented in table 4. Model 1 indicates that an increase of US$ 1,000 per worker in a district's total import exposure was associated with an increase in the unemployment rate of 3.1%. In model 2-4, we replicate the regression by replacing the total import exposure with import exposure of capital goods, intermediate goods, and consumption goods respectively. From model 2-4, we can see that imports of consumption goods mainly drove the negative coefficient of total import exposure. The effect of imports of capital and intermediate goods was modest.

Table 4. Change in The Unemployment Rate and Import Exposure, 2SLS Fixed Effects Estimates

Variable	Dependent variable: 3-year changes of the unemployment rate			
	Model 1	Model 2	Model 3	Model 4
Δ Exposure:				
Total imports	3.143***			
	(0.400)			
Capital goods		7.075***		
		(0.869)		
Intermediate goods			4.837***	
			(1.002)	
Consumption goods				60.001***
				(7.635)
Controls:				
% unemployment	-1.336***	-1.382***	-1.250***	-1.375***
	(0.123)	(0.131)	(0.111)	(0.137)
% working age with college education	-0.215**	-0.191*	-0.234**	-0.178*
	(0.099)	(0.100)	(0.097)	(0.096)
% employment among women	-0.018	-0.009	-0.025	-0.015
	(0.017)	(0.018)	(0.016)	(0.020)
Working age growth	0.014*	0.013*	0.016**	0.014*
	(0.008)	(0.008)	(0.008)	(0.008)
Observations	752	752	752	752
R^2	0.605	0.633	0.573	0.620

Source: Author's statistical results.
Note: Robust standard errors in parentheses are clustered on Province. Models are weighted by start of period district's share of national population. *p < 0.10, ** p < 0.05, *** p < 0.01.

According to the results, import competition increases unemployment. It may also be a consequence of the negative impact of import competition on manufacturing and non-manufacturing employment. In other words, the reduction of manufacturing and non-manufacturing employment causes some workers to lose their jobs and become unemployed. However, according to Statistics Indonesia, the unemployment rate in Indonesia during the period of 2007-2013 exhibited a decreasing trend, while the number of employment showed a slightly increasing trend. The possible reason is that there was an increase in employment in other sectors outside manufacturing and non-manufacturing. Another possibility is that there may be positive effects from exports that compensated the negative effects of imports.

The findings of the impact of import competition on unemployment in this paper are by the results of studies conducted by Autor et al. (2013) and Donoso et al. (2014). However, the size of the impact is different, this paper shows that the unemployment effects in Indonesia are lower than found by Autor et al. (2013) in the U.S., but it was higher than found by Donoso et al. (2014) in Spain. An increase of US$ 1,000 per worker in import competition causes an increase in unemployment in the U.S. and Spain by 4,9% and 2.7%, respectively. It may be because in the U.S. the impact of import competition on manufacturing employment was negative

and, in absolute value, much higher than the finding in this paper so that the unemployment effects were also more sizeable. On the other hand, the effect of import competition on manufacturing employment in Spanish provinces was negative, but in absolute value, was lower than found in this study resulting in more modest unemployment effects.

Wages

The effect of import competition on wages is described in table 5. The results suggest that import competition had a negative effect on average wages. The first model shows the impact of total import exposure on ln average wages. The coefficient -1.6 implies that a US$ 1,000 increase in a district's total import exposure per worker would decrease the ln average wages by approximately 1.6 natural log points. In model 2-4, we explore wages effects from import exposure of capital goods, intermediate goods, and consumption goods separately. The results confirm that the largest decline was mainly driven by imports of consumption goods, while, the lowest fall was from imports of intermediate goods. It means that imports of consumption goods can lead to a significant decrease in wages. Imports of intermediate goods may only slightly decrease wages.

Compared with the previous studies, the relationship between import competition and wages is in line with the research findings of Autor et al. (2013). However, the magnitude of the impact is somewhat larger than that was found by Autor et al. (2013). It might be because the condition of most companies in Indonesia is still weaker than firms in the U.S., a negative impact experienced by the enterprises due to import competition, such as the decline in sales could lead to a significant decline in wages. Furthermore, the large labor force in Indonesia causes difficulty in finding jobs because people must compete with many job seekers so that even though the firms decrease their wages, workers tend to accept it.

Table 5. Change in Average Wages and Import Exposure, 2SLS Fixed Effects Estimates

Variable	Dependent variable: 3-year changes of ln average wages			
	Model 1	Model 2	Model 3	Model 4
Δ Exposure:				
Total imports	-1.635***			
	(0.111)			
Capital goods		-3.745***		
		(0.213)		
Intermediate goods			-2.465***	
			(0.533)	
Consumption goods				-33.708***
				(2.101)
Controls:				
Ln average wages	-0.931***	-1.049***	-0.721***	-1.100***
	(0.098)	(0.074)	(0.136)	(0.070)
% working age with college education	0.072***	0.053***	0.091**	0.046***
	(0.026)	(0.020)	(0.036)	(0.018)
% employment among women	0.004	0.000	0.007	0.002
	(0.007)	(0.006)	(0.009)	(0.005)
Working age growth	-0.001	0.000	-0.002	0.000
	(0.003)	(0.002)	(0.005)	(0.002)
Observations	752	752	752	752
R^2	0.287	0.538	0.028	0.542

Source: Author's statistical results.

Note: Robust standard errors in parentheses are clustered on Province. Models are weighted by start of period district's share of national population. *p < 0.10, ** p < 0.05, *** p < 0.01.

Conclusion

The impact of increased imports due to trade globalization on the labor market during the last two decades has been a concern of many researchers. Although trade openness would benefit the economy, if an adjustment in the labor market cannot match the rapid increase of trade globalization, the structure of employment and wages may be affected. Research on this issue is important, especially in the affected economies. This paper examines the impact of import competition on the local labor markets in Indonesia.

Using panel data analysis covering 430 districts in Indonesia, the estimation results show that the impact of a substantial increase in imports to Indonesia during the period of 2007-2013 affected the Indonesian local labor markets through import competition. Import exposure negatively affected manufacturing employment share, non-manufacturing employment share, and wages in Indonesia. In a more detailed analysis, we found that the effects of import competition on Indonesian local labor markets are mainly driven by imports of consumption goods rather than capital and intermediate goods.

Based on the evidence that the impact of import competition on both manufacturing and non-manufacturing employment was negative, protecting employment by developing firms in both manufacturing and non-manufacturing is important. A possible way to protect employment is to assist for firms to increase the quality, variation, and innovation of their products so that they can compete with imported goods. Furthermore, the government can provide training to improve the skills of workers or to encourage them to become entrepreneurs. Providing better access to business loans is also important to help companies develop their businesses so that they can survive amid import exposure. It can also help people who lose their jobs and find it difficult to get new jobs to open their businesses. In this way, a decrease in employment and an increase in unemployment can be mitigated.

References

Amiti, M., & Cameron, L. (2012). Trade liberalization and the wage skill premium: Evidence from Indonesia. *Journal of International Economics*, *87*(2), 277–28.

Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. *The American Economic Review*, *97*(5), 1611–1638.

Autor, D. H., Dorn, D., & Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, *103*(6), 2121–2168.

Balsvik, R., Jensen, S., & Salvanes, K. G. (2014). Made in China, sold in Norway: Local labor market effects of an import shock. *Journal of Public Economics*, *127*(C), 137–144.

Caamal-Olvera, C. G., & Rangel-Gonzalez, E. (2015). Measuring the impact of the Chinese competition on the Mexican Labor Market: 1990-2013. *North American Journal of Economics and Finance*, *34*(C), 351–363.

Caves, R. E., & Porter, M. E. (1978). Market structure, oligopoly, and stability of market shares. *The Journal of Industrial Economics*, *26*(4), 289–313.

Dauth, W., Findeisen, S., & Suedekum, J. (2014). *The rise of the East and the Far East: German labor markets and trade integration* (Düsseldorf Institute for Competition Economics (DICE) Discussion Paper No. 127).

Donoso, V., Martin, V., & Minondo, A. (2014). Do differences in the exposure to Chinese imports lead to differences in local labour market outcomes? An analysis for Spanish provinces. *Regional Studies*, *49*(10), 1746–1764.

Dutt, P., Mitra, D., & Ranjan, P. (2009). International trade and unemployment: Theory and cross-national evidence. *Journal of International Economics*, *78*(1), 32–44.

Feenstra, R. C., & Hanson, G. H. (1997). Foreign direct investment and relative wages: Evidence of Mexico's maquiladoras. *Journal of International Economics*, *42*(3–4), 371–393.

Hasan, R., Mitra, D., Ranjan, P., & Ahsan, R. N. (2012). Trade liberalization and unemployment: Theory and evidence from India. *Journal of Development Economics*, *97*(2), 269–280.

Kasaharaa, H., Liang, Y., & Rodrigue, J. (2016). Does importing intermediates increase the demand for skilled

workers? Plant-level evidence from Indonesia. *Journal of International Economics*, *102*(2), 242–261.

Kis-Katos, K., & Sparrow, R. (2015). Poverty, labor markets and trade liberalization in Indonesia. *Journal of Development Economics*, *117*(C), 94–106.

Mendez, O. (2015). The effect of Chinese import competition on Mexican local labor markets. *North American Journal of Economics and Finance*, *34*(C), 364–380.

Pavcnik, N. (2003). What explains skill upgrading in less developed countries? *Journal of Development Economics*, *71*(2), 311–328.

Sjöholm, F. (1999). Exports, imports, and productivity: Results from Indonesian establishment data. *World Development*, *27*(4), 705–715.

Soderbom, M. (2009). Applied econometrics, lecture 2: Instrumental Variables, 2SLS and GMM. Retrieved from http://www.soderbom.net/lec2n_final.pdf

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

Spin-off, market structure, and deposit funds in an Islamic banking industry

Muhammad Nur Rianto Al Arif

Universitas Islam Negeri (UIN) Syarif Hidayatullah, Jakarta, Indonesia
Corresponding Author e-mail: nur.rianto@uinjkt.ac.id

Article Info

Article history:
Received : 6 May 2018
Accepted : 5 July 2018
Published : 1 October 2018

Keywords:
spin-off, market structure, deposit funds, Islamic banks

JEL Classification:
D4, G2, E5

DOI:10.20885/ejem.vol10.iss2.art7

Abstract

The regulator has imposed some Islamic business units to do the spin-off after the enactment of the Islamic banking act (The Act No. 21 of 2008). This paper examines the relationship between spin-off, market structure, and deposit funds. It uses panel data regression for analysis. The result shows that there is a difference in deposit funds between the spin-off banks and non-spin-off banks. The result also indicates that there is a relationship between spin-off, market structure, and deposit funds in the Indonesian Islamic banking industry. It implies that the regulator should a policy to accelerate the Indonesian Islamic banking industry.

Introduction

The Islamic banking industry in Indonesia has growing rapidly in the last two decades, especially after the enactment of The Act No. 21 of 2008 about Islamic banking. Spin-off policy has become one of the crucial issues in The Islamic banking act. In this act, Islamic business unit obligate to do the spin-off if they have fulfilled the spin-off criteria.

There have been many studies that have discussed the spin-off in the Islamic banking industry. Some of the studies supported that spin-off policy has positive impact on the performance of Islamic banks. Some of research concludes that there is a profitability differences between before and after the establishment of spin-off policy (Hamid, 2015; Poerwokoesoemo, 2016; Ramdani, 2015). Besides that, some of the studies also found that there a difference in deposit funds after the enactment of spin-off policy (Al Arif, 2014; Nasuha, 2012).

But, there are also some researches that conclude that spin-off had a opposite impact on the performance. Al Arif (2015); Al Arif, Haribowo, & Suherlan (2018) found that the spin-off policy had a negative impact on efficiency after the establishment of spin-off policies. Some of the research concludes that the spin-off policy should be evaluated (Al Arif, Nachrowi, Nasution, & Mahmud, 2017; Haribowo, 2016).

There is an increasing number of full-fledged Islamic banks after the enactment of the Islamic banking Act. initially, there were only three full-fledged Islamic banks and 26 Islamic business units, but now (until December 2017) there are 13 full-fledged Islamic banks and 21 Islamic business units. There will be an increasing of the competition if there is an increasing in a number of full-fledged Islamic banks. This phenomenon will also reduce the market concentration in the Islamic banking industry. The Islamic banking industry had operated in a high degree of market power (Abduh & Cupian, 2017; Shaffer, 2004). Shaffer (2004) provide the evidence that thrift institution may be a source of significant competition to community banks.

Up to now, there is no paper examines the impact of spin-off policy on market structure. The contribution of this research is to fill the gap that has not been studied about the relationship of spin-off policy on the market structure, and its impact on the performance. The indicator of Islamic bank's performance in this research is deposit funds. The deposit funds was using as a measurement because according to The General Council for Islamic Banks and Financial Institutions, one of the performance criteria was growth. The growth criteria include several measurements such as deposit funds, asset, and financing (Ascarya & Yumanita, 2008).

