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Pathway analysis of vegetable farming commercialization

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Abstract

High-valued vegetable farming can increase farmers' income if the vegetables are cultivated in commercial manner. This paper analyses factors that determine farmers' intention to commercialize vegetable farming; and the effect of commercialization on farmers' income. The study used structural equation model to estimate paths affecting farmers to engage commercial farming and its impact of commercial on households' income. Household and farm characteristics, business environment, and market support were hypothesized to influence farmers to commercialize vegetable farming. Data for this study were compiled from a quantitative survey of 360 farm households located in four major vegetable producing regions of Eastern Indonesia. Results indicate that commercial vegetable farming provides economic advantage in terms of increased income. To encourage commercial vegetable farming, vegetable agribusiness terminal with all market infrastructures should be established in the potential vegetable producing regions of Indonesia.

Abstrak

Budidaya sayuran bernilai tinggi dapat meningkatkan pendapatan petani jika sayuran dibudidayakan secara komersial. Makalah ini menganalisis faktor-faktor yang menentukan niat petani untuk mengkomersialkan usaha tani: sayuran dan dampak komersialisasi terhadap pendapatan petani. Penelitian ini menggunakan model persamaan struktural untuk memperkirakan jalur yang mempengaruhi petani melakukan usahatani secara komersial dan dampaknya terhadap pendapatan rumah tangga petani. Karakteristik rumah tangga dan usahatani, lingkungan bisnis, dan dukungan pasar diduga mempengaruhi petani untuk mengkomersialkan usahatani sayuran. Data penelitian ini dikumpulkan dari survey kuantitatif terhadap 360 rumah tangga petani yang berada di empat daerah penghasil sayuran utama di Kawasan Timur Indonesia. Hasil penelitian menunjukkan bahwa usahatani sayuran komersial memberikan keuntungan ekonomi dalam bentuk peningkatan pendapatan. Untuk mendorong usahatani sayuran komersial, terminal agribisnis sayuran dengan semua infrastruktur pasar harus didirikan di daerah penghasil sayuran potensial di Indonesia.

Introduction

Vegetable production is an important sector in global agribusiness; it can lead to increased farm productivity and higher farm-gate values compared to cereal and other staple crops (Johnson, Weinberger, & Wu, 2008). Because of the high profitability of commercial vegetable production compared to paddy rice and other cereal crops, the potential exists for higher household income diversification if more land can be devoted to intensive vegetable production.

In Indonesia, high-value vegetables such as chilli, shallot, and tomato are an important part of daily diets and livelihoods, and play an important role in the overall economy of the country. The household supply of the major staple, rice, is considered sufficient only when it is complemented with other foods such as vegetables.

In Indonesia, a study confirmed that farmer incomes can double agricultural inputs, and products in the market can increase substantially when farmers shift from rice farming to intensive chilli farming (Mariyono & Bhattarai, 2011). The intensification triggers rural markets, particularly through enhanced value chains of agricultural products since it also leads to an increase agrochemical inputs (Mariyono, 2015). Because vegetables are high valued cash crops and need more inputs (particularly labour and chemicals) than cereals or other staple crops (Mariyono & Bhattarai, 2011), vegetable cultivation undoubtedly provides income, employment, and nutritional benefits to millions of smallholder farmers, rural labourers, and consumers.

Despite the significant growth of vegetable production in Indonesia, its global share of the vegetable industry is quite low. Improvements in cultivation practices, availability of improved crop varieties, and improvement in irrigation infrastructure are some of the reasons for the recently observed increase in vegetable production (Mariyono & Sumarno, 2015). There is enough room to expand vegetable production in Indonesia by promoting a commercial mind-set among farmers who have yet not adopted this approach to agriculture (Mariyono, 2017). The adoption of intensive farming methods is necessary for agricultural commercialization in Indonesia.

Based on the previous studies, the main factors affecting farmers to move on better conditions include household, business environment, market and institutional factors. The reviews of selected literatures below are expected to justify this study.

Household factors consist of education, experience and age. Education level of the household head reflects human capital. Higher level of human capital leads to more rational decision-making. Many studies have used this variable to explain the adoption of agricultural technologies (Wang, Rozelle, Huang, Rearson, & Dong, 2006). Experience in vegetable farming represents a farmer's familiarity with vegetable production, which is considered more complex than for cereal crops. A more experienced farmer in vegetable farming is expected to commercialize farming activities at a higher level. A study by Kuntariningsih & Mariyono, (2013) used this variable in explaining farmers' decisions to select specific agricultural technologies in chilli production. Age of household head represents maturity, emotional adulthood and physical ability. In general, the effect of age on technology adoption is in a parabolic form, meaning that positive impact occurs at certain ages, and becomes negative after a critical point when farmers are getting older. This variable has been widely used as an explanatory variable in studies on adoption of agricultural technologies of chilli in Indonesia (Kuntariningsih & Mariyono, 2013).

The number of family members in productive age determines the availability of family labour devoted to drudgery farming. Since vegetable farming is labour intensive (Mariyono & Bhattarai, 2011), a higher number of family members is expected to support commercial farming. Fernandez-Cornejo, Beach, & Huang, (1994) show the significant contribution of this variable to the adoption of agricultural technology.

Farm size represents scale of farming. It is expected that large farm size would most likely to lead to increased adoption. Studies by Fernandez-Cornejo, Daberkow, & McBride, (2001), and Roberts, English, & Larson, (2002) confirm the observation that farm size significantly affects adoption of agricultural technology. Farm size also contributes to wealth and status in the community. Because intensive vegetable farming is very costly, farmers with a higher wealth ranking are expected to engage more in commercial agribusiness ventures. A study shows that comparatively, richer farmers tend to adopt new technology more easily (Jayasinghe-Mudalige & Weersink, 2004).

The number of plots within the same piece of land represents land fragmentation of the household. When land is fragmented into separate plots, it will be less efficient in operating intensive farming, and the farmer will become discouraged. In India, fragmented landholdings are a major burden to the adoption of commercial agribusiness (Firdaus & Ahmad, 2010). In Ethiopia, (Melesse, 2016) suggests that land fragmentation should be reduced since it lowers performance of commercial farming. Type of crops grown by farmers determines commercialization. As the goal of commercial farming is cash-flow, the crops that can be harvested quickly will play significant roles. This relates to scheduling of cultivation (Dey, 2001).

Use of mobile phones enables farmers to access information related to vegetable-based agribusinesses. With access to more complete market information, farmers can conduct their own business management activities. The effect of mobile phone usage on the commercialization of agriculture has been studied by Bresnyan (2008) and Kuntariningsih & Mariyono (2013), who indicate that the use of mobile phones leads to greater prospects for technology adoption. Agricultural technology related to vegetable farming enables farmers to operate efficiently. The greater the number of agricultural technologies applied in farming, the more efficient farming will be. With the availability of agricultural technology, farmers are more likely to engage in agribusiness ventures (Kafle, 2010;Raut, Sitaula, Vatn, & Paudel, 2011).

Access to credit enables farmers, regardless if rich or poor, to obtain adequate cash to finance intensive commercial agriculture. This variable has attracted particular research attention in the commercialization of agriculture around the world (Kafle, 2010; Kumar, 2009; Kuntariningsih & Mariyono, 2013; Raut et al., 2011; and Zeller, Diagne, & Mataya, 1997).

Agricultural training equips farmers with technical skills and practical knowledge. Participation in agricultural training enhances human capital and becomes an important factor in the adoption of agricultural technology in general. In Thailand, farmer's knowledge is an important factor affecting a farmer's ability to apply good agricultural practices (Athipanyakul & Pak-Uthai, 2012). Mauceri, Alwang, Norton, & Barrera (2005) and Yang et al., (2008) show that agricultural training influences the level of technology adoption. Like training program provided by the government, a specific program on vegetable production can be a significant factor in farming commercialization. The program of sustainable food reserve was conducted to encourage farmers to grow vegetables and other high-valued agricultural products in order to increase households' income. The program was conducted in several villages of sub-district. Several samples in this study got exposed from the program, thus these variables could be included in analysis.

Access to information about markets and agricultural technology reduces asymmetric information between farmers and traders, and increases the possibility of enhancing farmers' productivity. Asymmetric information such as lack of knowledge about prevailing prices, demand, and preferred quality between producers on one hand and other key actors (e.g., retailers, wholesalers, consumers) in the value chain, has caused farmers to have relatively low bargaining power (Soviana & Puspa, 2012). In sub-Saharan Africa, lack of available technology is the main constraint hindering adequate input supply in vegetable production (Chagomoka, Afari-Sefa, & Pitoro, 2014).

Distance to market represents the cost-effectiveness of marketing of product. Vegetables are perishable, thus the distance to vegetable markets is a critical determinant of marketing success. Many studies have shown that distance to market is the significant driving force to adoption of agricultural technology (Raut et al., 2011). The closer farmers are to vegetable markets, the more likely it is that they will engage in commercial farming.

Based on the importance of farming commercialization, this study aims to analyse factors affecting farmers to shift from subsistent farming to market-oriented farming. Vegetable crops were selected in this study is because of higher profitability than other cereal crops. This current study uses all such factors to determine driving forces and paths of commercialization of vegetable farming.

On the basis of recent policy dialogues, agricultural commercialization is seen as a key element for achieving economic growth and poverty reduction in developing countries, including Indonesia. Agricultural specialization, the development of markets and trade are fundamental to economic growth (Von Braun, Bouis, & Kennedy, 1994). Agribusiness aims to move crop producers from subsistence to commercialized agriculture; the government thus should encourage smallholder farmers to participate in market-oriented farming. Agricultural commercialization is an important process of agricultural transformation (Pingali, 1997); despite the fact that subsistence agriculture has an important role in transition countries. The subsistence agriculture plays a buffering role and provides beneficial impacts on the agricultural sector when the resources it employs are unacceptable to the commercial sector (Kostov & Lingard, 2004).

Drivers of agricultural commercialization include population growth, technical change, enhanced market access, crop intensification, and asset accumulation (Leavy & Poulton, 2007). More comprehensively, commercialization of agriculture requires a series of certain attitudes: a commitment to farming and new technologies; a low threshold of risk aversion; willingness to invest in land and soil fertility improvement practices; better access to rural financial markets; improved skills in managing business relations; better price negotiation; reduced time spent in markets; better product and process quality control and assurance; continuous improvement; and efficiency enhancement, starting from production to final product (Poole, Chitundu, & Msoni, 2013). Group activity to bring about commercialization has inherent operational and management challenges, yet is necessary to reduce transaction and transformation costs, and involves significant individual and organizational learning. Another important factor affecting commercialization is education level. Education is one of important determinants in improving rural households in Mexico (Yúnez-Naude & Taylor, 2001).

Farming is a risky business, and a low threshold of risk aversion is one of the critical factors for successful agribusiness (Ikerd, 2011). Agricultural diversification is one option to reduce economic and ecological risks, as well as to increase farm profitability (Mariyono, 2007). Agricultural diversification with high-value crops is one of the several pathways to agricultural development (Kumar, 2009). Availability of

farming technologies becomes important to support the commercialization process. Investment in land use intensification is only possible by replenishing soil nutrients to sustain productivity. In subsistence societies, the soil nutrient supply is replenished by farmyard manure. Without chemical fertilizers, a commercially oriented agricultural production system is not possible (Pingali & Rosegrant, 1995). In the case of cassava in Africa for example, unavailability of adequate agricultural technologies such as disease-free planting materials and disease-tolerant varieties has impeded the adoption of otherwise sound commercialization technologies (Mulu-Mutuku, Odero-Wanga, Ali-Olubandwa, Maling'a, & Nyakeyo, 2013).