This research uses the structure-conduct-performance (SCP) hypotheses in discussing this topic. There are two main hypotheses in the bank's performance literature. First, the traditional structure-conduct-performance, these hypotheses also known as structure performance (SP) hypothesis. According to SP hypothesis, the profitability of a banking firm is dependent to the market structure and the competition level in

P ISSN 2086-3128 | E ISSN 2502-180X

the market (Gilbert, 1984; Goldberg & Rai, 1996; Samad, 2008). The higher concentration will leads a to a higher profitability, this statement was the main idea of the SP hypothesis. Decreasing the level of competition and increasing market concentration will lead to increased profits earned by the company.

The second hypothesis is the efficiency hypothesis. In the second hypothesis emphasizes superior efficiency as an explanation for a firm's profitability. The performance of a firm depends on the efficiency (Yudaruddin, 2015). The fact that occurred in the Islamic banking industry in Indonesia is contrary to the two hypotheses. Some of the studies had found that the efficiency in Islamic banks was declining after the spin-off periods (Hosen & Rahmawati, 2016; Novarini, 2009; Pramuka, 2011).

This study tries to examine the relationship between spin-off policy, market structure, and deposit funds in the Indonesian Islamic banking industry. This paper structured as follows: section 1 provides a background of the study. Section 2 provides data and methodology. Section 3 reports findings and discussion. Section 4 presents the conclusion.

Methods

The data used in this study comes from the bank's published report. The data used is quarterly data starting from 2011 until 2017. The number of full-fledged Islamic banks that became the object of this study is eleven Islamic banks. Two full-fledged Islamic banks do not include (such as Bank of BTPN and Bank of Aceh), because they became Islamic full-fledge banks in 2014 and 2016.

To examine the relationship between spin-off policy, market structure, and efficiency by is using panel regression. There are two models to be tested in this research. The mathematical equation proposed in this research as follows.

Model 1: Spin-Off policy, Market Structure, Efficiency with Two Interaction Variables

$$Dep_{it} = \alpha + \beta_1 D\_spinoff_{it} + \beta_2 MS_{it} + \beta_3 HHI_t + \beta_4 D\_spinoff_{it} *MS + \beta_5 D\_spinoff_{it} *HHI + \beta_6 ROA_{it} + \beta_7 Interest_t + \beta_8 Growth_t + \varepsilon_{it} \quad (1)$$

Where: Dep is deposit funds; D_spin-off is dummy variable of the spin-off. which: 1 = spin-off banks and 0 = others; MS is market share from each bank in period t; HHI is the market structure that proxied by Herfindahl Hirschman Index; ROA is profitability ratio that measured by return on asset; Interest is average interest rate of conventional banks; Growth is economic growth

Model 2: Spin-Off policy, Market Structure, Efficiency with One Interaction Variables

$$Eff_{it} = \alpha + \beta_1 D\_spinoff_{it} + \beta_2 MS_{it} + \beta_3 HHI_t + \beta_4 D\_spinoff_{it} *MS + \beta_5 ROA_{it} + \beta_6 Interest_t + \beta_7 Growth_t + \varepsilon_i \quad (2)$$

Where: Dep is deposit funds; D_spin-off is dummy variable of spin-off. which: 1 = spin-off banks and 0 = others; MS is market share from each bank in period t; HHI is market structure that proxied by Herfindahl Hirschman Index; ROA is profitability ratio that measured by return on asset; Interest is average interest rate of conventional banks; Growth is economic growth.

Result and Discussion

The result of this study can summarizes in Table 1. Constant values in both models show significant results. This result means that if all variables are assumed to be zero, then the deposit funds will be valued as the coefficient value listed in Table 1. Furthermore, market share variables in both models showed the significant results. This result means that the market share had an impact on deposit funds. The positive sign means that the higher market share of Islamic banks will lead higher deposit funds that obtained by the Islamic banks. This result implies that the Islamic banks should increase the market share to had a larger opportunity to gain a higher deposit funds.

The next result is related to the market structure, in both models show a significant results. This result implies that the market structure in the Islamic banking industry is linier with the deposit funds. The more concentrated of the industry will lead a declining of deposit funds. The lack of competition or inter-bank competition makes many banks less innovative products related deposit fund raising. Based on these results indicate that the regulator should be able to create regulations or rules that can foster a healthy business competition climate among sharia banks.

Table 2 shows the market concentration of Islamic banking industry either by using Herfindahl-Hirschman Index (HHI), Concentration-Ratio 2 (CR2), or Concentration-Ratio 4 (CR4). The market structure in the Islamic banking industry is tend in high oligopoly. Although there is a declining in market concentration in the Indonesian Islamic banking industry after the enactment of The Islamic banking Act. The domination of the two most significant Islamic banks (Bank of Muamalat Indonesia and Bank of Sharia Mandiri) had declined after the enactment of spin-off policy. Market power is related with market concentration.

Table 1. The Summary of Empirical Result

	Model 1	Model 2
C	18.17412	17.57825
t-stat	28.08037	28.30575
Market Share	14.34010	14.29555
t-stat	37.60445	37.02076
HHI	-16.09996	-13.76738
t-stat	-4.592584	-3.984384
D-Spinoff	-0.611786	0.418648
t-stat	-1.612178	3.466627
MS*Dspinoff	10.29627	10.08851
t-stat	5.173606	5.005241
HHI*Dspinoff	7.224210	
t-stat	2.860069	
ROA	0.068046	-.074868
t-stat	3.833594	-4.200020
BOPO	-0.002576	-0.001030
t-stat	-1.196801	-0.487717
Inflation	-0.561418	-0.282169
t-stat	-0.239086	-0.118672
Interest	-0.046945	-0.055674
t-stat	-0.570862	-0.668480
Growth	-0.209278	-0.178191
t-stat	-1.316650	-1.108777
F-stat	198.5243	213.8788
Adj. R^2	0.878181	0.874881

Table 2. Market Concentration in The Islamic Banking Industry

Years	HHI	CR2	CR4
2005	0.3045	0.7684	0.8665
2006	0.2473	0.6794	0.7871
2007	0.2273	0.6504	0.7603
2008	0.2117	0.6185	0.7329
2009	0.1912	0.5832	0.7053
2010	0.1825	0.5641	0.7028
2011	0.1824	0.5649	0.7018
2012	0.1542	0.5175	0.6467
2013	0.1434	0.4946	0.6284
2014	0.1344	0.4770	0.6239
2015	0.1193	0.4328	0.5932
2016	0.1016	0.3776	0.5346
2017	0.1020	0.3759	0.5387

When associated with the structure of performance structures first proposed by Mason. According to Mason (1939) in Martin (1992) the fewer the number of firms will make a market less competitive, and more companies will make the market more competitive. According to Martin (1992) the competitiveness improves the performance of a market, with several indicators such as profitability, efficiency, and progressiveness. Ayadi & Ellouze (2013) shows that there is a relationship between market structure and bank performance. This result

is consistent with Zhang, Jiang, Qu, & Wang (2013) that conclude that there is a negative association between market concentration and performance.

The policy should be directed to increase the market share of the most efficient banks (Fu & Heffernan, 2009). Ajide & Ajileye (2015); Louati & Boujelbene (2015); Rahim (2016); Rashid, Yousaf, & Khaleequzzaman (2017); Schaeck, Cihak, & Wolfe (2009) stated that the policies promoting competition among banks, if well executed, have the potential to improve the financial stability and the financial soundness. Hamza and Kachtouli (2014) stated the in a competitive environment; each bank is required to analyze the market structure and competitive condition. But, it should be noted that if there is increased competition by small firm owners that would be a negatively effect on the performance (Scott & Dunkelberg, 2010).

The next variable is the dummy variable, namely spin-off. There is a difference between the result in model 1 and model 2. Model 1 shows that the spin-off variable doesn't had an impact on deposit funds. It mean, that there is no differences between the spin-off banks and non-spin-off banks. This result is consistent with Al Arif et al. (2017), that also found that the spin-off policy did not have an impact on deposit funds growth. However, in the model 2 shows that there is difference in deposit funds between the spin-off banks and non-spin-off banks. The spin-off banks had a larger deposit funds rather than the non-spin-off banks. The result of model 2 support the research that conducted by Al Arif (2014); Nasuha (2012), which is the spin-off policy had a good impact on the deposit funds growth in the Indonesian Islamic banking industry.

The next result that also can be seen in Table 1 is the interaction between market share and spin-off variables. Interaction variable results show a positive effect, indicating that the spinoff variable influences market share and further affects third party fund raising. This result implies that the spin-off bank has a tendency to increase its asset market share. Therefore, an increase in the market share of this asset strengthen and increase deposit fund collecting by Islamic bank.

Furthermore, the interaction between market structures (proxied by HHI) with spin-off show positive results. This indicates that the spin-off variable will affect the market structure, and will further affect the amount of deposit fund accumulation in the Islamic bank. This result implies that the spin-off banks have an impact on market structure changes, which are currently from the four largest sharia banks, there are two sharia banks which are spinoffs (i.e. Bank of BNI Shariah and Bank of BRI Shariah). Changes in market structure will further affect the difference of third party fund collecting made by syariah bank.

Islamic banks, especially the spin-off banks, must be able to innovate their savings products in order to attract potential customers to open accounts in Islamic banks. Besides that, the new product also maintain the old customers to increase their deposits in Islamic banks. The spin-off policy pursued by the government generally decreases the two largest Islamic banks in Indonesia, namely Bank of Shariah Mandiri and Bank of Muamalat Indonesia. However, this policy slightly changed the competition map of the sharia banking industry. This is due to the fact that there are two spin-off banks that are able to enter into the four largest sharia banks in Indonesia. In general, the sharia banking industry still shows an oligopoly market structure, it is a duty for the regulator to create a healthy business climate. The finding of this result also suggests that conventional banks (the parents banks) must make performance improvements in Islamic business units before the spin-off.

The level of profitability also shows significant results, but there are differences in results between model 1 with model 2. If the model 1 shows that the level of profitability shows a positive effect on the amount of third-party funds, then the model 2 shows the opposite results. This result difference is caused by the interaction variable performed. In model 1, two additional interaction variables were added. While in model 2, only one additional interaction variable is added.

Operational efficiency level variables, inflation rate, and interest rate do not show any significant effect on third party fund raising amount. This shows that the efficiency performed by Islamic banks does not affect the high amount of deposit fund raising. This result is difference with the research that conduct by Bello and Isola (2014); Tajgardoon, Behname, and Noormodamadi (2012) stated that the efficiency seems to be the main factors for the bank's performance. The spin-off policy will increase the cost of the new bank; policymakers should make a policy that can decrease the cost structure of the banks. Zhao, Casu, & Ferrari (2010) found that deregulation will increase the bank's performance.

The inflation rate also shows the same thing, it shows that high inflation rate does not affect the high amount of deposit fund raising. The interest rate variable shows an anti-thesis results with various findings that existed during this time, where the interest rate does not affect the amount of deposit funds collected in Islamic banks. This shows that customers of Islamic banks now have moved from rational customers to emotional customers who are not affected by the amount of interest offered by conventional banks. The growth rate variable in model 1 and model 2 has no effect on deposit funds in sharia bank. In general, the rate of direct

economic growth indicates whether or not the economic climate of a country is conducive. If the economy is conducive, it will increase the interest of saving from society.

This study finds that there is a relationship between spin-off policy, market structure, and deposit funds. The spin-off policy has led the increase a number of full-fledged Islamic banks in Indonesia. This result affect the declining in market concentration of the industry. The interaction between spin-off policy and market structure (proxied by Herfindahl-Hirschman Index) affects the deposit funds in the Islamic banks. The spin-off policy had a positive impact on the deposit funds.

The policy of segregating the Islamic business unit into a full-fledged Islamic bank is one of the efforts to increase the number of Islamic banks in Indonesia. This fact is an effort to make the Islamic banking industry more competitive. The additional number of full-fledged Islamic banks is done through the spin-of policy. This action hopefully will be able to improve the performance of sharia banking. However, the structure is also affected by supply and demand conditions. This explains why the separation that affects the addition of the number of full-fledged Islamic banks has not been able to improve the performance of the Islamic banking industry in general and the spin-off banks in particular.

The result also implies that the spin-off policy should be evaluated, especially for the Islamic business units that owned by the regional development banks. Almost the regional development banks had a small asset, it would give a potential negative impact for the Islamic business units if they are forced to do the spin-off (Haribowo, 2016). The smaller asset of the parents' banks (and the Islamic business units asset) would had less capitalized banks. The less capitalized banks will affect the performance of the banks. Sufian and Habibullah (2012) said that the well capitalized banks tent to be more profitable.

Actually, there is an alternative strategy to enchance the performance on Islamic banks, this strategy is through merger policy (Miftah & Wibowo, 2017). Berger (1995) said that the merger activity was motivated by the prospective benefit from greater market power (Berger, 1995). Besides merger, the other strategy such as acquisition of Islamic business units of full-fledged Islamic banks also can be do. Ahmed, Ahmed, & Kanwal (2018) said that the merger and acquisition activity will increase the performance of the companies in the market. But, the merger in the market could deteriorate the competitive process (Ahamed, 2012).