Technological change drives diversification with high-value crops and commercialization of agriculture (Pingali & Rosegrant, 1995). Throughout history, changes in agricultural technology have been an important component in the progress of human societies, particularly the development of modern agriculture with a range of technologies (Huang, Hu, van Meijl, & van Tongeren, 2004) and 'successful adoption of technology can be a powerful force in reducing poverty' (deJanvry & Sadoulet, 2002). New technology seems to provide opportunities to increase production and income substantially (Selvaraj, 2009). To enhance productivity of diversified farming systems, technologies that reduce costs and help farmers manage and optimize input allocation in multiple crop systems must be introduced and adopted. These technologies are costly, however, and the development of innovative low-cost, practical strategies that reduce production costs in diversified farming systems in the developing world will be necessary and should be widely disseminated (Bowman & Zilberman, 2013).

Research Method

The analytical framework employed for this study involved a model to estimate factor affecting commercialization and eventually the commercialization influences household's income. An approach of structural equation modelling (SEM) was utilized in this study as an analytical tool. The tool is a powerful multivariate technique that enables to measure indirect and indirect effects with multiple dependent variables and also use several simultaneous regression equations.

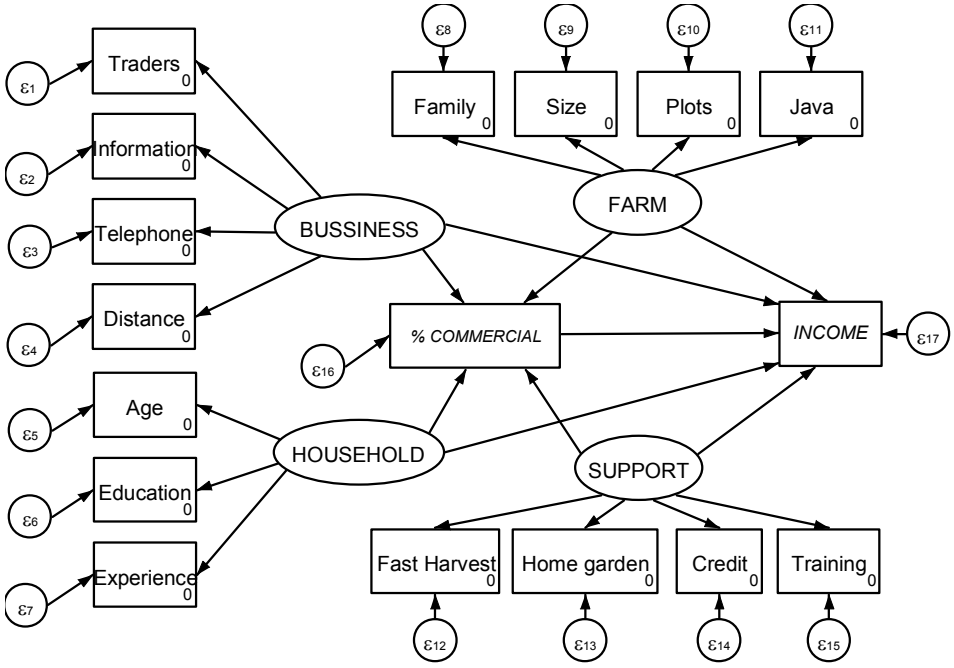

Figure 1. Analytical framework using structural equation modelling

The framework for the study is represented in Figure 1. Farmers to engage in commercial agribusiness in the market or continue with subsistence-oriented farming operations depends on four latent variables: household factors, business environments, farm factors, and other supports. The latent variables are constructed by observed variables. All variables simultaneously affect farmers' decision, such that some farmers engage more intensively in commercial agribusiness ventures than others. Subsequently, when farmers engage more commercial farming, they will gain higher incomes resulted from market-

oriented farming. Each factor has different power to influence farmers. All coefficients of factors are measured in standardized terms. A standardized coefficient compares the strength of the effect of each individual independent variable to the dependent variable. The higher the absolute value of the coefficient, the stronger the effect. Standardized coefficients have standard deviations as their units. This means the variables can be easily compared to each other (Freedman, 2009).

Table 1. Definition, measurement and summary of selected variables

Variables	Definition	Measure	Mean	SD
Dependent variable:				
Household' income	Profit gained from a hectare of farming	000 IDR	5040	5055
Level of commercialization	Percentage of number of vegetable crops for sale to total crops grown	Percentage	68.31	23.58
Latent variables				
Household characteristics:				
Age	Age of household head	Year	42.32	11.55
Education level	Length of formal education of household head	Year	8.31	2.96
Experience in vegetable	Time spent on vegetable farming	Year	16.85	11.54
Farm characteristics:				
Size of farm	Total area cultivated to crop	Hectare	0.70	0.77
Number of plots	Number of plots	Numeric	3.80	3.63
Family member	Number of family members in a household	Numeric	3.94	1.34
Location: Java	Farming in Java	1=yes; 0=no	0.52	0.50
Support				
Fast harvest crops	The age of crops to be harvested	Month	5.13	1.26
Access to credit	Whether farmers access credit for farming	1=yes; 0=no	0.20	0.40
Agricultural training	Participation in agricultural training program.	1=yes; 0=no	0.21	0.41
Home garden	Whether farmers get exposed to government program of home garden.	1=yes; 0=no	0.36	0.48
Business				
Traders	Number of traders to sell the produces	Numeric	1.48	0.50
Use of mobile-phone	Whether farmers use mobile phones in farming business activities (for marketing)	1=yes; 0=no	0.30	0.46
Distance to market	Distance to nearest local market or fixed traders to sell vegetables	Kilometre	16.82	14.12
Sources of market information	Number of sources of market information and agricultural technology	Numeric	1.58	1.41

This study uses a cross-section data set collected from a field survey of 360 farm households conducted in 2014 in Java and Bali, Indonesia. The samples were selected using a stratified random sampling approach at farm level in four main regions. Household level data were collected using individual interviews supported with qualitative data collected through group discussions with selected key farmers. Definition of selected variables, unit of measurement and summary statistics are provided in Table 1.

Results and Discussion

The result of estimated structural equation model is reported in Figure 2. We can see that the selected factors are expected to explain what drives farmers to commercialize vegetable production and the commercialization lead to change in farmers' income. The result shows that four latent variables highly influenced farmers to engage commercial farming. The highest impact came from farm characteristics, and the lowest impact came from institutional support. Eventually, the commercialization led to higher income. This is sensible because when farmers engaged profit-oriented farming, they would gain more income, as vegetables are high-valued horticultural crops. Note that the latent variables also provide direct impact on farm-

ers' income, but the magnitude of impacts is tiny. This means that latent variables led to better farmers' income through mediation of commercial vegetable farming.

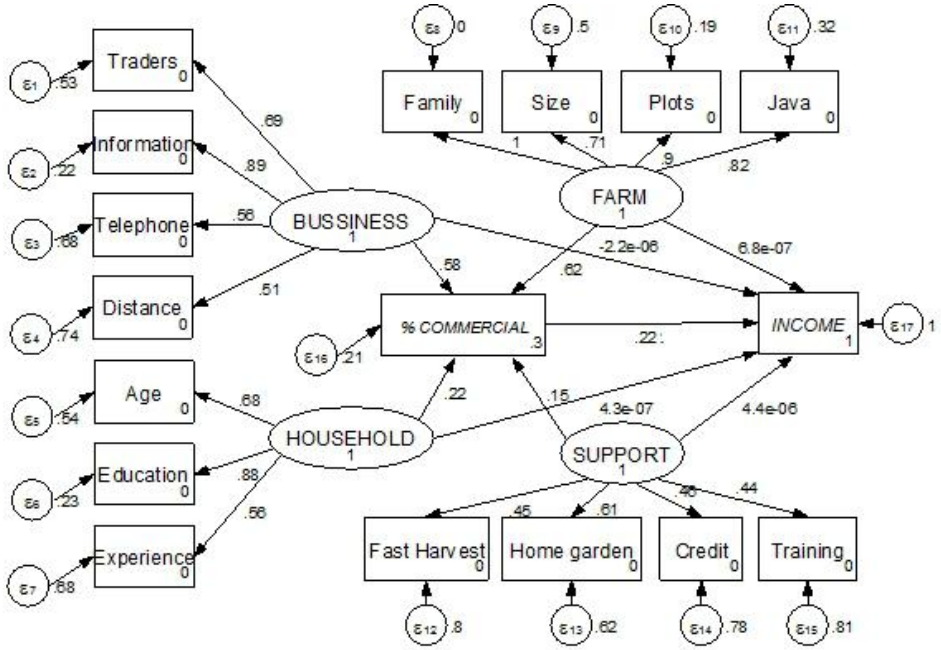

Figure 2. Estimated structural equation modelling

Let us to discuss the factors that construct latent variables that indirectly led to higher income via mediation of commercial vegetable farming. Household is highly characterized with age, education and experience. This means that when the farmers are more educated, experienced and mature they are encouraged from engaging in commercial farming.

Business environment is positively constructed with distance, use of telephone, access to information and number of traders. Distance to market vegetables represents cost-effective and efficient transportation for selling the produce. The further away farmers are from the market, the less likely they are to engage in commercial farming. Conversely, better transportation infrastructure can reduce transport and transaction costs and reduce the distance between farmers and markets for remote, rural communities (Bresnyan, 2008), as rural roads can increase market access (Jouanjean, 2013). In Indonesia, a reduction in trade and transport margins can reduce interregional agri-food prices (Rum, 2011). Farmers can use mobile phones to get more accurate market information, such as prevailing prices at markets and vegetable production in other regions. In many cases, farmers with mobile phones obtain price information by calling 2-3 traders before selling their produce the following day. Thus, access to mobile phones has dramatically changed the flow of market information in Indonesia's vegetable production areas. To a large extent, knowledge obtained through mobile phones has strengthened the farmers' price bargaining position. Furthermore, when market information is available and accessible to farmers, vegetable farming becomes less risky, and farmers have stronger bargaining power, particularly in negotiating produce prices. The number of vegetable-related technologies available in the local market, such as hybrid seeds, modern fertilizers, and crop protection inputs also significantly lead to the creation of commercial vegetable farming enterprises. Such technologies contribute to an environment conducive for engaging in vegetable-related agribusiness. (Prabha & Chatterjee, 2009), for example, show positive impacts of agricultural technologies such as modern fertilizers and high yielding varieties on agricultural productivity. In India, the lower availability of appropriate technologies for chilli production is the main factor associated with a decline in chilli-cultivated area (Rajput, Supe, & Chinchmalatpure, 2007).

Farming characteristic is substantially constructed with family members, size of farm, number of plots and location. The number of family members in productive age determines the availability of family labour devoted to drudgery farming. Farmers with larger farms are wealthier, and can more easily procure operating capital than farmers with small landholdings can. Farm size also represents wealth status in the community. Location determined farmers in Java to more intension to commercialize their farming than

those in Bali. Different marketing channel in Java and Bali could be the cause, where Java has direct marketing channel to food processing industries.

A support is highly constructed with training, credit, type of crops and home garden program. Training leads farmers to improve their technical knowledge and understanding of sophisticated production methods. Farmers who can access credit have a higher level of commercialization than those that cannot. Farmers can obtain the operating capital needed for intensive vegetable farming from credit. Larger farm size and higher wealth status of the household increase the likelihood of farmers commercializing vegetable production. This finding confirms previous studies in Indonesia and other developing countries (Mariyono & Sumarno, 2015; Raut et al., 2011). The longer time to harvest, the lower intention for farmers is to engage commercial farming. Longer time to harvest become is the most important variable in affecting farmers to engage commercial farming. This is reasonable because the financial return of agribusiness can be gained shorter when farmers grow quick-harvesting crops. Farmers seek to vegetable crops that can be harvested soon. Farmers who got exposed government program on sustainable food reserve have more intension to engage commercial vegetable farming. The program aims to promote commercial vegetables and other high-valued crops to increase income.

The increased growth of vegetable production in Indonesia is understandable because of a favourable business atmosphere. Development of telecommunication technology has provided farmers with affordable access to mobile phones. The government and private sectors have provided farmers with easy access to credit, in collaboration with rural cooperatives. In nearly every month of the major planting seasons, mobile banks open to provide banking services in rural areas. Markets and supporting infrastructure have been established close to existing vegetable production regions, to make it easy for farmers to sell their produce. In collaboration with international agricultural research centres, national research and development institutions have been discovering and disseminating vegetable-related technology over the past decade. All these factors have simultaneously led to the expansion of commercial vegetable production in East Java and Bali in particular, and Indonesia in general; and eventually farmers have gained higher income.

Conclusion

It is clear that intensive commercial vegetable farming provides more income and benefits the whole rural community. There is enough scope to increase the number of smallholder farmers in commercial vegetable farming. There are some major factors affecting farmers' ability to engage in intensive vegetable farming in East Java and Bali.

In response to increasing expansion of vegetable production in other regions, it is recommended that intensive vegetable farming technology should be introduced in communities where farmers have easy access to credit, are relatively mature, and have good experience in vegetable farming. In such communities, intensive vegetable farming will be adopted widely by farmers as a process of commercialization. Where farmers are already familiar with use of mobile phones, they will adopt commercial vegetable farming, as they will have access to accurate market information. Vegetable market and agronomic technology that support intensive vegetable farming should be provided, and market information should be regularly updated. In terms of agronomic technology, the government in collaboration with private sectors need to provide more choices of fast-harvesting cultivars. Providing vocational education and training—particularly on agricultural subjects—in rural areas will encourage youth to engage in promising agribusinesses.

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References

Athipanyakul, T., & Pak-Uthai, W. (2012). Determinants of good agricultural practices (gap) adoption in the chili production system in Northeastern Thailand: A case of participatory approach. *International Journal of Environmental and Rural Development*, *3*(2), 175–180.

Bowman, M. S., & Zilberman, D. (2013). Economic factors affecting diversified farming systems. *Ecology and Society*, *18*(1), 33. https://doi.org/10.5751/es-05574-180133

Bresnyan, E. (2008). *Agriculture for development: Value chains and small farmer integration* (World Development Report - LCR series).

Chagomoka, T., Afari-Sefa, V., & Pitoro, R. (2014). Value chain analysis of traditional vegetables from Malawi and Mozambique. *International Food and Agribusiness Management Review*, *7*(4), 59–86.

de Janvry, A., & Sadoulet, E. (2002). World poverty and the role of agricultural technology: Direct and indirect effects. *Journal of Development Studies*, *38*(4), 1–26. https://doi.org/10.1080/00220380412331322401

Dey, D. (2001). *Commercial greenhouse vegetable production* (Agdex 250/830-2). Retrieved from www.agriculture.alberta.ca

Fernandez-Cornejo, J., Beach, E. D., & Huang, W.-Y. (1994). The adoption of IPM techniques by vegetable growers in Florida, Michigan and Texas. *Journal of Agricultural and Applied Economics*, *26*(1), 158–172. https://doi.org/10.1017/S1074070800019271

Fernandez-Cornejo, J., Daberkow, S., & McBride, D. W. (2001). Decomposing the size effect on the adoption of innovations: Agrobiotechnology and precision agriculture. *AgBioForum*, *4*(2), 124–136.

Firdaus, G., & Ahmad, A. (2010). Exploring diversity among farmers in adoption of agricultural innovation and options for smallholder farming system-a case study of Ambedkarnager district of UP. *International Research Journal of Applied and Basic Sciences*, *1*(1), 25–36.

Freedman, D. A. (2009). *Statistical models: Theory and practice* (Revised ed). Cambridge Univercity Press.

Huang, J., Hu, R., van Meijl, H., & van Tongeren, F. (2004). Biotechnology boosts to crop productivity in China: Trade and welfare implications. *Journal of Development Economics*, *75*(1), 27–54. https://doi.org/10.1016/j.jdeveco.2003.07.005

Ikerd, J. (2011). Essential principles of sustainable food value chains. *Journal of Agriculture, Food Systems, and Community Development*, *1*(4), 15–17. https://doi.org/10.5304/jafscd.2011.014.001

Jayasinghe-Mudalige, U. K., & Weersink, A. (2004). Factors affecting the adoption of environmental management systems by crop and livestock farms in Canada. *Sri Lankan Journal of Agricultural Economics*, *6*(1), 25–36.

Johnson, G. I., Weinberger, K., & Wu, M. H. (2008). *The Vegetable Industry in Tropical Asia: An overview of production and trade, with a focus on Thailand*. (Maureen Mecozzi, Ed.) (Exploratio). Shanhua, Tainan: AVRDC Publication. Retrieved from http://203.64.245.61/fulltext_pdf/EB/2001-2010/eb0100.pdf

Jouanjean, M. A. (2013). *Targeting infrastructure development to foster agricultural trade and market integration in developing countries: An analytical review*. Retrieved from http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files

Kafle, B. (2010). Determinants of adoption of improved maize varieties in developing countries: A review. *International Research Journal of Applied and Basic Sciences*, *1*(1), 1–7. https://doi.org/10.1111/j.1477-9552.2004.tb00115.x

Kostov, P., & Lingard, J. (2004). Subsistence agriculture in transition economies: Its roles and determinants. *Journal of Agricultural Economics*, *55*(3), 565–579. https://doi.org/10.1111/j.1477-9552.2004.tb00115.x

Kumar, G. B. (2009). Factors affecting farmers' decision to cultivate high-valued crops: A case study of Burdwan District of West Bengal . *IASSI Quarterly*, *28*(1), 148–159.

Kuntariningsih, A., & Mariyono, J. (2013). Socio-economic factors affecting adoption of hybrid seeds and silvery plastic mulch for chili farming in Central Java. *Jurnal Sosial Ekonomi Pertanian Dan Agribinis*, *9*(2), 297–308.

Leavy, J., & Poulton, C. (2007). Commercialisations in smallholder agriculture: A general framework. In *The 5th International Conference on the Ethiopian Economy*. Ethiopian Economic Association (EEA) Addis Ababa.

Mariyono, J. (2007). Optimizing food crop diversification to enhance the rural income generated from the agricultural sector. *International Journal of Rural Studies*, *14*(2), 1–11.

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. (2017). Moving to tommercial production: A case of intensive chilli farming in Indonesia. *Development in Practice*, *(in press)*. https://doi.org/10.1080/09614524.2017.136084110.1080/09614524.2017.1360841

Mariyono, J., & Bhattarai, M. (2011). Revitalizing Indonesian rural economy through intensive farming of high value vegetables: A case of chili farming in Central Java. In B. E. Afianto, B. P. Resosudarmo, D. S. Priyarsono, & A. A. Yusuf (Eds.), *Indonesia Regional Economy in the Globalization Era* (pp. 71–89). Surabaya: Airlangga University Press.

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.

Mauceri, M., Alwang, J., Norton, G., & Barrera, V. (2005). Adoption of integrated pest management technologies: A case study of potato farmers in Carchi, Ecuador. In *The American Agricultural Economics Association Annual Meeting*. Providence, Rhode Island.

Melesse, K. A. (2016). Commercial behaviour of smallholder potato producers: The case of Kombolcha-woreda, Eastern Part of Ethiopia. *Economics of Agriculture*, *13*(95), 159–173. Retrieved from http://scindeks-clanci.ceon.rs/data/pdf/0352-3462/2016/0352-34621601159K.pdf%5Cnhttp://www.cabi.org.proxy2.cl.msu.edu/cabdirect/FullTextPDF/2016/20163128136.pdf

Mulu-Mutuku, M. W., Odero-Wanga, D. A., Ali-Olubandwa, A. M., Maling'a, J., & Nyakeyo, A. (2013). Commercialisation of traditional crops: Are cassava production and utilisation promotion efforts bearing fruit in Kenya? *Journal of Sustainable Development*, *6*(7), 48–58. https://doi.org/10.5539/jsd.v6n7p48

Pingali, P. L. (1997). From subsistence to commercial production systems: The transformation of Asian agriculture. *American Journal of Agricultural Economics*, *79*(2), 628–634.

Pingali, P. L., & Rosegrant, M. W. (1995). Processes and policies water policy for efficient agricultural diversification : Sub-Saharan Africa. *Food Policy*, *20*(3), 171–185.

Poole, N. D., Chitundu, M., & Msoni, R. (2013). Commercialisation: A meta-approach for agricultural development among smallholder farmers in Africa? *Food Policy*, *41*, 155–165. https://doi.org/10.1016/j.foodpol.2013.05.010

Prabha, K. G., & Chatterjee, B. (2009). Impact of infrastructure and technology on agrucultural productivity in Uttar Pradesh. *Agricultural Economics Research Review*, *22*(January-June 2009), 10.

Rajput, H. D., Supe, S. V, & Chinchmalatpure, U. R. (2007). Factors associated for declining chilli area and its diversification. *Indian Research Journal of Extension and Education*, *7*(2 & 3), 76–78.

Raut, N., Sitaula, B. K., Vatn, A., & Paudel, G. S. (2011). Determinants of adoption and extent of agricultural intensification in the central mid-hills of Nepal. *Journal of Sustainable Developmen*, *4*(4), 47–60.

Roberts, R. K., English, B. C., & Larson, J. A. (2002). Factors affecting the location of precision farming technology adoption in Tennessee. *Journal of Extension*, *40*(1). Retrieved from https://www.joe.org/joe/2002february/rb3.php

Rum, I. (2011). *The impact of trade costs in Indonesian agri-food cectors: An interregional CGE analysis* (All Theses Paper). Retrieved from http://tigerprints.clemson.edu/all_theses/1100/

Selvaraj, K. N. (2009). Impact of improved vegetable farming technology on farmers' livelihoods in India. *Acta Horticulturae*, *809*, 121–126. Retrieved from http://www.actahort.org/books/809/809_9.htm

Soviana, S., & Puspa, J. (2012). Multi-layer distribution system of Indonesian fruit-vegetable sector: Current challenges and future perspectives. In *International Research on Food Security, Natural Resource Management and Rural Development*. Göttingen, Germany.