Conclusion

This study examines the relationship between spin-off policy, market structure, and deposit funds in the Indonesian Islamic banking industry. The result shows that there is a deposit funds difference between spin-off banks and non-spin-off banks. Besides that, the result also indicates that there is a relationship between spin-off, market structure, and deposit funds in the Indonesian Islamic banking industry. The increasing number of full-fledged Islamic banks doesn't mean the performance will increase.

This research implies that the regulator should promote the competitive policy to increase the financial performance and soundness of Islamic banks. The spin-off policy is not the only one strategy to enhance the performance in the Indonesian Islamic banking industry. The other strategies that might be can enhance the accelerate the performance of Islamic banking industry are merger, the acquisition of Islamic business units by full-fledged Islamic banks, or the full conversion of the parents' banks from conventional bank into full-fledged Islamic bank.

References

Abduh, M., & Cupian, C. (2017). Competitive condition and market power of Islamic banks in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, *10*(1), 77–91. https://doi.org/10.1108/IMEFM-09-2015-0098

Ahamed, M. D. M. (2012). Market structure and performance of Bangladesh banking industry: A panel data analysis. *Bangladesh Development Studies*, *XXXV*(3), 1–18.

Ahmed, F., Ahmed, A., & Kanwal, S. (2018). Mergers and acquisition in selected frontier markets of Asia. *Signifikan: Jurnal Ilmu Ekonomi*, *7*(1), 123–136. https://doi.org/10.15408/sjie.v7i1.6074

Ajide, F. M., & Ajileye, J. O. (2015). Market concentraton and profitability in Nigerian banking industry: Evidence from error correction modeling. *International Journal of Economics, Commerce, and Management*, *III*(1), 1–12.

Al Arif, M. N. R. (2014). Spin-offs and its impact on third party funds in Indonesian Islamic banking industry.

Economic Journal of Emerging Markets, *6*(1), 50–55.

Al Arif, M. N. R. (2015). The relationship between spin-off policy and efficieny in the Indonesian Islamic banking industry. *Jurnal Keuangan Dan Perbankan*, *19*(2), 295–304.

Al Arif, M. N. R., Haribowo, I., & Suherlan, A. (2018). Spin-off policy and efficiency in the Indonesian Islamic banking industry. *Banks and Bank System*, *13*(1), 1–10.

Al Arif, M. N. R., Nachrowi, N. D., Nasution, M. E., & Mahmud, T. M. Z. (2017). The Islamic banking spin-off: Lessons from Indonesian Islamic banking experiences. *JKAU: Islamic Economics*, *30*(2), 117–133. https://doi.org/10.4197/Islec.30-2.11

Ascarya, & Yumanita, D. (2008). Comparing the efficiency of Islamic banks in Malaysia and Indonesia. *Buleting Ekonomi Moneter Dan Perbankan*, *11*(2), 95–120.

Ayadi, I., & Ellouze, A. (2013). Market structure and performance of Tunisian banks. *International Journal of Economics and Financial Issues*, *3*(2), 345–354.

Bello, M., & Isola, W. A. (2014). Empirical analysis of structure-conduct-performance paradigm on Nigerian banking industry. *The Empirical Econometrics and Quantitative Economics Letter*, *3*(3), 24–34.

Berger, A. N. (1995). The profit structure relationship in banking –tests of market-power and efficient-structure hypotheses. *Journal of Money, Credit, and Banking*, *27*(2), 404–431.

Fu, X., & Heffernan, S. (2009). The effects of reform on China's bank structure and performance. *Journal of Banking & Finance*, *33*(1), 39–52. Retrieved from https://econpapers.repec.org/RePEc:eee:jbfina:v:33:y:2009:i:1:p:39-52

Gilbert, R. (1984). Bank market structure and competition: A survey. *Journal of Money, Credit and Banking*, *16*(4), 617–644. Retrieved from https://econpapers.repec.org/RePEc:mcb:jmoncb:v:16:y:1984:i:4:p:617-44

Goldberg, L. G., & Rai, A. (1996). The structure-performance relationship for European banking. *Journal of Banking & Finance*, *20*(4), 745–771. https://doi.org/10.1016/0378-4266(95)00021-6

Hamid, A. (2015). The impact of spin-off policy to the profitability on Indonesian Islamic banking industry. *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah; Vol 7, No 1: January 2015*, *7*(1), 117–126. https://doi.org/10.15408/aiq.v7i1.1363

Hamza, H., & Kachtouli, S. (2014). Competitive conditions and market power of Islamic and conventional commercial banks. *Journal of Islamic Accounting and Business Research*, *5*(1), 29–46. https://doi.org/10.1108/JIABR-05-2012-0030

Haribowo, I. (2016). The Indonesian Islamic bank's spin-off: A study in regional development banks. *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah; Vol 9, No 1: January 2017*, *9*(1), 53–68. https://doi.org/10.15408/aiq.v9i1.4308

Hosen, M. N., & Rahmawati, R. (2016). Efficiency and Profitability in The Indonesian Islamic Banking Industry. *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah;*, *8*(1), 33–48. https://doi.org/10.15408/aiq.v8i1.2507

Louati, S., & Boujelbene, Y. (2015). Banks' stability-efficiency within dual banking system: A stochastic frontier analysis. *International Journal of Islamic and Middle Eastern Finance and Management*, *8*(4), 472–490. https://doi.org/10.1108/IMEFM-12-2014-0121

Martin, S. (1992). *Industrial economics*. New Jersey: Prentice Hall.

Miftah, K., & Wibowo, H. (2017). Merger and industrial acceleration: Study at Indonesian Islamic banking industry. *Signifikan: Jurnal Ilmu Ekonomi*, *6*(1), 29–48.

Nasuha, A. (2012). The impact of spin-off policy on Islamic bank performance. *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah*, *4*(2), 241–258.

Novarini. (2009). *The efficiency of Islamic business unit using SFA: Profit function and BOPO derivation*. Universitas Indonesia.

Poerwokoesoemo, A. (2016). The performance of conventional banks after the Islamic business unit's spin-off. *Jurnal Keuangan Dan Perbankan*, *12*(2), 145–164.

Pramuka, B. A. (2011). Assesing profit efficiency of Islamic banks in Indonesia: An intermediation approach. *Journal of Economics, Business and Accountancy Ventura*, *14*(1), 79–88.

Rahim, R. A. (2016). Does competition foster efficiency? Empirical evidence from Malaysian commercial banks. *Asian Academy of Management Journal of Accounting and Finance*, *12*(1), 1–23.

Ramdani, A. (2015). The impact of spin-off policy on profitability at Bank of BNI Sharia. *Etikonomi*, *14*(1), 17–34.

Rashid, A., Yousaf, S., & Khaleequzzaman, M. (2017). Does islamic banking really strengthen financial stability? Empirical Evidence from Pakistan. *International Journal of Islamic and Middle Eastern Finance and Management*, *10*(2), 130–148. https://doi.org/10.1108/IMEFM-11-2015-0137

Samad, A. (2008). Market structure, conduct and performance: Evidence from the Bangladesh banking industry. *Journal of Asian Economics*, *19*(2), 181–193. Retrieved from https://econpapers.repec.org/RePEc:eee:asieco:v:19:y:2008:i:2:p:181-193

Schaeck, K., Cihak, M., & Wolfe, S. (2009). Are competitive banking systems more stable? *Journal of Money, Credit and Banking*, *41*(4), 711–734. Retrieved from https://econpapers.repec.org/RePEc:mcb:jmoncb:v:41:y:2009:i:4:p:711-734

Scott, J. A., & Dunkelberg, W. C. (2010). Competition for small firm banking business: Bank actions versus market structure. *Journal of Banking and Finance*, *34*(11), 2788–2800.

Shaffer, S. (2004). Patterns of competition in banking. *Journal of Economics and Business*, *56*(4), 287–313. Retrieved from https://econpapers.repec.org/RePEc:eee:jebusi:v:56:y:2004:i:4:p:287-313

Sufian, F., & Habibullah, M. S. (2012). Globalization and bank performance in China. *Research in International Business and Finance*, *26*(2), 221–239. https://doi.org/10.1016/j.ribaf.2011.12.005

Tajgardoon, G., Behname, M., & Noormodamadi, K. (2012). Is profitability as a result of market power or efficiency in Islamic banking industry? *Economics and Finance Review*, *2*(5), 1–7.

Yudaruddin, R. (2015). Market structure, conduct, and performance: Evidence from Indonesian banking industry. *Ekuitas: Jurnal Ekonomi Dan Keuangan*, *19*(3), 299–317.

Zhang, J., Jiang, C., Qu, B., & Wang, P. (2013). Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *International Review of Financial Analysis*, *30*(C), 149–157. Retrieved from https://econpapers.repec.org/RePEc:eee:finana:v:30:y:2013:i:c:p:149-157

Zhao, T., Casu, B., & Ferrari, A. (2010). The impact of regulatory reforms on cost structure, ownership, and competition in Indian banking. *Journal of Banking and Finance*, *34*(1), 246–254.

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

Meat demand model in Iran: a restricted source-differentiated almost ideal demand system approach

Elham Pourmokhtar, Reza Moghaddasi*, Amir Mohammad Nejad, Seyed Safdar Hosseini

Department of Agricultural Economics, Faculty of Agriculture and Natural Resources, Islamic Azad University, Science and Research Branch, Tehran, Iran
Corresponding author e-mail: r.moghaddasi@srbiau.ac.ir

Article Info

Articlehistory:
Received : 12 May 2018
Accepted : 7 September 2018
Published : 1 October 2018

Keywords:
Imported demand, beef, poultry, imports, RSDAIDS model

JELClassification:
O13, O33, Q1

DOI:10.20885/ejem.vol10.iss2.art9

Abstract

The gradual disappearance of pastures due to overgrazing of cattle, high cost of meat (red and poultry) and gradual increasing domestic demand, so far, meat imports in Iran have been inevitable to meet domestic needs. In this article, the authors have used RSDAIDS model, the economic factors (meat prices and costs) and non-economic factors (prevalence of diseases) affecting the demand for meat (beef and poultry) during the years 2002-16 have been investigated. The results of this study shed light on Iran consumer preferences with regard to imported meat. This is the first study that analyzes the Iran meat demand differentiated by source. In this study, it was observed that Brazil, United Arab Emirates, Ireland and Turkey were the most gainer from an increase in the size of the imported meat market of Iran. Also, these countries had a competitive advantage compared with other export sources.

Introduction

Iran is the second largest country in the Middle East with a population of nearly 80 million people. After Egypt, Iran is regarded as the second largest consuming market in the Middle East followed by North Africa with approximately 80 million consumers. Over past 20 years, the Iranian agricultural sector accounts for the smallest portion of the GDP (Gross Domestic Product) with only 8.3%. On an average, the agronomy sector accounts for 65.7% of the value added of the Iranian agricultural sector, followed by animal husbandry and hunting, fishing, agricultural services and forestry with 26.8, 4.4, 2.6 and 0.5%, respectively (Anonymous, 2017).

According to the reports released during 2018 by the Iranian Center for Strategic Research, the production of beef, mutton and poultry has reached 2.673 million tonnes in 2017 (with a growth rate of 0.8% in comparison to the previous year). An important part of meat production in Iran is allocated for poultry production; 2.172 million tonnes of poultry have been produced in 2017 (with a growth rate of 0.5% in comparison to the previous year). In 2017, the per capita meat (including both beef and mutton) and poultry consumption has been reported to 26 and 12 kg, respectively.

The per capita meat consumption of each of the members of a four-member family in low-income group families [the monthly income of less than 20 million Iranian Rial (about 40 Euro) per month] as well as average and high-income group families (the monthly income of more than 20 million Iranian Rial per month) is 11 and 38 kg, respectively. These statistics indicate the elasticity of high incomes for meat demand. The studies conducted by the researchers indicate that instead of consuming red meat, the consumers start consuming alternative meat (poultry) when their incomes decrease, and in low-income levels, red meat has turned out to be a luxury product.

According to the statistics released during 2017 by the Ministry of Agriculture, Jihad, the red meat production has not significantly increased over the past two years (2015-17). In the past, only 10% of the country's need for red meat was fulfilled through imports. However, this percentage has significantly changed over the past two years; the imports have increased to more than 40%. The conditions ruling the red meat market as well as the relative increase of this product in recent years in Iran are resulted from reduced tariffs on imports, policy makers' inattention to domestic producers, domestic producers' problems including drought and animal feed scarcity. As a result, the domestic red meat producers are thus dealing with numerous problems. The domestic producers are thus forced to send most of the highly productive animals to slaughterhouses; the

P ISSN 2086-3128 | E ISSN 2502-180X

productive livestock population (especially light livestock) has thus decreased. Despite the country's high capacity for red meat production, most of the light livestock producers have lost the market to carcass importers.

About poultry trade, fact is that as much as 25-30% of the global poultry trade is being conducted with neighboring Iran countries (about 6 billion dollars). However, Iran does not have a significant share in poultry exports. The poultry exports of Iran have been around 25,000 tones over the past 20 years; this accounts for only 1.6% of the region's total exports. These studies show that most of the chicken feeds are imported, resulting in a higher price for chicken feeds. The increased price of chicken feeds (about 70%) as well as the increased cost of buying one-day old chicks (about 16%) resulted in an increased end price of poultry. At present, it seems difficult to import poultry in the large scale and to compete with other countries. In this regard, it can be stated that in terms of red meat and poultry exports, Iran is a relatively small country. However, as for the foreign trade of red meat and poultry, Iran is a relatively significant country. Thus, the necessity of fulfilling self-sufficiency in agricultural sector, especially self-sufficiency in producing different kinds of meat has led the policy makers towards recognizing the factors affecting the imports and production of red meat and poultry through analyzing the efficiency of the existing methods of supplying and marketing of these products (Parizan and Esmaeili, 2008).

Therefore, the main objectives of this study are to evaluate the effects of economic factors (meat prices and costs) as well as non-economic factors (animal disease outbreaks) on meat request from various sources in Iran. Thus, accessing meat competition from various sources seems possible in the Iranian meat market. The findings of this study certainly will help to adopt strategic decisions about the Iranian consumers' behaviours in the consumption of meat products. Numerous studies have estimated import demand function consistent with economic theory. The AIDS model of Deaton and Muellbauer (1980) is one of the most popular models for analyzing the import demand function. In several cases, the use of restricted source differentiated AIDS (RSDAIDS) specification to estimate the import demand has been reviewed. A number of studies have used the restricted source differentiated AIDS (RSDAIDS) specification to estimate of import demand, including those conducted by Boumahdi *et al*. (2004), Henneberry and Seong-huyk (2007), Mekonnen *et al*. (2011), Thanagopal and Felix (2014), Cheng *et al*. (2015), Capitello *et al*. (2015), Gómez *et al*. (2015) and Sun and Niquidet (2017).

Research Methods

Empirical specification of the RSAIDS model

The almost ideal demand system (AIDS) was used in this study. This model has been one of the most popular research tools in applied demand analysis. The RSDAIDS imposes block substitutability, which assumes that the cross-price effect of products in good 'j' on the demand for product 'h' in good 'i', are the same for all products in good 'j' (Yang and Koo, 1994). Following Yang and Koo (1994), the RSDAIDS is specified as under:

$$w_{ih} = \alpha_{ih} + \sum_k \gamma_{ihk} ln(P_{ik}) + \sum_{j \neq i} \gamma_{ihj} ln(P_j) + \beta_{ih} ln\left(\frac{M}{P^*}\right) \quad (1)$$

Where, subscripts 'i' and 'j' indicate goods (i, j = 1, 2, …N), and 'h' and 'k' indicate supply sources, w_{ih} is the budget share of good 'i' from source 'h', α_{ih} is an intercept term for meat 'i' from source γ_{ihk} is the price coefficient of source differentiated good P_{ik} is the price of good 'i' from source 'k' (with k including h), γ_{ihj} is the cross-price coefficient between source differentiated good 'i' from source 'h' and no source differentiated, β is the real expenditure coefficient, E is group expenditures, P_j is the price of the no source differentiated good 'j' and was calculated as the weighted average of source differentiated 'j' prices as follows:

$$ln(P_j) = \sum_k w_{jk,t-1} ln(P_{jk}) \varepsilon \quad (2)$$

P^* is a price index which for source differentiated AIDS is defined as under:

$$ln(P^*) = \alpha_0 + \sum_j \sum_h \alpha_{jh} ln(P_{jh}) + \frac{1}{2} \sum_i \sum_j \sum_h \sum_k \gamma^*_{ihjk} ln(P_{ih}) ln(P_{jk}) \varepsilon \quad (3)$$

The RSDAIDS model in above equation 1 is nonlinear due to the nonlinear price index in equation 3. To make the system linear, Deaton and Muellbauer (1980) suggest using Stone's price index, here specified as follows:

$$ln(P^*) = \sum_i \sum_h W_{ih} ln(P_{ih}) \quad (4)$$

The budget shares W_{ih} that are used as dependent variables in equation 1, are also used as independent variables in the aggregate price calculation in equation 4. Therefore, to avoid simultaneity bias following Eales and Unnevehr (1988), this study uses lagged budget shares $w_{jk,t-1}$ to compute Stone's price index. Therefore, in this study, the intercept term in equation 1 is defined as follows:

$$\alpha_{ih} = \alpha_{ih0} + \sum_{g=1}^{G} \alpha_{ihg} D_{G\varepsilon} \quad (5)$$

Following Yang and Koo (1994), homogeneity and symmetry are imposed as shown in following equations 6 and 7, respectively, where D represents the three indicator variables (BSE, FMD) and Avian Influenza (Flu) outbreaks exporter countries are included.

$$\sum_k \gamma_{ihk} + \sum_{j \neq i} \gamma_{ihj} = 0 \quad (6)$$

$$_{ihk} = \gamma_{ikh}, \ \forall i, h, k \quad (7)$$

Due to the inclusion of indicator variables in the RSDAIDS model in equation 1, the adding-up property of demand is imposed as follows:

$$\sum_i \sum_h \alpha_{iho} = 1, \sum_i \sum_h \alpha_{ihg} = 0 \ \forall i, \sum_h \gamma_{ihk} = 0, \sum_i \sum_h \beta_{ih} = 0, \sum_i \sum_h \gamma_{ihj} = 0 \quad \forall i, h \quad (8)$$

Block substitutability makes the symmetry conditions among goods not applicable (Yang and Koo, 1994). The condition of block separability among goods proposed by Hayes *et al.* (1990) was verified by testing whether:

$$\gamma_{ikj} = w_{ih} . w_{jk} . \gamma_{ij} \quad \forall j \neq i \quad (9)$$

Where, γ_{ij} is the cross-price parameter between groups i and j, estimated from an aggregate AIDS model. The hypothesis of product aggregation, considering the block substitutability was imposed by testing the following assumptions:

$$\alpha_{ih} = \alpha_i \quad \forall h \epsilon i; \ \gamma_{ihj} = \gamma_{ij} \quad \forall h, k \epsilon i, j; \ \beta_{ih} = \beta_i \quad \forall h \epsilon \quad (10)$$

The hypothesis is that the country of origin affects the preferences of consumers.

Block separability test

This model assumes, however, that while allocating expenditures among different sources of the same good, consumers do not distinguish among sources of other goods (Hayes *et al.*, 1990). Block separability is tested for using the Wald F-test (Andayani and Tilley, 1997).

Marshallian (uncompensated), Hicksian elasticities (compensated) and expenditure elasticity

The estimated parameters of the RSDAIDS model were used to compute the Marshallian and Hicksian own-price and cross-price demand elasticities and the expenditure elasticity (Green and Alston, 1990). The Marshallian (uncompensated) elasticities, Hicksian elasticities (compensated) and expenditure elasticity are presented in Table 1.

Estimation procedures and statistical tests

Since both the time series vertical data and the cross-sectional horizontal data are joined, panel data have the advantage of a large observation sample. Panel data models are usually estimated using either fixed or random effect techniques. The basic idea is to start with following equation 11 (Giorgioni and Holden, 2003):

$$Y_{it} = \beta_1 + \beta_{2i} X_{2i} + \beta_{3i} X_{3i} + u_i \quad (11)$$

In this model, authors assume that it is a random variable with a mean value of β_1 (no subscript 'i' here) and the intercept value for individuals can be expressed as under:

$$\beta_{1i} = \beta_1 + \varepsilon_i \quad i = 1,2, \dots, N \quad (12)$$

Where,

$$\varepsilon_i \sim \tilde{N}(0, \sigma_\varepsilon^2), \ u_{it} \sim \tilde{N}(0, \sigma_u^2), \ E(\varepsilon_i u_{it}) = 0, \ E(\varepsilon_i \varepsilon_j) = 0 \quad (i \neq j)$$
$$E(u_{it} u_{is}) = E(u_{it} u_{jt}) = E(u_{it} u_{js}) = 0, \ (i \neq j, t \neq s) \quad (13)$$

Hausman and Taylor (1981) provide a test for discriminating between the estimators of fixed and random effects. Consider the following set of equations:

$$y_i = \beta_i X_i + u_i \quad for \quad i \epsilon \{1, \dots, m\} \quad (14)$$

Where, the index 'i' denotes the i-th equation in the considered system (Breusch and Pagan, 1980). Levin *et al.* (2002) showed that using a unit root test for panel data has a higher test power in comparison to a unit root test for each section is coexistent.

Data and sources

This study uses secondary data collected from various sources. These data consist of the volume (in thousand tonnes) and values of imported sources viz. beef and poultry (in US dollars) for the period from 2002-16, obtained from United Nations Commodity Trade Statistics Database and the Tehran Chamber of Commerce Industries Mine and Agriculture. Import values include cost, insurance and freight (CIF).

Real price=Nominal price × (Base period CPI)/(Nominal period CPI) (15)

$$Real\ price = Nominal\ price \times \frac{Base\ period\ CPI}{Nominal\ Period\ CPI} \quad (16)$$

$$E_{Countries} = \sum_{i=i}^{n} E_i \Rightarrow W_i = \frac{E_i}{E_{Country}} \Longrightarrow P_{country} = \sum_{i=1}^{n} w_i p_i \quad (17)$$

The sample statistics of expenditure shares for each product is summarized in Table 1. Among two meat items, the larger import accounts on the average for beef nearly 44% followed by poultry (67%). A country was identified as an import origin if it exported in terms of values over 5% for each meat category. Import sources that took less than 5% were combined into a single country named "Rest of World" for each meat category. During the years 2002-16, the main countries exporting beef to the Iranian market were Brazil, United Arab Emirates, Ireland and Netherlands. Poultry was imported mainly from Brazil, United Arab Emirates and Turkey. In rest of world, major countries for beef import included Australia, Belgium, India and Germany and, for poultry include Republic of Korea, Germany, Ukraine, China and Portugal. Regarding the trend of beef import (Fig. 1) from Brazil to Iran between 2009 and 2013 indicated its downside. According to the OIE report, due to the spread of Foot and Mouth Disease (FMD) between 2012-08 several beef importing countries initiated an import ban. The maximum reduction in imports from Brazil in 2013 was due to an outbreak of BSE in addition to FMD (Fig. 1).

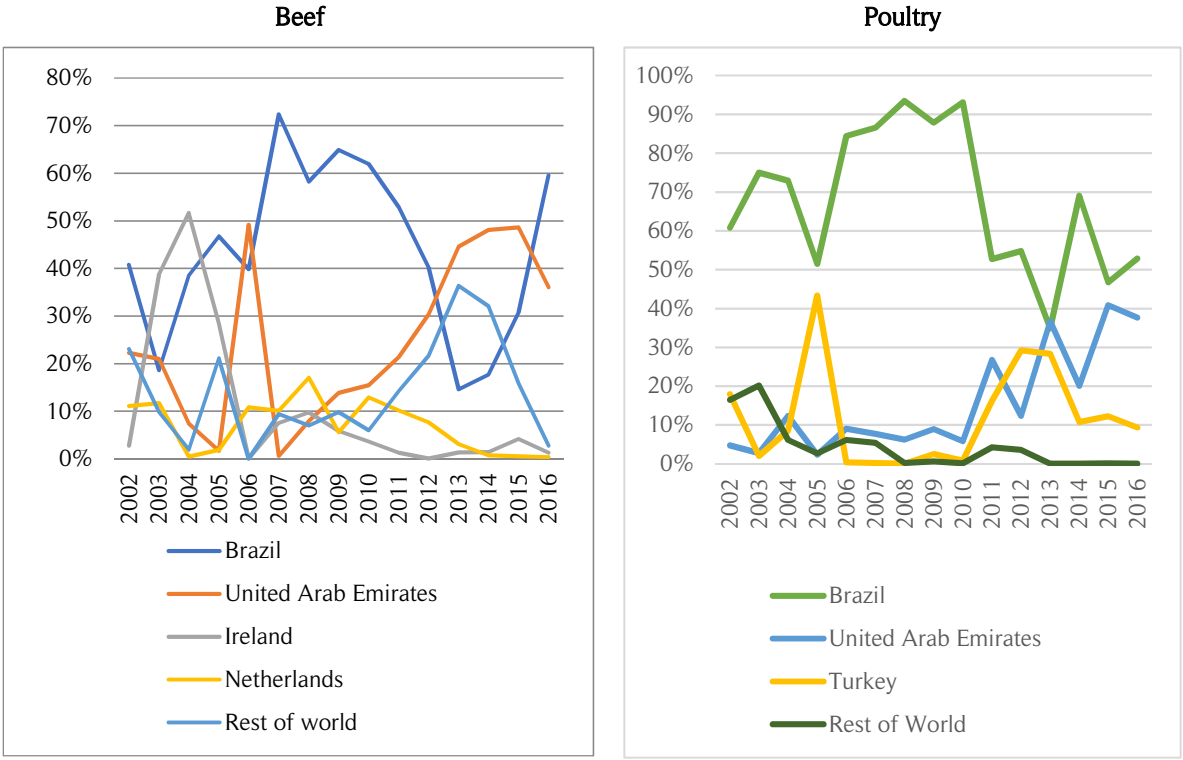


Figure 1. Evolution of beef and poultry import shares from 2002 to 2016

Results and Discussion

Parameter estimates

Source-differentiated models allow us to separate sources that are important for policy-related research, and the modification of the Yang and Koo block-substitutability restrictions enables us to estimate large models with relatively limited data sets. The STATA12 program was used to estimate nine equations by the SUR method with the homogeneity, symmetry and block substitutability conditions imposed. Each equation includes seven parameters, with diseases dummy variable and intercept variable. Degrees of freedom are not a problem since the data set has a total of 135 observations. The results of the SUR system are shown in Table 1.