Von Braun, J., Bouis, H., & Kennedy, E. (1994). Conceptual framework. In J. von Braun & E. Kennedy (Eds.), *Agricultural Commercialization, Economic Development and Nutrition.* (pp. 11–33). Washington DC: Johns Hopkins University Press.

Wang, L., Rozelle, S., Huang, J., Rearson, T., & Dong, X. (2006). *Marketing channel and technology adoption: Chinese villages in the local horticulture market. International Association of Agricultural Economists Conference*. Gold Coast, Australia.

Yang, P., Liu, W., Shan, X., Li, P., Zhou, J., Lu, J., & Li, Y. (2008). Effect of training on acquisition of pest management knowledge and skill by small vegetable farmers. *Crop Protection*, *27*(12), 1504–1510.

Yúnez-Naude, A., & Taylor, E. J. (2001). The determinants of nonfarm activities and incomes of rural households in Mexico, with emphasis on education. *World Development*, *29*(3), 561–572.

Zeller, M., Diagne, A., Mataya, C. (1997). *Market access by smallholder farmers in Malawi: Implications for technology adoption, agricultural productivity, and crop income* (Discussion Paper No. 35). Washing-ton, D.C.

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Examining the impact of bank's risks to Islamic banks' profitability

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Abstract

This paper analyzes the impact of banks' risk to the profitability of Islamic banks and to identify what risks play the non-trivial role. To this objective, 75 Islamic banks in 24 countries in 2015 have been studied. A series of bank risks, industry-specific and macroeconomic indicators are combined to explain the profitability of Islamic banking as measured by Return on Average Assets (ROAA), Return on Average Equity (ROAE), and Value Added (VA). The bank risks comprise credit risk, insolvency risk, liquidity risk, and operational risk. Having used robust linear regressions, the results indicate that all four types of risk influence bank's profitability. Operational risk is the risk that plays the most important role in influencing banks' profitability, whether measured by ROAA, ROAE or profit before taxes over the total asset (PBTTA). On the other hand, credit risk, liquidity, and insolvency do not conclusively increase or decrease Islamic bank profitability. Macroeconomic conditions, measured by inflation, actually has a positive impact on the profitability of Islamic banks. This indicates that operational risks and macroeconomic stability should be given primary attention in increasing bank's profitability.

Abstrak

Makalah ini mengidentifikasi dan menganalisis dampak risiko bank terhadap profitabilitas bank syariah. Untuk itu penelitian ini meneliti 75 bank syariah di 24 negara pada tahun 2015. Serangkaian risiko bank, indikator industri dan makroekonomi dianalisis untuk menjelaskan profitabilitas perbankan syariah yang diukur dengan *Return on Average Assets* (ROAA), *Return on Average Equity* (ROAE), dan *Value Added* (VA). Risiko bank terdiri dari risiko kredit, risiko insolvensi, risiko likuiditas, dan risiko operasional. Dengan menggunakan regresi linier, hasil penelitian menunjukkan bahwa keempat jenis risiko tersebut mempengaruhi profitabilitas bank. Risiko operasional adalah risiko yang berperan paling penting dalam mempengaruhi profitabilitas bank, baik yang diukur dengan ROAA, ROAE atau laba sebelum pajak atas total aset (PBTTA). Di sisi lain, risiko kredit, likuiditas dan insolvensi tidak secara meyakinkan meningkatkan atau menurunkan profitabilitas bank syariah. Kondisi makro ekonomi, yang diukur dengan inflasi, sebenarnya berdampak positif terhadap profitabilitas bank syariah. Hal ini mengindikasikan bahwa risiko operasional dan stabilitas makroekonomi harus mendapat perhatian utama dalam meningkatkan profitabilitas bank.

Introduction

Investigations into whether bank risks has a positive or negative effect on bank performance proliferated after the 2007/2008 subprime crisis. The existing empirical works mainly focus on the association between credit, insolvency and liquidity risk to banks' profitability. Fisseha (2015) in his meta-analysis on the determinants of profitability of commercial banks found most of the articles published after 2008 emphasized on the role of insolvency and credit risk but few portion of the focus on liquidity and operational risk.

In parallel to the increased interest in Islamic finance, the literature on Islamic banking profitability has been growing rapidly. The sizeable main body of research has explained the general feature of profitability of Islamic banks such as Samad & Hasan (2000). The second group of research evaluates whether it is possible to distinguish Islamic and conventional banks profitability such as Khediri, L., & Youssef (2016) and Zarrouk, H., Jedidia, K.B., and Moualhi (2016). However, the whole results are not conclusive whether Islamic banks are more profitable than conventional banks or not. The third category is more fo-

cused on looking at factors that affect profitability in Islamic banks, such as Bashir (2003), Ramlan & Adnan (2016), Aliyu & Yusof (2016), and Khediri et al. (2016). In general, those factors were divided into three categories, which are bank-specific financial factors, industry-specific factors, and macroeconomic factors. Some emphasized on capital market factors and country based factors (Bashir, 2003; Athanasogloua, Brissimis, & Delis, 2008).

However, there is limited research which specifies on linking profitability with bank risk-taking in Islamic banks. Most research on the profitability of Islamic banks is on the individual country and the sample is limited compared with that of conventional banks which have a huge panel data across country (Molyneux & Thornton, 1992; Petria, Capraru, & Ihnatov, 2015). This study plays a role in filling the gap of research on the role of banks risk taking on bank's profitability of Islamic banks cross country.

Following the previous study of Khediri et al. (2016), we focused on bank's risks as the main determinants of profitability instead of introduced some bank-specific factors, industry-specific factor, and macroeconomic factors. We perform a comparison between the different measures of profitability, namely Value Added (VA), Return on Average Assets (ROAA) and return on average equity (ROAE).

This study will investigate whether the profitability of Islamic banks is influenced by bank risk, which as it is believed that Islamic banks have different risk exposures compared with conventional banks (Greuning, Iqbal, Van Greuning, Iqbal, & Mondiale, 2008). In order to do so, we use recent data of 116 listed Islamic banks around the country available on the Fitch Connect database 2015. By applying robust OLS technique, it could be able to account for profit persistence and its determinants. Although most previous research use panel data with a common generalized method of moments (GMM) technique this study uses a simple robust OLS technique considering the limitations of cross-section data availability. Former papers also using a multi-country setup, including the study closest to ours from Demirguc-Kunt & Huizinga (1999), have used linear OLS methods, which however, lead to inconsistent results. Finally, we find new evidence that operational risks far play a more dominant role in influencing the profitability of Islamic banks compared to other risks such as liquidity, insolvency or credit risks. Macroeconomic factors also play more dominant role than the banking sector factors.

There is a wide literature dealing with determinant of the profitability of banks. There are some early investigations on bank profitability (Short, 1979; Smirlock, 1985; Bourke, 1989). Some empirical studies on the bank profitability are on individual country basis, while others have focused on a panel of countries or regions. Examples of single country studies are those for the US (Hoffmann, 2011), the U.K. (Saeed, 2014), Greece (Athanasogloua et al., 2008; Alexiou & Sofoklis, 2009), China (Sufian & Habibullah, 2009), Malaysia (Ramlan & Adnan, 2016), and Pakistan (Dawood, 2014). There are other important studies which assess bank profitability by groups of countries such as Europe (Molyneux & Thornton, 1992; Goddard, Molyneux, & Wilson, 2004), South Asia (Sufian, 2012), Sub Saharan Africa (Flamini, McDonald, & Schumacher, 2009), and Europe, North America and Australia (Bourke, 1989).

However, very limited research are available on bank profitability which focuses on specific groups or types of banks, such as investment banks, universal banks, conglomerate banks or Islamic banks. Some research emphasize on Islamic banking such as Bashir (2003), Ascarya & Yumanita (2010), Khediri et al. (2016), Zarrouk et al. (2016), Ramlan & Adnan (2016) and Aliyu & Yusof (2016).

Most of the research on the profitability of banks divides the important determinants into three factors, namely bank specific factors, industrial factors and macroeconomic factors. Bank specific factors could include bank size, capital adequacy or insolvency risk, credit risk, liquidity risk, operational efficiency or business model (Bashir, 2003; Athanasogloua et al., 2008; Curak, Poposki, & Pepur, 2012; Petria et al., 2015; Zarrouk et al., 2016). Industry factors could comprise market concentration, ownership structure or stock market capitalization (Bashir, 2003; Athanasogloua et al., 2008; Curak et al., 2012; Petria et al., 2015 Athanasoglou et al., 2008; Ćurak, et al., 2012; Petria et al., 2015). Macroeconomic factors that influence profitability include Gross Domestic Product (GDP) and its growth (GGDP) (Bashir, 2003; Curak et al., 2012; Aliyu & Yusof, 2016), inflation rate (Molyneux & Thornton, 1992; Bashir, 2003; Athanasogloua et al., 2008; Zarrouk et al., 2016; Aliyu & Yusof, 2016), or the exchange rate (Aliyu & Yusof, 2016) or money supply (Molyneux & Thornton, 1992).

To determine the role of risk factors, industry and country specific factors, most research use panel data between countries and some use time series data for a specific country. The most analytical method they use is the analysis of panel data, such as simple panel regression and the Generalized Methods of Moment (GMM) (Molyneux & Thornton, 1992; Bashir, 2003; Zarrouk et al., 2016). Some research use a simple OLS method (Ramlan & Adnan, 2016) and dynamic models such as Error Correction model (ECM) (Curak et al., 2012).

At first, the profitability measured by the ratio of return on average assets (ROAA) and or returns on average equity (ROAE) and examines the internal and external factors that affect the bank's profitability. Bourke (1989) adds a measure of profitability into three which are Return on Capital, return on Asset and value added return on total assets. Recently, those third indicators have been widely used and developed into a variety of indicators such as profit to capital and reserve ratio and total borrowing (Molynex and Thorthon, 1992), Profit Before taxes to Asset Ratio (Bashir, 2003), and net profit margin for Islamic banks (Zarrouk et al., 2016).

Research on the banks profitability generally does not provide the same conclusion. With regard to the risk models, most studies have found a positive relationship between capital ratio (equity to total assets) to profitability (Alexiou & Sofoklis, 2009; Ismail, Amin, Syaheri, & Hashim, 2014; Syafri, 2012; Dawood, 2014; Saeed, 2014). While others found a negative relationship between the ratio of capital to profitability (Hoffmann, 2011; Gul, Irshad, & Zaman, 2011).

Meanwhile, most of the research expect the negative relationship between credit risk to profitability as measured by the non-performing loan (NPL) or loan loss provision against total loans (LLPTL) (Molyneux & Thornton, 1992; Bashir, 2003; Zarrouk et al., 2016). But empirically, the results were not conclusive, whether its effect is positive (Sufian, 2012; Zarrouk et al., 2016), or negative (Ayanda, Christopher, & Mudashiru, 2013).

On the other hand, in general, liquidity risk is expected to play a positive significant effect on banks' profitability. This means that the higher the liquidity position of the bank will encourage banks to be more profitable (Sufian & Habibullah, 2010; Dawood, 2014; Saeed, 2014). However, some research found negative of liquidity risk to bank's profitability (Alexiou & Sofoklis, 2009; Nahang & Araghi, 2013).