Table1. Marshallian elasticities, Hicksian elasticities and expenditure elasticity

Kind of elasticity	Marshallian elasticities	Hicksian elasticities
Own-price elasticity of good i from source h	$\varepsilon_{ihih} = -1 + \frac{\gamma_{ihh}}{W_{ih}} - \beta_{ih}$	$\varepsilon_{ihih} = -1 + \frac{\gamma_{ihh}}{W_{ih}} - W_{ih}$
Cross-price elasticity of good i from different sources (with k≠h)	$\varepsilon_{ihik} = -1 + \frac{\gamma_{ihk}}{W_{ih}} - \beta_{ih}\frac{W_{jk}}{W_{ih}}$	$\varepsilon_{ihik} = \frac{\gamma_{ihk}}{W_{ih}} + W_{ik}$
Cross-price elasticity of good i with a different good j (with j≠i)	$\varepsilon_{ihj} = -1 + \frac{\gamma_{ihj}}{W_{ih}} - \beta_{ih}\frac{W_j}{W_{ih}}$	$\varepsilon_{ihj} = \frac{\gamma_{ihj}}{W_{ih}} + W_j$
Expenditure elasticity	$\eta_{ih} = \frac{\beta_{ih}}{W_{ih}} + 1$	

Moschini (1995) and Chern *et al*. (2003).

Tables 2, 3 and 4 also presents the parameter estimates and associated t-ratio of the expenditure share function systems from RSDAIDS. For the beef share equation, the expenditure coefficients were significant and negative for Brazil and ROW. This implies that the beef expenditure share of Brazil and ROW would decrease, with any increase in the real total expenditure, but the beef expenditure share of United Arab Emirates, Ireland and the Netherlands would increase.

Table 2. Summary statistics for expenditure shares for Iran meat imports (2002-16)

Variable	Mean	Std. Dev.	Min	Max
Beef				
Brazil	0.4384	0.1800	0.1459	0.7237
United Arab Emirates	0.2457	0.1731	0.0062	0.2142
Ireland	0.1055	0.1593	0.0004	0.5167
Netherlands	0.0696	0.5480	0.0040	0.1706
Rest of world (ROW)	0.1408	0.1088	0.0006	0.3637
Poultry				
Brazil	0.6779	0.1866	0.3486	0.935
United Arab Emirates	0.1564	0.1344	0.0236	0.4089
Turkey	0.1215	0.1296	0.0003	0.4337
Rest of world (ROW)	0.0442	0.0615	0.0004	0.2020

Source: Computed by the authors

Table 3: Estimated parameters of the RSDAIDS with homogeneity, symmetry and block substitutability imposed

	Expenditure share								
	Beef					Poultry			
Parameter	BR	UAE	IRE	NE	ROW	BR	UAE	TUR	ROW
Within the group									
α_{ih}	1.9058***	8.6478***	-0.1129	0.4915	-0.3856	0.0312	0.0041	-0.0640	0.0319
	(6.9613)	(-1.9856)	(0.0193)	(0.1735)	(-0.3077)	(0.4210)	(0.1230)	(-0.8759)	(0.5610)
$ln(P_{BBR})$	0.0194	-0.0442**	-.0775	-0.0312***	0.1274***				
	(1.1267)	(-3.6833)	(-0.3744)	(-2.600)	(5.6875)				
$ln(P_{BUAE})$	-0.0095	-0.00320	0.0126**	0.0167***	0.0318***				
	(-1.1047)	(-0.5614)	(1.2755)	(2.9298)	(2.9972)				
$ln(P_{BIRE})$	-0.0044***	-0.0007	0.0026*	0.0019**	-0.0003				
	(-3.1429)	(-0.8000)	(1.5294)	(1.9000)	(-0.1444)				
$ln(P_{BNE})$	0.0026	-0.0059*	-0.0017	-0.0027	0.01073*				
	(0.5652)	(-1.5946)	(-0.2698)	(-0.8182)	(1.59702)				
$ln(P_{BROW})$	-0.02902***	-0.0054	0.0298***	0.0228***	-0.0036				
	(-3.3721)	(-1.0189)	(3,2043)	(3.8814)	(-0.3600)				
$ln(P_{PUBR})$						-0.0001	0.0021***	-0.0008	-0.0001
						(-0.2000)	(4.2000)	(-1.1429)	(-0.2000)
$ln(P_{PUAE})$						-0.0042***	0.0108***	-0.0125***	-0.0006
						(10.5000)	(12.0000)	(-10.4167)	(-0.4615)
						-0.0064***	0.0108***	0.0014	-0.0067***
$ln(P_{PUTU})$						(12.8000)	(-10.8000)	(1.0769)	(-6.0909)
$ln(P_{PUROW})$						-0.0013***	-0.0030***	0.0031***	-0.0025***
						(-4.3333)	(4.1429)	(3.8750)	(-2.5000)
Between group									
P_{Beef}						0.0326***	0.0480***	0.0175	0.0096
						(3.7045)	(2.9814)	(1.1986)	(0.0908)
$P_{poultry}$	0.3689***	0.0082	0.0191*	-0.0185*	0.0690				
	(3.6309)	(0.1514)	(1.60989)	(-1.5072)	(1.2105)				
$ln\left(\frac{E}{P}\right)$	-0.1175***	0.5421**	0.0074***	0.2737***	-0.004***	0.0030***	0.0010	0.0012***	0.0003
	(-6.8314)	(1.9795)	(6.1667)	(2.8273)	(-8.0000)	(2.5000)	(0.1000)	(12.000)	(0.1000)
$Dummy_{Beef}$	-0.0135**	0.0018	0.0010***	0.0311***	-0.0004**				
	(-9.000)	(1.0271)	(-4.5000)	(4.7619)	(-8.6957)				
$Dummy_{poultry}$						-0.0020*	-0.0013	0.0124***	-0.0026***
						(-1.5037)	(-0.753)	(-5.9048)	(23.7273)
RMSE	0.7087	0.8959	0.8145	0.3769	0.7095	0.6363	0.9408	0.9852	0.8690

BR: Brazil, UAE: United Arab Emirates, IRE: Ireland, NE: Netherlands, TUR: Turkey and ROW: Rest of World
*, ** and ***: Significant at 10, 5 and 1% level of significance, respectively; t-ratios are reported in parentheses

Table 4 presents the results of goodness-of-fit analysis. McElroy's R^2 was used as a measure of goodness of fit for the system. Based on the majority of the estimated equations contain a number of statistically significant coefficients, and overall the model fits the data well. Most of the McElroy's R^2 values are reasonable except for the value for the Netherlands beef share equation from the RSDAIDS, which is of low magnitude. It might be that either data are limited or the Netherlands beef accounts for a small percentage of the total expenditure. For beef, the significant estimates concern the demand functions for Brazil, United Arab Emirates and ROW, and also for poultry demand functions consist of United Arab Emirates and Turkey. The beef own price coefficient estimate for all countries (except Ireland) is not significant. The positive own price coefficient of Ireland which contradicts the downward own-price-demand curve theory, indicating that beef imported from Ireland could be a Giffen good in the Iran market. However, in the real market, beef is not a Giffen good and the reason for that contradictory finding could be data limitation or correlation.

Table 4. Results of product block separability for the RSDAIDS model

Type of Test	Null Hypothesis	F-test	P-value
Block Separability	Beef is separable from Poultry	81.3651	0.0001

Source: Computed by the authors

For beef, the significant estimates concern the demand functions for almost all countries are considered. The expenditure for Brazil beef is negatively and significantly correlated with Ireland price (-0.0044)

and rest of world (-0.02902). Considering that Brazil is one of the largest exporters of meat in the world market and represents competition of Brazil with the other meat suppliers. The United Arab Emirates beef is having statistically significant relation with Brazil prices, which is negative (-0.0442). This demonstrates that at this ever-increasing phase of Iran import demand; consumer utility also rises with source differentiation. The positive cross-relations among price and expenditure for Netherlands with United Arab Emirates, Ireland and Rest of World confirm that price competition strategies on the supply side and source differentiation strategies on the demand side are implemented for this undifferentiated product.

For the poultry share equation, only ROW coefficients are significant at the lower level and have a negative sign while the United Arab Emirates own-price coefficients are positive and significant which is not consistent with the downward own-price-demand curve theory. This theory also indicates that poultry import from United Arab Emirate could be a Giffen good in the Iran market. Therefore, it can be justified that Iran is relatively self-sufficient in poultry. The Iranian consumers prefer fresh domestic poultry in comparison to imported frozen poultry.

It was observed that cross-relations between prices and expenditure for Brazil with the United Arab Emirates, and United Arab Emirates with Turkey/rest of world (ROW) were negative and significant but differences were small to the fourth decimal digit in magnitude. Considering the relation between meat group, only Brazilian beef as well as Emirate poultry and beef display significant coefficients at 1%. Also beef and poultry seem to have a substitution relationship. The dummy variables measuring the effects of Disease Indicator reflecting BSE, FMD and Avian Influenza (Flu) outbreaks related exporter countries. The BSE and FDM dummy variable of beef for Brazilian, Ireland, Netherlands and Rest of World were significant and negative and Avian Influenza (Flu) of Turkey and Rest of World was significant at the lower level. In the beef market, the estimates showed a small decrease in the shares of beef from all sources (except United Arab Emirates) during 2002-16. The same result was true for avian influenza in Brazil, Turkey and other countries. Table 4 shows the results for block separability. The null hypothesis that the beef import demand can be estimated separately for poultry was rejected as well at 1% level of significance.

The relation of the Lin and Levin test in this research was based on three types of non-dimensional and non-proximal relationships, with the width of the source and without the trend, with the width of the source and with the process, which at best indicated the results (Table 5). Table 6 shows the results of the random effects test using the likelihood test. The data presented in Table 6 show that except budget share of poultry from Brazil, they confirmed the random effect.

Table 5. Levin-Lin-Chu unit-root test

Variable	W		LnP		$\mathrm{Lnp_j}$		$\mathrm{Ln}(E/P^*)$	
	Statistic	p-value	Statistic	p-value	Statistic	p-value	Statistic	p-value
Include time trend	-19.7929	0.0000	-6.6343	0.0000	-6.8728	0.0000	-6.1859	0.0000
Subtract cross-sectional means	-13.6158	0.0000	-5.2379	0.0000	-1.4403	0.0749	4.0419	1.0000
suppress panel specific means	-3.6412	0.0001	-2.5571	0.0053	-2.1110	0.0174	-2.7437	0.0030

Source: Computed by the authors

Table 6. Random effects test result

Variable	Likelihood test	p-value	Variable	Likelihood test	p-value
W_{BBR}	19.45	0.0126	W_{PUBR}	8.43	0.2963
W_{BUAE}	35.80	0.0000	W_{PUAE}	13.24	0.0464
W_{BIRE}	28.79	0.0003	W_{PUTU}	26.52	0.0004
W_{BNE}	26.36	0.0009	W_{PUROW}	18.42	0.0102
W_{BROW}	22.28	0.0044			

Source: Computed by the authors

Elasticity estimates

Marshallian elasticity and expenditure elasticity estimates

Table 7 presents the Marshallian (uncompensated) elasticities. Consistent with what is expected from economic theory, all of own-price elasticities for beef and poultry were statistically significant. The own price elasticities

of Brazil, United Arab Emirates and Ireland were lower than one indicating inelastic demand. The magnitudes of response to these countries suggest that beef consumers would not probably replace the imported beef with other substitutes when faced with higher import prices. The low sensitivity of these countries, in both poultry and beef markets, there can be several reasons, including differences in quality, shipping costs or access to the product market. This finding is consistent with market characteristics fragmentation of market shares, product homogeneity and volatility of commercial strategies.