The references above are not conclusive and this study will examine the determinants of profitability of Islamic banks as measured by three indicators as used by Bashir (2003) and Zarrouk et al. (2016). But we do not use NPM or NIM as a measure of profitability, but we use Value Added (VA) as used by Bourke (1989) and Molyneux & Thornton (1992). The independent variables were used overall risk relevant for Islamic banks, i.e. four types of risk. The credit risk is measured by financing loss provision to total financing (FLPTF) and financing to deposit ratio (FTA) as used by Zarrouk et al. (2016) and Khediri et al. (2016). We use liquidity risk measures following Khediri et al. (2016), as well as the risk of insolvency used. We add operational risk as used by Zarrouk et al. (2016).

Research Method

Following Bourke (1989) and other previous research, as dependent variables, this paper uses the return on capital, return on assets, and value added return on asset. Return on capital is measured by average return on equity (ROAE), while return on assets is measured by average return on assets (ROAA), and value added return on total asset is measured by the ratio of net profit before taxes plus staff expenses to total assets (PBTTA). The selection of explanatory variables and hypotheses used in this study are based on a sound theoretical framework and the results of previous research.

Credit risk

Credit risk refers to the risk that borrowers or debtors may not repay a loan or financing facilities and that the lender or the financier may lose the principal of the loan/financing or the interest/profit margin associated with it. Credit risk arises because debtors expect to use future cash flows to pay current debts. Mostly credit risk could be reflected from the loan loss provision to total loans (LLPTL), nonperforming loan (NPL), or total loan to total assets (Khediri et al., 2016; Bitar, Saad, & Benlemlih, 2016).. Those ratios measure loan quality with higher values indicating poorer loan quality or higher protection against credit default risk. For the robustness tests, we use nonperforming financing to total loans (FLPTF) and Financing to Total Asset ratio (FTA) as being used by Khediri et al. (2016).

We hypothesize that the higher the credit risk the lower profitability of the banks, as common opinion among scholars (Bourke, 1989; Molyneux & Thornton, 1992; Athanasogloua et al., 2008). All ratios expected decrease in asset quality and credit risk and in turn reduce bank's profitability.

Insolvency risk

Insolvency risk relates to the capital strength of the bank and it is considered to be an important factor in affecting and explaining bank profitability. Sufficient amount of equity, measured by ratio of equity to total asset (ETA) or Debt to Total Asset (DTA), allows bank to absorb any shocks that it may experience.

Higher capitalization, which serves as a safety cushion, implies lower insolvency risk (bank is safer) and according to the risk-return hypothesis, a lower profitability is expected (negative relationship) (Curak et al., 2012). However, creditworthiness of better capitalized and safer banks encourage the confidence of depositors which lowers interests as funding costs and the need for external financing, thereby lowering interest expenses. Therefore, higher equity to asset ratio (lower risk) would imply higher profitability (positive relationship). (Bitar et al., 2016; Athanasogloua et al., 2008).

We hypothesize that the risk of insolvency affecting important for Islamic banks, but could be positive or negative, given that some Islamic banks are quite new entries, but most of them are part of a development of conventional banks, such as opening Islamic windows or dual bank system whose have been good credit worthiness. This hypothesis was also made by previous researchers (Dietrich & Wanzenried, 2014; Petria et al., 2015; Khediri et al., 2016).

Liquidity risk

Liquidity risk refers to the risk stemming from the lack of marketability of an investment or asset that cannot be bought or sold quickly enough to prevent or minimize loss. The common rule of thumb is that the smaller the size of the marketable security or its issuer, the larger the liquidity risk. Some research used Loan to customer deposit (LTD) to show the liquidity risk considering that if this ratio increase, e.g., banks use less deposits to grant loans or grant more loans without increasing the deposits, then bank performance deteriorates (Petria et al., 2015). However the bank loan could be financed from other source of funding, not only deposit. Therefore this study consider the cash and due from bank to total asset (CTA) and the cash and due from bank to total deposit (CTD) as proxies for the liquidity risk. Both ratios reflect the short term funds available for liquidity purposes (Bashir, 2003). Lower CTA or CTD ratios reflect the higher liquidity risk which in turn lower the ability of bank to generate profit, and then we have a negative relationship hypothesis between the liquidity ratio and profitability.

Operational risk

Operational risk can commonly be defined as the risk of monetary losses resulting from inadequate or failed internal processes, people, and systems or from external events. Because the risks from internal problems will be closely tied to a bank's specific products and business lines, banks should be more firm-specific than the risks due to external events. There is no clearly established, single way to measure operational risk on a firm-wide basis. Instead, several approaches have been developed the operational risk could be identified form the operational cost efficiency. It is because operational cost comprises staff salaries, property costs, administrative costs, excluding losses due to bad and non-performing loans. Accordingly, we expect higher cost-income ratios to have a negative relationship with bank profitability.

In order to generate a robust estimator, we include some control regression variables, i.e. bank's size, industry specific factors and country specific factors. Size is introduced to account for existing economies or diseconomies of scale in the market. Smirlock (1985) finds a positive and significant relationship between size and bank profitability. But some argued that the effect of size depend on the bank capital adequacy (Short, 1979; Goddard et al., 2004). Therefore this study does not have expectation of positive relationship between size and profitability of Islamic banks, considering that the observed banks in this research is scattered in various countries with various capital adequacy.

External control variables comprise those that represent banking industry (market) and macroeconomic characteristics. Aiming to control for external industry features, previous studies (e.g. Bashir, 2003; Athanasogloua et al., 2008; Curak et al., 2012; Petria et al., 2015) include variables such as bank market concentration, bank ownership, and banking sector development, whereas variables such as GDP level or growth, inflation, interest rates, or financial system features are used to describe macroeconomic conditions. Two opposite hypothesis are prevalence. The positive relationship between market concentration and bank's profitability is supported the classical SPC (Structure-Performance-Conduct) hypothesis, while negative relationship is accepted considering that efficient firms increase in size and market share because of their ability to generate higher profits, which usually leads to higher market concentration. Thus, the positive relationship between profits and concentration is explained by lower costs achieved through either superior management or production processes (Goldberg & Rai, 1996).

Because data market concentration is limited, this study uses the ratio of bank credit to GDP to measure the Banking Sector Development (BSD) and the spread to measure the efficiency of the banking

sector. The high BSD reflects the growing banking sector and expected to boost the profitability of banks. The high spread reflects the inefficiency of the banking sector or the market concentration in the banking sector. The effect of spread to banks' profitability could be positive or negative.

Table 1. Definition, notation and the expected effect of the explanatory variables of the model

Variable	Measure	Notation	Expected effect	Source
Dependent variable:				
Profitability	Net profit before taxes/average assets	ROAA		Fitch Connect
	Net profit before taxes/average equity	ROAE		Fitch Connect
Value Added	(Profit before taxes + staff expenses)/	PBTTA		Fitch Connect
Independent variables:	total assets)			
Bank' Risk:				
Credit risk	Financing loss provision/total financing	FLPTF	Negative	Fitch Connect
	Financing/total assets	FTA	Negative	Fitch Connect
Insolvency risk	Equity/total assets	ETA	+/-	Fitch Connect
	Debt /total assets	DTA	+/-	Fitch Connect
Liquidity risk	Cash and cash-equivalent/total assets	CTA	Positive	Fitch Connect
	Cash and cash-equivalent/total deposits	CTD	+/-	Fitch Connect
Operational risk	Operational costs/comprehensive income	OCI	+/-	Fitch Connect
	Operational costs/total assets	OCTA	Negative	Fitch Connect
Size	Log (Total assets)	LgTA	+/-	Fitch Connect
Industry Specific:				
Banking Sector Development	Domestic Credit provided to private sector/GDP	BSD	Positive	Worldbank.org
Spread	Financing interest minus deposit interest	Spread	Positive	Worldbank.org
Macroeconomic Specific:				
Inflation	Inflation, average consumer prices per cent change	INF	+/-	Worldbank.org
Dummy variable:		Malaysia	Positive	
Country		Pakistan	+/-	
	Malaysia as a dummy variable	MosPop	Positive	Islamicweb.com
	Pakistan as a dummy variable			
	Moslem population proportion/total population (%)			

The focus independent variables are bank risks which include credit risk, insolvency risk, liquidity risk and operational risk, while controlling variables comprises of bank specific variable (bank's size), industry specific variables (banking sector development and deposit interest rate) and macroeconomic variables (inflation and economic activities). We also introduce Muslim population as a country specific variable, considering that most Islamic banks operate in Moslem majority countries. We include two dummy variables, which are the country aspect. Economic structure, historical background, social norms and cultural and religious values among countries are diverse in many ways. We use Malaysia and Pakistan as dummy variable considering 28 percent and 11 percent of sampling banks are head quarter in Malaysian and Pakistan.

We collect the data of Islamic bank in 2015 from the Fitch Connect database and we edit the data in order to use it for out statistical analysis. Given than our focus in on Islamic commercial banks, we exclude central bank, securities companies and non-bank credit or saving institutions. We limit only banks that provide complete data such as required variables.

Table 2. Islamic banks in sample by region category

Region	Total Islamic bank (Fitch Connect)	Investment & Securities companies	Islamic banks	complete data
MENA	58	10	48	30
Asia	48	2	45	41
Western Africa	4	1	3	2
Europe	6	1	4	2
Total	116	14	100	75

Bank-risks, industry specific factors and macroeconomics variables are used into an estimable model to capture their effect on Islamic bank profitability. The general model is specified as follow:

$$\Pi_i = c + \sum_{j=1}^{9} \beta_j BR_i + \sum_{j=1}^{2} \beta_j S_i + \sum_{j=1}^{3} \beta_j C_i + \varepsilon_i$$

Π_i is the profitability of bank i, with i = 1, . . ., N, c is a constant term, BR_i's are the bank-specific risks and S_j's are banking sector specific factors, C_i are country specific factors and ε_i is the disturbance. Bank risks (BR_i) comprises of four types of risk with 8 (eight) proxies variable as presented in table 1. We also include bank's size as measured by the logarithm of the total assets (LgTA). Industry specific factors (S_i) refers to the development of financial sector in a country and it is measured by two main proxies, i.e. Banking Sector Development (BSD) which is the contribution of banking credit to private sector in proportion to the Gross Domestic Product and Spread which is the difference between average lending interest and deposit interest. Country specific factor could be many but we choose inflation (INF) and moslem population (MosPop) as proxies variables.

Regarding estimation we use a robust linear regression panel estimator. It is a simple linear regression model which consider heteroscedasticy and normality issues. We choose this method because of the available data on cross-sectional basis, but we ascertain that this model could perform with BLUE estimators as suggested by Demirguc-Kunt & Huizinga (1999).

Results and Discussion

In the first step we carry out descriptive statistic and ANOVA univariate tests to identify some basic relationships between variables. In our second stage, analysis on ROAA, ROAE and VA will be discussed.

Univariate results

Table 3 provides descriptive statistics of each variable for 75 Islamic banks in 24 countries. Statistically, the profitability of Islamic banks on average is quite low, 0.64% and 8.15% measured by ROAA and ROAE respectively. The variation in profitability between banks is very high, because some, 11 sample banks, suffered losses during the observation period. On the other hand, Value Added (VA) of sample banks averaged 17.9% with a fairly high variant as well. VA shows the ability of banks to contribute to shareholders, investors and banks' staff. From Table 3 it can also be seen that some banks are experiencing negative capital or in high insolvency risk which is seen from negative values in Equity/total Asset ratio. Then it can be justified that the profitability conditions of sample banks are quite varied so it is reliable to be the object of profitability analysis of Islamic banks, although only limited to one year period.