Table 7. Marshalian Elasticity's (uncompensated Elasticity's) for of Iran Meat Import Demand using Restricted Source Differentiated AIDS (Columns are prices)

Parameter	BR	UAE	IRE	NE	ROW	BR	UAE	TUR	ROW
Beef									
BR	-0.8375*** (-4.7933)	-0.0246** (-2.2574)	-0.1685** (-2.3114)	-0.0550 (-0.1695)	0.3443*** (-2.4032)			+	
UA	-0.8498*** (-10.489)	-0.9532*** (-4.1180)	-0.0358*** (-5.5426)	-0.0625 (-1.272)	-0.2257*** (-1.6158)			+	
IR	-0.181*** (-16.7100)	-0.0676*** (-3.4133)	-0.9454*** (-9.8595)	0.0341*** (-2.8549)	-0.0376*** (-2.6239)			+	
NE	0.2507*** (-20.479)	0.0469*** (-5.9091)	-0.0062*** (-12.418)	-1.0112*** (-4.7123)	0.2543*** (-4.077)			+	
ROW	-0.1535 (-0.8634)	-0.024*** (-8.0699)	0.1686*** (-16.882)	0.1303*** (-11.678)	-1.0163*** (-22.7172)			+	
Poultry									
BR						-0.9801*** (-4.3058)	-0.0245*** (-3.4751)	-0.0100*** (-21.9061)	-0.0013 (-1.1747)
UAE						-0.0249*** (-4.4077)	-0.9362*** (-8.8285)	-0.0744 (-0.789)	-0.0036** (-11.789)
TUR						-0.0098** (-1.8328)	-0.0167*** (-4.1292)	-0.9991*** (-4.6440)	-0.0103*** (-6.3773)
ROW						-0.0155* (-1.621)	-0.0346*** (-15.784)	0.0369 (-7.0132)	-1.0298** (-2.18719)
Beef						0.3763*** (-3.7059)	0.2838*** (-2.8132)	0.0253*** (-6.8667)	0.1144*** (-4.5961)
Poultry	0.0111*** (-2.6792)	-0.6439*** (-3.8234)	-0.5182*** (-4.3056)	-0.117*** (-2.7933)	0.3963*** (-2.4418)				
Expenditure	1.7271*** (3.9549)	2.8959*** (3.7560)	1.1765*** (5.6383)	0.5126*** (3.1716)	0.9775*** (5.0589)	1.0012*** (4.0254)	1.1006*** (5.9773)	1.0018*** (3.5654)	0.7001*** (4.9791)

BR: Brazil, UAE: United Arab Emirates, IRE: Ireland, NE: Netherlands, TUR: Turkey
*, ** and ***: Significant at 10, 5 and 1% levels of significance, respectively. t-ratios are reported in parentheses

While beef from Netherlands and ROW, own-price elasticities are greater than one (-1.0112 and -1.01631, respectively). This suggests that as the price of export beef increases by 10%, the domestic demand of imported beef coming from Netherlands and ROW will decrease by 10.11 and 10.16%, respectively. So, beef from Netherlands and ROW suffers from the competition of other suppliers, and its demand is sensitive to price policies. In the poultry market, Brazil and ROW price elasticities are elastic.

In the beef and poultry market, expenditure elasticities of Brazil, United Arab Emirates, Ireland and Turkey are significant and larger than one. This indicates that meat from these countries can be considered as luxury (better quality) commodities, while the expenditure elasticity of beef and chicken meat imported from ROW as well as beef imported from the Netherlands is significant and lower than one. So, the share of Brazil, United Arab Emirates, Ireland and Turkey meat increases faster than the share of Netherlands and ROW.

The expenditure elasticity are greater than 1 (for beef from Brazil, United Arab Emirates and Ireland and poultry from Brazil, United Arab Emirates and Turkey) implying that there is a tendency for these countries imports to be particularly favoured over other imports when total expenditure on beef/poultry imports grows between main exporters of beef/poultry to Iran or slightly lower than 1 (for beef from Netherlands and ROW, and poultry from ROW), suggesting that expanded beef import expenditures result in a less than proportionate increase from Netherlands and ROW. Over the time, this would seem to suggest a longer-term decline in market share from these sources, holding relative prices constant. Therefore, expenditure elasticity confirms the income determinant in the purchase of imported beef and poultry. Iranian meat consumption is moving towards new suppliers and product differentiation, and the emerging scenario is competitive.

According to Yang and Koo (1994), a country is regarded as having strong export potential in an import market if demand for its product is price inelastic but expenditure elastic. Brazil, United Arab Emirates, Ireland and Turkey satisfy these criteria in the beef and poultry markets. On the contrary, Netherlands and ROW appear to be at a competitive disadvantage in the beef and poultry market due to price elastic and expenditure inelastic demand for its product and, this could explain why Netherlands and ROW's export of the product declined over time while Brazil and United Arab Emirates exhibited increasing or stable export to Iran. Porter (1985) defines competitive advantage as an advantage over competitors achieved by offering consumers a greater value, either through lower prices or by providing greater benefits that justify higher prices.

The cross price elasticities are conditional on total expenditure of meat imported by the country and account for both substitution and expenditure effects of price changes. The cross-price effect varied for most of the imported beef and poultry.

The positive cross price elasticities suggest some degree of substitution between imports from various sources, while negative cross price elasticities suggest that the expenditure effect of price changes outweighs the pure substitution effects. Regarding the beef and poultry market, more than half of cross elasticities were negative, small and statistically significant for most exporting countries indicating complementary relationships between imported beef/poultry from different sources, showing no fierce competition among these countries, while the relation between Brazil vs. ROW, Ireland vs. Netherlands, Netherlands vs. Brazil/United Arab Emirates/ROW, ROW vs. Ireland/Netherlands and ROW vs. Turkey and indicating substitution relationships.

The complementary relationships between beef and poultry are more difficult to explain. These peculiar effects were also found in domestic demands (Hayes *et al*., 1990) and are not unusual in demand studies. Several restrictions imposed on the data (e.g. adding-up, homogeneity and symmetry) may account for the apparent complementary relationships (Yang and Koo, 1994). Pitts and Herlihy (1982) showed evidence supporting the fixed expenditure hypothesis. The hypothesis says that when the prices of two products differ substantially and the own price elasticity of a product is less than one, a decrease in the price may increase the consumption of both the products, with a relatively fixed expenditure on the group. Also, the lack of competitiveness between imported meat is due to co-movements of exchange rates so that a factor since the value was used as a proxy for price and the role of exchange rates may not be rejected, or due to the difference in the quality or differences in meat cuts and products between exporter countries or model restrictions.

Table 8: Hicksian Elasticity's (compensated Elasticity's) for of Iran Meat Import Demand using Restricted Source Differentiated AIDS (Columns are prices)

					Beef				Poultry
Parameter	BR	UA	IR	NE	ROW5	BR	UA	TU	ROW
Beef									
BR	-0.5243 (-4.3188)	0.2 (-5.8402)	-0.576 (-3.7365)	0.1365 (-4.7536)	0.3394 (-2.4092)				
UA	0.4435 (-3.8756)	-0.7253 (-3.2392)	-0.279 (-1.5565)	-0.011 (-1.0906)	0.2232 (-1.8477)				
IR	0.4334 (-16.7100)	0.2847 (-1.6223)	-0.8961*** (-9.7108)	0.0253 (-3.834)	0.1704 (-1.6670)				
NE	0.429 (-1.8840)	0.2853 (-4.4103)	0.1623 (3.0537)	-0.9785 (-4.6661)	0.1544 (-6.2477)				
ROW	0.4353 (-6.2477)	0.2807 (-6.3476)	-0.038 (-1.4694)	0.0398 (-9.8666)	-0.8426 (-23.2493)				
poultry									
BR						-0.9141 (-4.1938)	0.1914 (-3.7996)	0.6568 (-4.3158)	0.0588 (-2.3747)
UA						0.0632 (-1.0063)	-0.7672 (-8.3712)	0.6633 (-2.1362)	0.0993 (-6.4097)
TU						-0.006 (-1.6099)	0.1009 (-8.2191)	-0.3371 (-3.7194)	-0.015 (-4.006)
ROW						0.0745 (-6.4384)	0.1592 (-8.6368)	0.6584 (-1.935)	-0.9459 (-8.9949)
Beef						1.0223 (-2.9466)	0.9295 (2.2633)	0.6717 (-5.6731)	0.7597 (3.7673)
poultry	0.2691 (-1.9935)	0.3834 (-2.0702)	-0.101 (-3.1674)	0.0648 (-2.2029)	0.743 (1.5798)				

BR: Brazil, UAE: United Arab Emirates, IRE: Ireland, NE : Netherlands, TUR :Turkey.

*, ** and ***: Significant at 10%, 5% and 1% level of significance, respectively, t-ratios are reported in parentheses.

Hicksian elasticities

To better understand the competition relationship among suppliers, the Hicksian cross price elasticities are calculated and reported in Table 8. A positive price elasticity between imported beef and poultry from two countries denotes substitutes and a negative value denotes complements. In total, there are 50 pairs of cross price elasticities among the nine countries. For each pair, the sign and significance and magnitude may differ. In general, most pairs of Hicksian cross-price elasticities at the higher triangle of the panel are significant. Twenty-seven of them are positive and indicate substitutes. In both the markets, four pairs of cross-price elasticities are negative, significant and indicate complements.

Conclusion

This study estimated the impacts of economic factors (meat prices and expenditures) and non-economic factors (animal diseases/outbreaks) on the import demand for source differentiated meat during 2002-16 in Iran. In fact, this study has examined the factors driving the competitive relations among suppliers and products for the Iranian beef and poultry import market.

Results of this study shed light on Iran consumer preferences with regard to imported meat. This is the first study that analyzes the Iran meat demand differentiated by source. The estimation results show that Brazil, United Arab Emirates and Ireland have a competitive advantage compared with the Netherlands and ROW (Australia, Belgium, India and Germany). For poultry, Turkey and the United Arab Emirates also have the competitive advantage compared with other sources (Brazil and ROW). This is determined by the Brazil, United Arab Emirates, Ireland and Turkey's relatively low own-price elasticity and high expenditure elasticity, compared with rest two sources for beef and poultry and considering the future growth in Iran consumer's per capita income. Therefore, the growing per capita income in Iran is expected to expand the marketing potential for Brazil, United Arab Emirates and Ireland for beef, and United Arab Emirates and Turkey for poultry exporters. These countries have the most gain from an increase in the size of imported meat market in terms of their beef and poultry exports.

It is evident that the patterns used in Iran's trade for different countries are different. However, aggregation over sources may demonstrate considerable bias for estimating the elasticities when evaluating demand models, which especially when meat with a considerable market share of importers such as beef are highlighted. Although the findings are rather reasonable, it is worth noting that the estimated elasticities can be influenced by the poor quality of data, the nature of aggregations based on the source and by inaccurate dynamic specification related to the model. In addition, there is a scope for conducting other studies in this area.

All suppliers are searching for more opportunities for development in this developing market although their strength of competition is different and the relations are often regarded as asymmetric. Thus, entrepreneurs and managers focus on presenting new methods and strength for new investments.

References

Andayani, S. R. M. and Tilley, D. S. (1997). Demand and competition among supply sources: The Indonesian fruit import market. *Journal of Agricultural and Applied Economics*, 29:279–289.

Anonymous (2017). Deputy Director of Planning and Economic Affairs of the Ministry of Agriculture of the Islamic Republic of Iran, http://www.maj.ir

Boumahdi, R., Chaaban, J. and Thomas, A. (2004). Import Demand Estimation with Country and Products Effects: Application of Multi-way Unbalanced Panel Data Models to Libanese Imports. *Institute National de la Recherche Agronomique, 3rd Ed.*, 3: 35-40

Breusch, T. S. and Pagan, A. R. (1980). The lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies*, 47: 239-253.

Capitello, R., Agnoli, L. and Begalli, D. (2015). Chinese import demand for wine: evidence from econometric estimations. *Journal of Wine Research*, 26:115-135.

Cheng, Ya Hao, Zhifeng, Gao and Seale, J. (2015). Changing Structure of China's Meat Imports. *Journal of Integrative Agriculture*, 14: 1081–91.

Chern, W. S., Ishibashi, K., Taniguchi, K., Tokoyama, Y. and Pingali, P. (2003). Analysis of the food consumption of Japanese households. Food and Agriculture Organization of the United Nations, Rome

Deaton, A., and Muellbauer, J. (1980). An almost ideal demand system. *AmericaneEconomiceReview*, 70: 312-326.

Eales, J. S. and Unnevehr, L. J. (1988). Demand for beef and chicken products: separability and structural change. *AmericaneJournaleofeAgriculturaleEconomics*, 70: 521-532.

Giorgioni, G. and Holden, K. (2003). Does the Ricardian equivalence proposition hold in less developed countries? *InternationaleReviewaofeAppliedeEconomics*, 17 :209-221.

Gómez, A., Jiménez. J. G. P. and Figueroa, G. F. (2015). Contribution of the Nafta countries in the Japanese Pork market. *JournaleAgraria*,12:117-125

Green, R. and Alston, J. M. (1990. Elasticities in AIDS models. *AmericaneJournaleofeAgriculturaleEconomics*, 72: 442–45.

Hausman, J. A. and Taylor, W. E. (1981). Panel Data and Unobservable Individual Effects. *Econometrica*,e49 :1377-1398.

Hayes, D. J., Wahl, T. I. and Williams, G. W. (1990). Testing Restrictions on a Model of Japanese Meat Demand. *AmericaneJournaleofeAgriculturaleEconomics*, 72: 556-566.