Table 3. Descriptive statistics

Variable	Notation	Obs	Mean	Std. Dev.	Min	Max
Net profit before taxes/average assets (%)	ROAA	75	0.64	1.96	(8.29)	5.25
Net profit before taxes/average equity (%)	ROAE	74	8.15	11.40	(49.28)	48.10
(Profit before taxes + staff expenses)/total assets (%)	PBTTA	75	17.09	128.37	(5.23)	1,113.81
Financing loss provision/total financing (%)	FLPTF	75	6.20	9.37	0.02	46.98
Financing/total assets (%)	FTA	75	58.41	22.39	0.34	112.34
Equity/total assets (%)	ETA	75	15.88	25.57	(120.66)	97.80
Debt /total assets (%)	DTA	75	76.59	25.96	0	189.66
Cash and cash-equivalent/total assets (%)	CTA	75	12.30	11.35	0	66.79
Cash and cash-equivalent/total deposits (%)	CTD	72	34.22	97.04	0	820.00
Operational costs/comprehensive income (%)	OCI	75	8.49	22.78	(8.43)	184.82
Operational costs/total assets (%)	OCTA	75	5.74	4.58	1.09	35.43
Log (Total assets)	LgTA	75	7.19	1.77	2.08	10.79
Domestic Credit to private sector/GDP (%)	BSD	74	84.26	51.86	0	162.51
Lending interest minus deposit interest (%)	Spread	74	1.81	2.06	(2.09)	7.70
Inflation, average consumer prices % change	INF	74	3.53	4.74	(0.87)	16.91
Moslem population/ total population (%)	MosPop	74	77.22	25.66	2.70	100

Furthermore, Table 4 illustrates that the profitability of Islamic banks between regions is not different, but rather the differences occur between countries. Due to the differences between these countries, then in the regression analysis we include elements of the country, namely Malaysia and Pakistan, as explanatory variables. Malaysia contributes 21 Islamic banks while Pakistan 8 Islamic banks in this analysis. From the risk perspective, statistically the risk of Islamic banks in each country is different but few is not. Credit risk (FLPTF, FTA), liquidity risk (CTA, CTD) and operational risk (OCI) of each country tend to be different, but the risk of insolvency (ETA, DTA) tends to be the same. This is very relevant to the fact that every country has similar banking capital requirement as emphasized by Basel Accords. The average asset (TA) of observed Islamic banks also is not significantly differing among regions or countries.

Table 4. Analysis of variance (ANOVA) between regions and countries

Variable	ANOVA F-stat		Variable	ANOVA F-stat	
	Region	Country		Region	Country
ROAA	1.83	4.39***	CTD	0.68	69.89***
ROAE	0.75	1.91**	OCI	0.2	1.85**
PBTTA	0.52	21812.41***	OCTA	0.56	1.19
FLPTF	0.4	1.89**	TA	0.26	0.74
FTA	3.64**	3.26***	BSD	9.1***	~***
ETA	0.61	1.31	Spread	1.76	7.3E+32***
DTA	1.11	1.23	INF	1.66	~***
CTA	2.24*	4.6***	MosPop	23.74	~***

Regression results

Given the heterogeneity of our sample and normality issue, we carry out the following robustness tests to make sure that our results are not driven by extreme values in our data or specific data specification. First, our results might be affected by extreme values of certain explanatory variables, such as bank size, development of banking industry or other country specific explanatory variable, e.g., countries with very high inflation rates might drive the corresponding results. Therefore we include control variables gradually, starting from the bank size (LgTA in model A2 and RA2 in Table 5), industry specific factor (Banking Sector Development and interest spread) and country specific variables (inflation and number of Muslim population). Second, because we run a multiple linear regression model, we carry out a Ramsey-reset test to provide information about the linearity in explanatory variables. Low F-stat (without asterisks) shows that the linear model is appropriate. Based on the available data we do not find any issue of linearity on our estimation. Third, we also provide heteroskedasticity test using Breusch Pagan Chi-2 test. The low value of the Chi-2 stat (without asterisks) indicates the absence of the issue of heteroskedasticity in the model. We did not find any heteroskedasticity problems of our data, probably because our data are 75 Islamic banks in 24 countries, so there is no close correlation among the individual banks' performance. Fourth, we carry out the VIF tests for multicollinearity issue. Multicolinearity problem could be identified from the high value of VIF, which is commonly more than ten. We found that the maximum values of VIF are lower than 10.000 and it shows that there is no issues on multicollinearity. Fifth, we also present a normality test for the error term based on statistical skewness and kurtosis test. Unfortunately, we found normality issue. The models entirely (A1, A2, A3, A4 and A5) indicate the problem of normality, as shown in the figure 1a and 1b on the leverage point which indicate few banks that become outliers, such as Housing Development Finance and Syria International Islamic Bank. Considering normality issue, we do robust regression for each step, as indicated by the model RA1, RA2 to RA5. Therefore Table 5 shows the stable regression coefficients and these models could be the subject of analysis.

Empirical results for ROAA

Table 5 shows the results of the regression for the main variables, namely ROAA. The differences in each model column shows the difference in the independent variables used. The analysis of ROAE and PBTTA we present separately.

Of the four types of risks, three variables have stable or robust coefficients, namely credit risk (FLPTF), insolvency (DTA) and operational risk (OCTA). It is shown that stability of the magnitude and sign of the coefficients after the control variables included, either for the model of RA1 to RA5. FLPTF

have a negative association with banks' profitability. This is in accordance with the common hypothesis, such as Athanasogloua et al. (2008) and Bitar et al. (2016), whereas the higher non performing financing will erode banks' profitability.

The financing loss provisions relative to total financing (FLPTF) is a measure for credit quality and credit allocation. The results show that this variable has a statistically small but significant negative effect on the Islamic bank profitability in all models. Control of the impact of credit risk is quite big issue. Controlled by industry specific variables (e.g. BSD and spreads), the effect of the credit risk on ROAA decrease significantly from -0,074 to -0,065 (see Model RA1 and RA4). Much more interesting when the control variables on country specifics (e.g. inflation and Moslem population) are included, then the role of credit risk fell to -0.024. This shows the importance of the role of the banking sector and macro-economic stability on Islamic banks profitability. In line with the research Bitar et al. (2016), it is still relevant because until today the share of Islamic banks in the country is still very small compared to the conventional banks. While variable FTA, total financing to total assets ratio, does not have a significant role to the ROAA. This result is in line with the finding which was not conclusive. Some research find the FTA play a negative role on profitability (Curak et al., 2012) and others found a positive effect (Syafri, 2012). This means that the ratio of total financing may not be accurately reflect of credit risk on Islamic banks.

Table 5. Regression results ROAA on bank's risk, sector and country specifics

Dependent Variable: ROAA

Variables/Model		A1	RA1	A2	RA2	A3	RA3	A4	RA4	A5	RA5
Credit risk	FLPTF	-0.027	**-0.074*** **	-0.032	**-0.071*** **	-0.031	**-0.065*** **	-0.010	**-0.026*** **	-0.024*	**-0.021*** **
	FTA	-0.017	**-0.017** **	-0.018	**-0.017** **	-0.011	-0.008	-0.006	-0.004	-0.009**	-0.0004
Insolvency	ETA	**0.029***	-0.004	**0.029***	-0.004	**0.035** **	0.001	**0.038** **	**0.014*** **	**0.037*** **	**0.030*** **
risk	DTA	**0.031***	-0.005	**0.032***	-0.006	**0.035***	-0.009	**0.031***	-0.001	**0.033*** **	0.013**
Liquidity	CTA	-0.019	0.003	-0.023	0.005	-0.027	0.030	-0.019	**0.046*** **	0.0004***	**0.032*** **
risk	CTD	0.002	0.001	0.002	0.001	0.002	**-0.016** **	0.000	**-0.027*** **	-0.019*	**-0.054*** **
Opera-	OCI	-0.001	-0.004	-0.002	-0.004	-0.004	-0.007	-0.003	**-0.005*** **	-0.005**	**-0.006*** **
tional risk	OCTA	**-0.139*** **	**-0.058** **	**-0.143*** **	**-0.054***	**-0.153*** **	**-0.080*** **	**-0.178*** **	**-0.175*** **	**-0.145**	**-0.168*** **
Size	LgTA			-0.051	0.034	0.081	0.039	0.088	-0.054	0.026	-0.043
Sector	BSD					**-0.011*** **	**-0.007*** **	**-0.007***	**-0.002** **	-0.008**	**-0.008*** **
specific	Spread					0.054	-0.045	0.076	-0.025	0.026	-0.017
Country specific	INF							**0.116*** **	**0.127*** **	**0.094*** **	**0.126*** **
	Malaysia									0.679	**0.689*** **
	Pakistan									-1.127	**-0.517*** **
	MosPop									0.0132***	**0.009*** **
	Constant	-0.011	3.007***	0.400	2.714**	-0.215	3.287***	-1.205	2.266***	-1.621	0.110
Number of Observation		72	72	72	72	71	70	71	70	71	70
F-stat		3.270	8.460	2.880	7.260	3.200	8.130	4.000	60.670	3.610	53.990
adjusted R-squared		0.204		0.193		0.257		0.340		0.359	
Ramsey reset F-stat		0.744		0.749		0.883		0.955		0.860	
Maximum VIF		5.030		5.590		5.760		5.800		5.820	
Breusch-Pagan Chi-2		1.550		1.160		0.400		1.500		0.180	
Normality chi-2		7.78***		7.09***		7.01***		11.93***		12.03***	

Note:
different observation on common model and robust model reflect the outlier exclusion on the robust model. Model with prefix R refers to a robust model, which already consider heteroscedasticity and normality problem. Before running robust regression, we evaluate the leverage of the model to find outliers.
* Coefficient that is significantly different from zero at the 10% level
** Coefficient that is significantly different from zero at the 5% level
*** Coefficient that is significantly different from zero at the 1% level

The capital risk, measured by the equity to total asset ratio ETA, has significant positive effects on the ROAA. This implies that the higher capital adequacy banks have in a country, the safer banks from bankruptcy and then the higher banks' profitability. This result is also in line with many previous research (Athanasogloua et al., 2008; Bitar et al., 2016; Molyneux & Thornton, 1992) On the other hand, the capital risk, measured by the ratio of debt to total assets DTA, also has a positive effect on the ROAA, especially when controlled by an industry and country specific factors (Model RA5). In contrast with Bashir (2003) who found a negative effect on the DTA to ROAA, the positive effect indicates that the higher the debt portion of Islamic banks actually lead higher profitability. This is because most of the debt is in the form of customer deposits and a small portion in the form of securities or other borrowing.