Henneberry, S. R, and Seong-huyk, H. (2007). Meat Demand in South Korea: An Application of Restricted Source-Differentiated Almost Ideal Demand System Model". *JournaleofeAgriculturaleandeResourcee Economics*, 39:47-60.

Levin, A., Chien-Fu, L., Chu, J. and Chia-Shang (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *JournaleofeEconometrics*,eElsevier, 108: 1-24.

Mekonnen, D. K., Fonsah., E. G. and Borgotti, B. (2011). US import demand for apple: source differentiated almost ideal demand system approach. *International journaleofeTradeeandeGlobaleMarkets*, 4: 372-382.

Moschini, G. (1995). Units of Measurement And The Stone Index In Demand System Estimation. *Americane JournaleofeAgriculturaleEconomics*, 77: 63-68.

Parizan, V. and Esmaeili, A. (2008). Assessing Import Demand Factors of Livestock Products in Iran. *AgriculturaleEconomics*, 2: 2008-5524 (in Persian).

Pitts, E., and Herlihy, P. (1982). Perverse substitution relationships in demand studies: the example of butter and margarine. *JournaleofeAgricultureeEconomics.*, 33:37-46.

Porter, M. E. (1985). Competitive Advantage. Creating and sustaining superior performance. Macmillan Inc. London .

Sun, L. and Niquidet, K. (2017). Elasticity of import demand for wood pellets by the European Union. *Foreste PolicyeandeEconomics*, 81: 83-87.

Thanagopal, T. and Félix, H. (2014). A restricted source differentiated almost ideal demand system, augmented with quality in the study of French imports", Working Paper, No. 698, San Rafael, CA: Forum for Research and International Trade, http://www.freit.org/WorkingPapers/Papers/TradePolicyGeneral/FREIT698.pdf (accessed January 20, 2013).

Yang, S., and Koo, W. W. (1994). Japanese meat import demand estimation with the source differentiated AIDS models. *JournaleofeAgriculturaleandeResourceeEconomics* 19: 396-408.

EJEM
Econ.J.Emerg.Mark.

Economic Journal of Emerging Markets
Available athttp://journal.uii.ac.id/index.php/jep

Economic agglomeration, economic growth and income inequality in regional economies

Imam Mukhlis[1]*, Isnawati Hidayah[2], Sariyani[3]

[1] Department of Development Economics, Faculty of Economics, Universitas Negeri Malang, Malang, Indonesia
[2] Master's Student, Master of International Development Studies, Wageningen University & Research, Hollandseweg 1, 6706 KN Wageningen, The Netherlands.
[3] Master's Student, Master of Economics, Postraduate Study, Universitas Negeri Malang, Malang, Indonesia
Corresponding Author e-mail: imm_mkl@yahoo.com

Article Info

Article history:
Received: 6 May 2018
Accepted: 5 July 2018
Published: 1 October 2018

Keywords:
Economic agglomeration, income inequality, economic growth, gini ratio, panel data

JEL Classification:
R120; O150; C230

*DOI:*10.20885/ejem.vol10.iss2.art9

Abstract

This study analyses the relationship between economic agglomeration, economic growth, and income inequality in East Java Province, Indonesia, in 2011-2015, after implementing a regional autonomy policy of regional development. It uses panel data with a random effect model. The model estimation's result suggests that economic agglomeration significantly and positively affects income inequality. However, economic growth does not have any significant effects on income inequality.

Introduction

Regional autonomy and fiscal decentralization in regional development policies have been implemented in Indonesia since 2000 by transferring various authorities from the central government to local ones. The development affairs are mainly related to planning of regional development, budget allocation and implementation of development in the region. The authority delegation is expected to increase community participation in the implementation of regional development to achieve a welfare state and to reduce income inequality. These are the primary indicators of the achievement of national development in Indonesia.

Economic developments in various regions in Indonesia show some income inequalities among societies. The income inequalities are due to an uneven allocation of economic resources and inability of the communities to access available economic resources. The era of regional autonomy is mainly expected to encourage community's involvement in the development process. Additionally, it is also expected to increase equity in the availability of economic resource allocation in development.

Along with some dynamics in the global economy, the orientation of national development is for the country to be directly involved in global competitiveness. One of the strategies adopted is to implement industrial agglomeration policy of the 1990s. This policy aims to facilitate development of leading economic sectors in distinct clusters, to enable the sectors to have competitiveness in the global economy.

The applied agglomeration has generated some centres of economic activities in various regions in Indonesia. In aggregate, this policy could push the performance of the national economy in the 1990s. By the result, Indonesia reached economic growth rate, about 8-9% per year. Nevertheless, the pertinence of agglomeration created problems of income inequality among communities in various regions. The presence of economic agglomeration does not generate a multiplier effect on the area around the industry.

The critical theory of economic growth is aggregate production's rules which related to the amount of input used in the form of capital and labor to produce output in a given period (Badel & Hugget, 2016). One of the most famous economic growth models is the Harrod-Domar model that links to the Keynesian ideas. This model is often used in developing countries to explain the linkage between economic output and total capital (Tranh & Hoang, 2016). The Harrod Domar model assumes that the capital-output ratio has a rigid relationship with the coefficient of production. Besides, the Solow model explains that technology has transformed capital and labor into output productively (Ozdemir,

P ISSN 2086-3128 | E ISSN 2502-180X

2017). In an empirical study, Jagadeesh (2015) explains that in Bostawa, there is a significant relationship between economic growth and saving, which is supported by the Harrod-Domar economic growth model.

The economic growth shows the role of the regional economy in national development. The leading economic region can be transformed into an industrial agglomeration area. This industrial agglomeration can lift up the economic outputs. In this case, Marshall connects economic and social conditions, often called the "Marshallian Industrial District" which means the concentration of companies or industries that are affected by geographical conditions has a relationship with regional growth and labor (Tappi, 2001). The industrial district has an industrial atmosphere and can produce output efficiently. The industrial districts may influence the dissemination of information, innovation, and technology. It also can affect the workforce and provide specific training for the community and encourage more efficient production costs due to joint production (Trullen, 2015).There are three main reasons for the industrial district establishment, which are the need for the industry to get closer to the resources; the excellence of market demand; and the existence of urban (Belussi & Caldari, 2008). The Marshallian Industrial district can be used to compare significant similarities and differences between industries in a country (Boix & Galletto, 2008).

Economic gap or disparities also remains a concern for policy researchers in Europe. Geppert and Stephan (2008) explain that the increase in economic agglomeration has triggered the increase of disparity in the UK. Agglomeration also promotes economic growth (Brulhart and Sbergami, 2009; Gardiner et al. 2010). Economic gap and agglomeration have the potential to increase economic growth (Castells, 2011).

On the other hand, Mukhlis and Simanjuntak (2016) explain that economic growth does not have any significant effect on poverty. The raise of the minimum wage will reduce poverty in East Java Province. Associated with Kuznet's hypothesis according to Frazer (2006) in low-income countries, economic growth significantly affects economic inequality. Meanwhile, Dietz, Rosa, & York (2012) explains that the relationship of per capita income to the environmental quality has an opposite shape to the U-curve.

Obradovic, Lojanica, & Janković (2016) explain that economic growth and long-term gaps are significantly positive. To reduce the gap rate, it requires an increase in output in disadvantaged areas. Risso, Punzo, Javier, & Carrera (2013) find that there is a negative relationship between income disparity and economic growth. In addition, Vu & Mukhopadhaya (2011) find that the economic disparity negatively affect the economic growth, especially in developing countries, which has a more considerable influence than the developed countries. In the long-term, the economic gap has negatively affected economic growth in developed and developing countries, democracy, and non-democratic countries (Herzer & Vollmer, 2012).

Hsing (2005) explains that economic disparities are detrimental to economic growth in the United States, means that the economic disparity negatively affects economic growth. Case studies in Pakistan show that the gap has a significant relationship with economic growth. Hence, it supports Kuznet's inverted U hypothesis (Shahbaz, 2010; Tian, 2012; Wahiba & Wariemmi, 2014), which also explain that economic gap has a negative relationship with economic growth. On the other hand, Risso, Javier, and Carrera (2012) state that economic disparities and economic growth are positively influential in China.

Up to now, various studies about the linkages of agglomeration, economic growth and income inequality in various countries. The results of these studies can justify the linkage between agglomeration and income inequality that occurs in various countries (Frazer, 2006; Geppert & Stephan, 2008). Based on the relationship between economic growth and income inequality research conducted by Mukhlis and Simanjuntak (2016) found a link between economic growth and poverty levels.

The discernment of research result about the relationship between economic growth and agglomeration happen because many countries implement different policies to increase economic performance. The countries that have limited economic resources would try to optimise economic activities with industrialisation and international economic activities (i.e., international trade, capital inflow, and labor mobility). Besides that, countries that have abundant economic resources adopt technology to boost the productivity to enter the global market. In this case, agglomeration and income inequality still happen in many countries and need the right policy to facilitate economic activities to grow well and spread over the area.

East Java Province of Indonesia has an economic growth rate above the average of national economic growth in several periods. The advantages of East Java province compared to other provinces are the existence of land, sea, and air transportation infrastructure that can be connected internationally. Natural resources availability is abundance, mainly in the agricultural sector; such as terrestrial and marine fisheries, plantations, forestry, and food crops. Supported by a large population, the economic capacity of eastern Java province can grow faster than the national average.

The economic agglomeration strategy in economic development also experienced by East Java Province. The economic agglomeration applied in the form of industrial estate, an industrial centre and a cluster of sectoral economic activities which spread in Pasuruan, Surabaya, Gresik, Mojokerto, and Lamongan. As a result of the massive rate of economic activities in these districts, economic activities have a significant rate of economic growth. As an illustration, in 2016, economic growth in East Java province reaches 5.6% (BPS East Java, 2017), per capita income level (GRDP per capita) has reached the amount of IDR 35.962.000 - per year (more and less 2600 USD/year).

The performance of economic agglomeration and regional economic growth in various regencies/cities in East Java also causes poverty and income inequality among the population. Not all residents can access the available economic resources. Also, the need for competence employment not fulfilled by the labor force in the region. As a result, there are mobilities of economic resources from peripheral areas to hinterland. In 2016, the number of poor people in various regencies/cities in Eastern Java reached 4,639 thousand people. The level of income inequality (measured by the Gini ratio) in 2015 is 0.42 (BPS East Java, 2017).

This research aims to analyse the correlation of economic agglomeration, economic growth and income inequality in East Java province, Indonesia for 2011-2015.

Research Methods

The type of this research is quantitative analysis while the data analysis method is descriptive. The object of this research is ten regencies/cities in East Java Province, covering Malang City, Batu City, Blitar City, Malang Regency, Pasuruan Regency, Lumajang Regency, Sidoarjo Regency, Mojokerto Regency, Jombang Regency, and Kediri Regency. The data in this research is from East Java BPS using publication services in the form of physical documents and through the website. These data that analysed are labor absorbed at work, Gini ratio, and economic growth during 2011-2015. The data analysis used in this research is Location Quotient (LQ) and Data Panel Regression method (OLS).

Location Quotient

Location Quotient (LQ) analysis measures the level of the task at the district level and the provincial level in sectoral production activities. The concept used is LQ > 1, then the sectors that are the basis of the sector, LQ = 1 matters required by the sector that is sufficient for local needs, LQ <1 is not the base sector and is unable to meet local needs.
Here is the LQ equation (Tian, 2012):

$$LQ = \frac{xij}{xsj} = \frac{xij/xis}{xsj/xss}$$

Based on the equation: X_{ij} is the workforce of sector *i* in regencies/cities *j*, X is the total sector *i* workforce in East Java Province. Then, X_{sj} total labor of all sectors in regencies/cities *i*, and X_{ss} is the total of the workforce. This coefficient is used to measure economic agglomeration in the region.

Panel data regression

This case study uses disparity that is represented by the Gini ratio as the dependent variable, while economic agglomeration represented by LQ coefficient and economic growth become the independent variable. Here is the equation of the panel data regression model:

$$Gin_{it} = a_i + \beta_i LQ_{it} + \beta_i Gr_{it} + \varepsilon_{it}$$

The error terms are ε, and *i* denotes the observed unit distribution, *t* years of observation, the magnitude of the constant, indicating the coefficient of the independent variable. Gini ratio is the value of gap or Gini coefficient, LQ is the value of agglomeration or Location Quotient, while Gr is the value of economic growth.