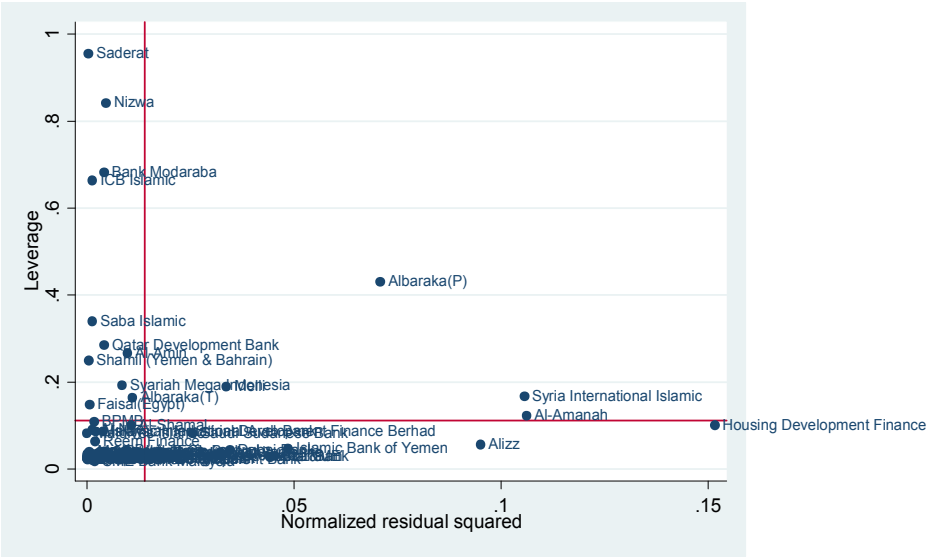

Figure 1a. Leverage points in regression model A1

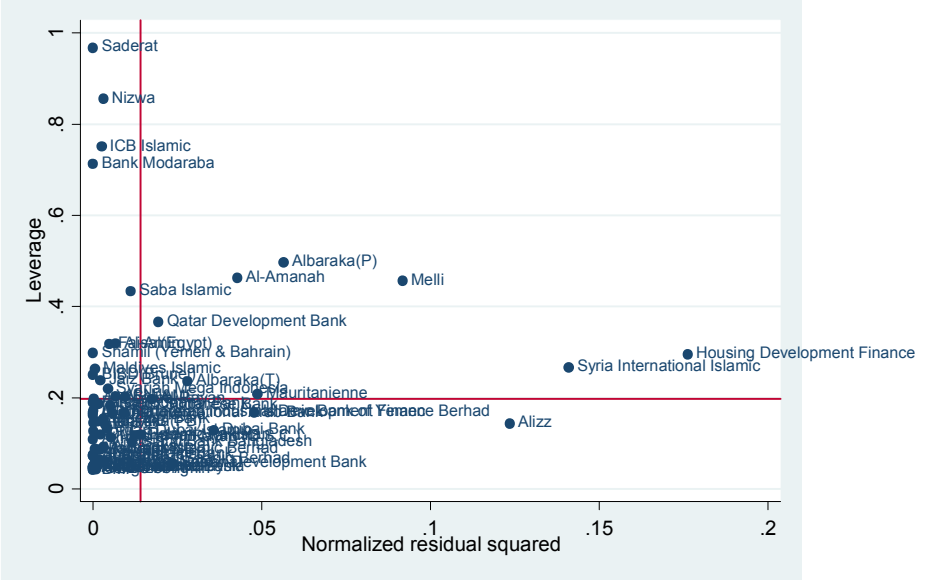

Figure 1.b. Leverage points in regression model A5

Liquidity risk, measured by the ratio of cash and due from banks on assets CTA, has a positive effect on ROAA after the control industry and country specific variables included. High CTA reflects the low liquidity risk and it contributes to the high profitability or ROAA. It is appropriate findings in line with Bashir (2003) , although contrary to the Molyneux & Thornton (1992), which found a negative effect. we find that high liquidity risk (or low liquidity ratio) in Islamic banks actually associated with a lower ROAA. This can be explained that in general Islamic banks have limited liquidity instruments and liquidity market, so there is a tendency to hold higher liquidity ratio in order to maintain the banks' business cycle. The ability to hold a high CTA can only be done by a bank with high profit. However, further research on the causality between profitability and liquidity risk is needed. We also found a negative relationship between the cash to deposit ratio (CTD) on the ROAA. This indicates that the higher deposit (relative to cash) push ROAA to rise. The more bank hold the deposit in cash (higher CTD) then the higher the potential for ROAA to fell, even though in small rate, i.e. 5.4 percent (look at model RA5).

The operational risk has significant negative effect on ROAA, either it is measured by cost-to-income ratio (OCI) or cost-to-total-asset ratio (OCTA), which confirm to our expectation. This result,

consistent with the results of Athanasogloua et al. (2008) clearly shows that an efficient cost management is a prerequisite to improve the profitability of banks around the world. Interestingly, we observe that operational risk has the greatest impact compared to other risks on the ROAA. Operational risk coefficient is -0,168, five to eight times greater than the effect of liquidity risk, capital risk and capital risk to the ROAA. It clarifies the importance of operational efficiency in Islamic banks.

As to size of the bank, we used a logarithmic of bank assets (LgTA), and found empirical evidence that there is no significant role of size to banks' profitability, either before or after controlled by industry or country specific factors. It asserted some previous research (Dawood, 2014) that Islamic banks do not enjoy the profit due to high product or financing diversification and/or economies of scale.

The industry specific factors, banking sector development (BSD) has a negative role and significance on the ROAA. BSD, we measure with the ratio of banking credit sector to the private sector to GDP, could indicate the level of financial literation of the country. This implies that the higher the financial literation precisely related to the lower ROAA of Islamic banks. It means that the high penetration of credit nationwide does not contribute positively to the ROAA of Islamic banks, although some found a positive relationship between financing growth in Islamic banks to their ROAA (Saeed, 2014; Syafri, 2012). Besides, the spreads, the difference between the loan interest to deposit interest in a country, we use it to describe the efficiency and competition level of the banking sector, due to limited data on market concentration. Low spreads could indicate the high level of competition in banking, and it has a positive effect on the ROAA. Both of these finding indicate that financial literacy is not a significant impact on ROAA while sector banking efficiency has the potential to increase the ROAA of Islamic banks.

Finally, we find that the country specific factor has a positive role to the ROAA, such as Inflation rate, as being found by Bashir (2003). The interesting thing is the positive role of the number of Muslim population of a country to the ROAA. Countries with higher Muslim population are higher in relation to the ROAA. Whether it is relates to the role of the Muslim as the main customers of Islamic banks need to be further investigated. On the other hand, as mentioned previously of the variation of ROAA among countries, we found that the ROAA Islamic bank in Malaysia on average was higher than other countries, and it can be seen from a positive and significant coefficient of Malaysia (Model RA5). Conversely, Pakistan experienced the lower average ROAA than that of the Islamic banking globally.

Empirical results for ROAE and VA

This section presents the results of regression with the dependent variable ROAA, ROAE and VA after passing the robustness test. The last column in table 6 shows stability of regression coefficients using three different variable of profitability.

In general, the variable ROAE confirms some similarities to the role of risks on the ROAA, where operational risk (OCTA) has the most dominant role also. Similarly, credit risk (FLPTF) also has a negative effect on profitability-ROAE.

The interesting thing is the difference in the role of liquidity risk and insolvency risk. While the insolvency risk has a negative impact on the ROAA, but this risk does not have significant effect on ROAE. Meanwhile, liquidity risk has the opposite effect on ROAA compared with ROAE. Model RA-5 found that the decrease in liquidity (CTA) tends to reduce profitability-ROAA, while the model R-ROAE found the opposite result, i.e. to increase the profitability-ROAE. This indicates that banks with low capital ratio (CTA) tend to enjoy the low liquidity rather than banks with high capital ratio. It can be shown from the two-sample t-test which indicates that bank with lower CTA has significantly higher ROAE than banks with higher CTA.[1]

On the other hand, the results of regression with VA as dependent variable confirm the identical results with ROAA model. The difference is in the role of the control variables, either in term of bank's size, industry or country specific factors. Size, BSD and Spreads have a significant role to the VA. In term of Size there is a diseconomy of scale, whereas small banks tend to get higher VA than large banks. This is reasonable, because VA is measured by the profit before taxes plus employee expenses. Other interesting thing is that the ROAA each country tend to different but not for ROAE and VA.

[1]Two-sample t-test splits the observations into two according to the level of CTA. The test shows that the average of ROAE between two sample is significantly different, whereas ROAE for banks with low CTA below the average) is 9.97% on average, while that for banks with high CTA (above the average) is 2.90% on average. The t-stat is 3.015 and significant at the 1% level.

Table 6. Regression results ROAA, ROAE and VA on bank's risk, sector and country specifics

Variables /Model		R-ROAA RA5	R-ROAE	R-VA	Stability of coefficient
	FLPTF	-0.021***	-0.460***	-0.046***	**-/-/-(s)**
Credit risk	FTA	-0.0004	-0.114**	-0.008	0/-/0(ns)
	ETA	0.030***	*0.063*	0.058***	+/0/+(ns)
Solvency risk	DTA	0.013**	*0.052*	0.062***	**+/+/+(s)**
	CTA	0.032***	-0.178***	0.027***	+/-/+(ns)
Liquidity risk	CTD	-0.054***	0.428***	-0.069***	-/+/+(ns)
	OCI	-0.006***	*-0.011*	-0.007*	-/0/-(ns)
Operational risk	OCTA	-0.168***	-0.568***	-0.252***	-/-/-(s)
Size	LgTA	-0.043	3.188***	-0.331***	-/+/-(ns)
	BSD	-0.008***	*-0.020*	-0.022***	-/0/-(ns)
Sector specific	Spread	-0.017	*-0.738**	*0.128***	0/-/+(ns)
	INF	0.126***	0.782***	0.146***	+/+/+(s)
Country specific	Malaysia	0.689***	*1.050*	*0.513*	+/0/0(ns)
	Pakistan	-0.517***	*-1.099*	*-0.492*	-/0/0(ns)
	MosPop	0.009***	*0.0444*	*0.005*	+/0/0(ns)
Constant		0.110	-13.280	1.860	0/0/0(s)
Number of Observation		70	70	69	
F-stat		77.810	18.33	43.23	
adjusted R-squared			0.4934	0.0541	
Ramsey reset F-stat			2.07	417.09***	
Maximum VIF			4.88	5.82	
Breusch-Pagan Chi-2			0	412.31	
Normality chi-2			21.28***	~***	

Note: all model in the above table already being estimated using robust method, due to heteroscedasticity and normality problem. As we can see the number of observation of model VA has been reduced due to outlier problem. Those models are estimated using Stata-13 software. The last column indicates the stability of the regression coefficient among three models. Zero (0) sign refers to insignificant coefficient or at the level of more than 10%.
* Coefficient that is significantly different from zero at the 10% level
** Coefficient that is significantly different from zero at the 5% level
*** Coefficient that is significantly different from zero at the 1% level

Conclusion

This study found that the effect of the risk on the profitability of Islamic banks tend to follow a common pattern. Islamic banks globally are a small part of the banking industry of each country. This study shows the importance of banks' risk to banks' profitability. While conventional banks have been to notice the importance of capital and liquidity risks, as highlighted in the Basel-3, Islamic banks are more influenced by the operational risk other than capital or liquidity risks.

Of the four hypotheses about the risk, this study confirmed the truth of all hypotheses, either relates to credit risk, operational risk and insolvency and liquidity risks which all have a negative impact on profitability. On the other hand, bank's size has no significant impact on profitability, while the macroeconomic environment contributes to encourage profitability as expected. The industry specific factors show that the role is less significant to profitability of Islamic banks.