Results and Discussion

Location Quotient (LQ)

This study measured the Location Quotient (LQ) on ten (10) regencies/cities from 2011-2015. The following LQ values are in Tables 1 and 2:

Table 1. Average LQ District-City East Java Province

Sector	Malang City	Blitar City	Batu City	Malang Regency	Pasuruan Regency
1	0.04	0.27	0.76	1.05	0.80
2	0.31	0.29	0.15	0.67	0.30
3	1.41	0.96	0.57	0.97	1.71
4	3.52	2.39	1.22	1.36	1.19
5	1.13	1.01	1.35	1.44	1.21
6	1.66	1.52	1.45	0.95	0.99
7	1.64	1.14	0.97	0.93	1.09
8	2.51	2.60	1.22	0.59	0.56
9	1.86	2.07	1.33	0.82	0.83

Table 2. Average LQ District-City East Java Province

Sector	Mojokerto	Jombang	Lumajang	Kediri	Sidoarjo
1	0.55	0.72	1.27	0.92	0.16
2	0.54	0.50	1.77	0.55	0.49
3	2.04	1.26	0.80	1.04	2.53
4	0.29	1.06	0.25	0.31	0.70
5	0.93	1.44	1.01	1.28	1.00
6	1.05	1.23	0.76	1.21	1.13
7	1.31	1.01	1.01	0.65	1.53
8	1.20	0.78	0.39	0.78	2.34
9	1.06	1.04	0.84	0.91	1.29

Notes:
Sectors 1: Agriculture, forestry, hunting, and fisheries
2: Mining and quarrying
3: Processing Industry
4: Electricity, Gas, and Water
5: Building
6: Great Trade, Retail, Restaurants, and Hotels
7: Transportation, Warehousing, and communication
8: Finance, Insurance, Leasehold business, land, and services company
9: Community, social, and individual services

The above results indicate that the value of LQ Malang in the sector of electricity, gas and clean water with a value of 3.52. Blitar City excels in transport, trade, and communications with a value of 2.60. Batu City excels in the sector of large trade, retail, restaurants, and hotels with a value of 1.45. Malang Regency transcends in building sector with value 1.44. Pasuruan Regency outdoes in the processing industry sector with a value of 1.71. Mojokerto Regency outrivals in the manufacturing sector with a value of 2.04. Jombang Regency excels in the building sector with a value of 1.44. The building sector is also the leading sector in Kediri Regency with the value of 1.28, and the last of Sidoarjo regency better in the manufacturing industry sector with a value of 2.53.

Based on the table above, it shows that in the first sector (Agriculture, Forestry, Hunting, and fisheries) and the second sector (mining and excavation) are in Lumajang District. Moreover, the third sector (manufacturing industry) is in Malang City, Pasuruan Regency, Mojokerto Regency, Sidoarjo Regency, Jombang. The fourth sector (electricity, gas, and water) is the area of Malang City, Malang Regency, Batu City, Blitar City, Pasuruan District. The fifth sector (building) the superior area that is almost all districts except Mojokerto, Sidoarjo, and Lumajang. Then, the sixth sector (big trade, retail, and hotels) are Batu, Malang City, Blitar City, Kediri Regency, Jombang Regency, Sidoarjo Regency. The seventh sector (Transportation, Warehousing and Communication) is in areas of Malang City, Blitar City, Mojokerto Regency, Sidoarjo Regency. Lastly, the eighth sector (finance, insurance, building rental business, land and services company) in

Malang City, Blitar City, Batu City, Mojokerto Regency, and Sidoarjo Regency. The last ninth sector (social services, social and individual) areas that are superior are the city of Malang, Blitar, Batu, and Sidoarjo.

The geographical conditions significantly affect the form of economic agglomeration (concentration) of each region as an example of the ninth sector example (social service, social and individual) tend to superior in the urban areas of Malang, Blitar and Batu City. Related to the Marshallian Industrial District Model which stated that the concentration of firms or industries that are affected by geographical conditions, has a relationship to regional growth and labor in an area (Tappi, 2001).

Panel data regression

The first step before doing the test panel data regression is doing the Chow Test and Hausman Test.

Chow Test

Chow Test is used to test the best model between Common Effect Model and Fixed Effect model. Here's the Chow test result.

Table 3. Chow Test

Effect Test	Statistic	D, F	Probability
Cross-Section F	5.253538	(9,38)	0.0001
Cross-Section Chi-Square	40.418772	9	0.0000

Based on Chow Test Probability value 0.0001 < 0.05. Thus, the Fixed Effect Model is better than the Common Effect Model.

Hausman Test

Hausman Test is used to test the best model between the Fixed Effect Model and Random Effect Model. The following Hausman Test results explained in table 4.

Table 4. Hausman Test

Test Summary	Chi-Sq Statistic	Chi-Sq d.f	Probability
Cross-Section random	2.488157	2	0.2882

Hausman Test shows that the probability of 0.2882, which exceeds 0.05. Thus, the suitable model used in panel data regression is the Random Effect Model.

Random Effect Model

Based on the Chow Test and Hausman Test the best model is the Random Effect Model. The test results are shown in the following table:

Table 5. Random Effect Model

Variable	Coefficient	Probability
C	0.284398	0.0000
LQ	0.088885	0.0006
Gr	-0.009633	0.1513
Adjusted R-Squared		0.23739
F-Statistic		0.000743

Based on the table, the panel data regression model is:
Gini =0.284398+0.088885LQ – 0.009633Gr

Panel data regression test shows that the relationship between economic disparity and agglomeration is significant and positive with coefficient value 0.088885 (p-value equal 0.0006 below α =1%). This coefficient means that any increase (1%) in the level of economic agglomeration (concentration) followed by an increase in income disparity of 0.089 or 8.9%. Geppert (2008) explains that the increase in economic concentration can increase the disparity. In this case, the concentration of economic activity in one region tends to establish other

economic activities located in the same region due to their necessary infrastructure in economic activity. As for labor and raw materials, it can provide from other regions outside the existing economic area. Nevertheless, the use of these factors of production is unable to improve the economic equality in various regions significantly. In many cases, the increase of income inequality between the regions where the economic concentration and the surrounding areas are affected.

Economic growth variables do not have a significant relationship with economic disparities. Based on data outcome, the coefficient equal to -0.009633. The results of study provide essential information about the strategy of optimising the economic growth, especially in developing countries. That high economic growth is a necessity to improve the welfare and livelihood. However, high economic growth will only increase the economic gap when there is no regulation of social costs arising. In other words, in every development process always creates the side-effects in the form of crime, unemployment, and poverty. Therefore, it takes a growth strategy that can improve the prosperity of the community evenly. The results of this study are by the results of research conducted by Mukhlis and Simanjuntak (2016). In his research, it concludes that in East Java province economic growth has no significant effect on poverty. The results of this study also illustrate that Kuznets hypothesis of reversed U curve about the income inequality and economic growth relationship does not occur in the context of economic development in East Java Province of Indonesia.

In contrast, some research conducted, such as: Frazer, (2006); Herzer &Vollmer, (2012); Risso et al., (2013); Vu and Mukhopadhaya, (2011). The absence of a relationship between economic growth and the income gap level in various regencies/cities in East Java province during the period of 2011-2015 provides essential information on the policy of development equity and economic growth performance. East Java province still has an economic growth rate above the national economic growth rate during 2011-2015. Hence, the rate of economic growth requires considerable economic resources supported by the contribution of qualified human resources. The performance of high economic growth requires high attention in order to prevent high-income inequality in East Java province. Theoretically, the level of economic disparities caused by the quality of human resources, uneven economic distribution, and high unemployment rate.

The results of this study still indicate the ambiguity about the relationship between the level of economic agglomeration, economic growth and income inequality in various regions in Indonesia. The causes are the differences in endowment factors and economic policies applied in each country. Endowment factors are increasingly qualified to provide a maximum contribution in achieving the economic performance of a country. Likewise, with economic policy, for a country, the application of broad economic policy is an option to overcome the problem of income inequality and economic slowdown. In developed countries, the problem of poverty and income inequality overcame by the transfer of income (welfare subsidy subsidies) from the country to the resident. The size of this income transfer depends on the financial capacity of the country. At the same time, the developed country's economy leads to achieving sustainable economic growth. Besides that, economic agglomeration causes inconsistency in economic impact. In industrial countries, this policy succeeds to push economic activity in the region. However, in developing countries, this policy still need action for economic optimisation resources in the production process.

Conclusions

Regional economic development happens through economic agglomeration activities. This policy is applied because based on various theories and studies, economic agglomeration has a positive correlation to the acceleration of economic resource utilisation and economic output. Based on the results of this study, the economic agglomeration has a positive and significant impact on income inequality in various districts of East Java Province during 2011-2015. The manifestation of economic agglomeration that occurs in various regencies/cities is the centralisation of sectoral economic activity (agriculture, industry, and services). The result of the study is in line with Marshallian Industrial District Theory, where the economic growth has no significant effect on income inequality in various cities/regencies in East Java Province. Besides, the findings are incompatible with the Kuznets Hypothesis. This study concluded that regencies/city governments could identify areas/regions that potentially form industrial estate (agglomeration). These industrial estates need to take apart to expand the affected areas to reduce the level of economic disparities. The recommendation: establishing a relevant local regulation; optimising the role of local human resources in recruiting the workforce in existing industrial areas, to create equity of income distribution.

References

Badel, A., & Hugget, M. (2016). *Macroeconomics: A growth theory approach*. Retrieved from http://faculty.georgetown.edu/mh5/class/econ102/macro-book.pdf

Belussi, F., & Caldari, K. (2008). At the origin of the industrial district: Alfred Marshall and the Cambridge School. *Cambridge Journal of Economics*, *33*, 335–355.

Boix, R., & Galletto, V. (2008). Marshallian industrial districts in Spain. *Scienze Regionali*, *7*(3), 29–52.

BPS East Java. (2017). Jawa Timur dalam angka,. Retrieved from www.bps.jatim.go.id

Castells, D. (2011). *Agglomeration, inequality and economic growth* (Working Paper Institute de Recerca en Economia Aplicada Regional I Publica). Retrieved from http://www.ub.edu/ubeconomics/wp-content/uploads/2012/02/201114.pdf

Dietz, T., Rosa, E. A., & York, R. (2012). Environmentally efficient well-being: Is there a Kuznets curve? *Applied Geography*, *32*(1), 21–28.

Frazer, G. (2006). Inequality and development across and within countries. *World Development*, *34*(9), 1459–1481.

Geppert, K., & Stephan, A. (2008). Regional disparities in the European Union: Convergence and agglomeration. *Regional Science Association International*, *87*(2), 193–217.

Herzer, D., & Vollmer, S. (2012). Inequality and growth: Evidence from panel cointegration. *Journal Economic Inequal*, *10*(4), 489–503.

Hsing, Y. (2005). Economic growth and income inequality: The case of the US. *International Journal of Social Economics*, *32*(7), 639–647.

Jagadeesh, D. (2015). The impact of savings in economic growth: An empirical study based on Botswana. *International Journal of Research in Business Studies and Management*, *2*(9), 10–21.

Mukhlis, I., & Simanjuntak, T. M. (2016). The nexus of economic factors and poverty in the region's economy. *International Journal of Management Science*, *7*(1), 14–20.

Obradovic, S., Lojanica, N., & Janković, O. (2016). The influence of economic growth on regional disparities: Empirical evidence from OECD countries. *Zbornik Radova Ekonomskog Fakulteta u Rijeci*, *34*(1), 161–186.

Ozdemir, D. (2017). A post-keynesian criticism of the solow growth model. *Journal of Economics Business and Management*, *5*(3), 134–137.

Risso, A., Punzo, L. F., Javier, E., & Carrera, S. (2013). Economic growth and income distribution in Mexico. *Economic Modelling*, *35*, 708–714.

Risso, W. A., Javier, E., & Carrera, S. (2012). Inequality and economic growth in China. *Journal of Chinese Economics and Foreign Trade Studies*, *5*(2), 80–90.

Shahbaz, M. (2010). Income inequality- economic growth and non-linearity: A case of Pakistan. *International Journal of Social Economics*, *37*(8), 613–636.

Tappi, D. (2001). *The Neo-Marshallian industrial district a study on Italian contributions to theory and evidence*. Germany: Kahlaische Strasse.

Tian, Y. (2012). The euality on economic growth in China. *Economics & Business Journal: Inquiries & Perspective*, *4*(1), 150–157.

Tranh, D., & Hoang, N. (2016). The model of economic growth and implications for economic growth Danang. In *Proceedings of the International Academic Research Conference on Small & Medium Enterprises* (pp. 1–21). Danang City-Vietnam. Retrieved from http://globalbizresearch.org/IAR16_Vietnam_Conference_2016_Aug/docs/doc/PDF/VSL622.pdf

Trullen, J. (2015). Giacomo becatini and the Marshall's method. *Investigaciones Regionales-Journal of Regional Research*, (32), 43–60.

Vu, H., & Mukhopadhaya, P. (2011). Reassessing the relationship between economic growth and inequality. *A Journal of Applied Economics and Policy*, *30*(2), 265–272.

Wahiba, N. F., & Wariemmi, M. E. (2014). The relationship between economic growth and income inequality. *International Journal of Economics and Financial Issues*, *4*(1), 135–143.

Economic Journal of Emerging Markets is Indexed by:

1) Drectory of open Access Journals; 2) Crossref; 3) EBSCO HOST Research Databases; 4) BASE Bielefeld Academic Search Engine; 6) ASEAN Citation Index; 7) Sinta, Science and Technology Index; 8) Google Scholar; 9) IPI, Indonesian Publication Index; 10) ISJD, Indonesian Scientific Journal Database; 11) Indonesia One Search; 12) Garuda Scholar