Limitations of the data in this study also limit the estimation tools to choose from. The inability to explain causality requires time series data or panel for further study. However, the results of this study contribute to the findings of the role of risk in Islamic banks globally.

Further research is needed to identify in depth, the precise impact of each risk on banks' profitability. Similarly, some of our findings on the uniqueness of Islamic banks should be further studied whether this is merely an even case or long-term pattern. For example is about the ambiguous role of liquidity risk to banks profitability and high impact of operational risk or efficiency to Islamic banking profitability.

References

Alexiou, C., & Sofoklis, V. (2009). Determinants of bank profitability: Evidence from the greek banking sector. *Economic Annals*, *54*(182), 93–118. https://doi.org/10.2298/EKA0982093A

Aliyu, S., & Yusof, R. M. (2016). Profitability and cost efficiency of Islamic banks: A panel analysis of some selected countries. *International Journal of Economics and Financial Issues*, *6*(4), 1736–1743.

Ascarya, A., & Yumanita, D. (2010). *Determinants of bank's net interest margin in Indonesia*. *International Conference On Eurasian Economies 2010*. Retrieved from https://www.avekon.org/papers/171.pdf

Athanasogloua, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, *18*(2), 121–136. https://doi.org/10.1016/J.INTFIN.2006.07.001

Ayanda, A. M., Christopher, I., & Mudashiru, M. A. (2013). Determinants of banks' profitability in developing economy: Evidence from Nigerian banking industry. *Interdisciplinary Journal of Contemporary Research in Business*, *4*(9), 155–181. Retrieved from http://search.proquest.com/openview/6c437f80d7c5dc070df69ccc7ace926a/1?pq-origsite=gscholar%5Cnhttp://journal-archieves27.webs.com/155-181.pdf

Bashir, A. H. (2003). Determinants of profitability in Islamic banks: Some evidence from the Middle East. *Islamic Economic Studies*, *11*(1), 32–57. https://doi.org/10.1017/CBO9781107415324.004

Bitar, M., Saad, W., & Benlemlih, M. (2016). Bank risk and performance in the MENA region: The importance of capital requirements. *Economic Systems*, *40*, 398–42. https://doi.org/10.1016/j.ecosys.2015.12.001

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance*, *13*(1), 65–79. https://doi.org/10.1016/0378-4266(89)90020-4

Curak, M., Poposki, K., & Pepur, S. (2012). Profitability determinants of the macedonian banking sector in changing environment. *Procedia - Social and Behavioral Sciences*, *44*, 406–416.

Dawood, U. (2014). Factors impacting profitability of commercial banks in Pakistan for the period of (2009-2012). *Ijsrp.Org*, *4*(3), 1–7.

Demirguc-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. *World Bank Economic Review*, *13*(2), 379–408.

Dietrich, A., & Wanzenried, G. (2014). The determinants of commercial banking profitability in low-, middle-, and high-income countries. *Quarterly Review of Economics and Finance*, *54*(3), 337–354. https://doi.org/10.1016/j.qref.2014.03.001

Fisseha, F. L. (2015). Meta analysis on the determinants of commercial bank's profitability: (A conceptual frame work and modelling). *European Scientific Journal*, *1111*(1919), 1857–7881. Retrieved from http://eujournal.org/index.php/esj/article/viewFile/5947/5732

Flamini, V., McDonald, C. A., & Schumacher, L. (2009). *The determinants of commercial bank profitability in Sub-Saharan Africa* (IMF Working Paper No. WP09/15). Retrieved from https://www.imf.org/external/pubs/ft/wp/2009/wp0915.pdf

Goddard, J., Molyneux, P., & Wilson, J. (2004). The profitability of European Banks: A cross-sectional and dynamic panel analysis. *The Manchester School*, *72*(3), 363–381. https://doi.org/10.1111/j.1467-9957.2004.00397.x

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

Greuning, H. Van, Iqbal, Z., Van Greuning, H., Iqbal, Z., & Mondiale, B. (2008). *Risk analysis for Islamic banks*. *The World Bank*. https://doi.org/10.1596/978-0-8213-7141-1

Gul, S., Irshad, F., & Zaman, K. (2011). Factors affecting bank profitability in Pakistan. *The Romanian Economic Journal*, *14*(39), 61–87. Retrieved from http://www.rejournal.eu/sites/rejournal.versatech.ro/files/issues/2011-03-01/561/gul20et20al20-20je2039.pdf

Hoffmann, P. S. (2011). Determinants of the profitability of the US banking industry. *International Journal of Business and Social Science*, *2*(22), 255–269.

Ismail, S., Amin, H., Syaheri, S. F., & Hashim, N. (2014). Determinants of attitude towards credit card

usage. *Jurnal Pengurusan*, *41*(2014), 145–154.

Khediri, K. B., L., C., & Youssef, S. B. (2016). Islamic versus conventional banks in the GCC countries: A comparative study using classification techniques. *Research in International Business and Finance*, *33*, 75–98. https://doi.org/10.1016/j.ribaf.2014.07.002

Molyneux, P., & Thornton, J. (1992). The determinants of European bank profitability. *Journal of Banking and Finance*, *16*(6), 1173–1178. https://doi.org/10.1016/0378-4266(92)90065-8

Nahang, F., & Araghi, M. A. (2013). Internal factors affecting the profitability of city banks. *International Research Journal of Applied and Basic Sciences*, *5*(12), 1491–1500.

Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of banks' profitability: Evidence from EU 27 banking systems. *Procedia Economics and Finance*, *20*(15), 518–524. https://doi.org/10.1016/S2212-5671(15)00104-5

Ramlan, H., & Adnan, M. S. (2016). The profitability of Islamic and conventional bank: Case study in Malaysia. *Procedia Economics and Finance*, *35*(October 2015), 359–367. https://doi.org/10.1016/S2212-5671(16)00044-7

Saeed, M. S. (2014). Bank-related, Industry-related and macroeconomic factors affecting bank profitability: A case of the United Kingdom. *Research Journal of Finance and Accounting*, *5*(2), 2222–2847.

Samad, A., & Hasan. (2000). Islamic banking and finance in theory and practice: The experience of Malaysia and Bahrain. *American Journal of Islamic Social Sciences*, *22*(2), 69–86.

Short, B. K. (1979). The relation between commercial bank profit rates and banking concentration in Canada, Western Europe and Japan. *Journal of Banking and Finance*, *3*(3), 209–219. https://doi.org/10.1016/0378-4266(79)90016-5

Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. *Journal of Money , Credit and Banking*, *17*(1), 69–83.

Sufian, F. (2012). Determinants of bank profitability in developing economies: Empirical evidence from the South Asian banking sectors. *Contemporary South Asia*, *20*(3). https://doi.org/10.1080/09584935.2012.696089

Sufian, F., & Habibullah, M.S. (2009). Bank specific and macroeconomic determinants of bank profitability: Empirical evidence from the China banking sector. *Frontiers of Economics in China*, *4*(2), 274–291. https://doi.org/10.1007/s11459-009-0016-1

Sufian, F., & Habibullah, M.S. (2010). Assessing the impact of financial crisis on bank performance: Empirical evidence. *Indonesia AseanEconomic Bulletin*, *27*(3), 245–262.

Syafri. (2012). Factors affecting bank profitability in Indonesia. In *International Conference on Busi-ness and Management*. Retrieved from https://www.academia.edu/7681307/Factors_affecting_bank_profitability_in_Indonesia_PDF

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

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Measurement of the efficiency of monetary policy

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Abstract

Since 2000, monetary policy in Indonesia started to use Inflation Targeting Framework (ITF). To evaluate the performance of the monetary policy, it requires efficiency indicators. The measurement of the efficiency of monetary policy is based on inflation and output variations. This paper formulates a method for measuring the efficiency of monetary policy and applies it in Indonesia. It finds that since the implementation of ITF, the efficiency of monetary policy has not changed significantly. However, the efficiency of monetary policy tends to increase after the full implementation of the ITF framework after 2005 than in the transition period of 2000-2005.

Abstrak

Sejak tahun 2000 kebijakan moneter di Indonesia mulai menggunakan Inflation Targeting Framework (ITF). Untuk mengevaluasi kinerja kebijakan moneter, diperlukan indikator efisiensi. Pengukuran efisiensi kebijakan moneter didasarkan pada variasi inflasi dan output. Makalah ini merumuskan metode untuk mengukur efisiensi kebijakan moneter dan menerapkannya di Indonesia. Penelitian ini menemukan bahwa sejak implementasi ITF, efisiensi kebijakan moneter tidak berubah secara signifikan. Namun, efisiensi kebijakan moneter cenderung meningkat setelah implementasi penuh kerangka kerja ITF setelah tahun 2005 dibandingkan dengan periode transisi 2000-2005.

Introduction

In the past few decades, policy makers around the world have become increasingly aware of the social and economic costs due to inflation. Economists and politicians have begun to discuss the costs caused by the high inflation since 1960 in which the world has been experiencing the rising inflation. Inflation may lead to uncertainty concerning relative prices and the rate of price index in the future, so that brings companies and individuals become difficult to make a decision, and in turn, lead to lowers the economic efficiency. Economists claim that inflation may harm economic growth, especially when the inflation is high (Mishkin, 2007).

The awareness of high costs due to inflation lands to the viewpoint that low and stable inflation will encourage the productivity of economic resources and support economic growth, price stability becomes an important factor for the long term healthy economic growth. Therefore, price stability defined as low and stable inflation is regarded as the main goal of the monetary policy.

In relation to the matters, the central element which is necessary for the monetary policy is the use of a nominal anchor to be used as a policy strategy. Nominal anchor is a nominal variable such as inflation, and money supply that could limit the fluctuation of prices in order to achieve price stability. There are three monetary policy strategies that are nominal anchor determination namely monetary targeting, inflation targeting, and implicit nominal anchor. Inflation targeting has advantages compared to the other strategies because it is more correlated with the price fluctuation (Mishkin, 2007).

The optimal choice of a monetary policy instrument depends on how tight and transparent the available instruments are and on whether policymakers can commit to future policies (Atkeson, Chari, & Kehoe, 2007). Tightness is always desirable; transparency is only if policymakers cannot commit. Interest rates, which can be made endogenously tight, have a natural advantage over money growth and exchange rates, which cannot. As prices, interest and exchange rates are more transparent than money growth. All else equal, the best instrument is interest rates and the next-best, exchange rates.

Inflation targeting is characterized by the announcement of official target ranges for the inflation rate at one or more horizons, and by explicit acknowledgement that low and stable inflation is the overriding goal of monetary policy. Other important features of inflation targeting include increased communication with the public about the plans and objectives of the monetary policy makers, and in many cases, increased accountability of the central bank for attaining those objectives (Mishkin, 2007). The monetary policy with strategy of inflation target has been widely adopted by many countries. New Zealand was the first country which implemented the strategy of the inflation targeting in 1990, followed by Canada in 1991, England in 1992, Sweden and Finland in 1993, Australia and Spain in 1994, followed by other countries such as Israel, Chile, and Brazil (Mishkin, 2007).

The ITF approach in the monetary policy implementation in several developed countries generally noted a success stories. Aguir & Smida (2015) found that the implementation of the ITF can raise the credibility of the monetary authority. Their study indicates the ITF regime is conducive to sustainable economic growth and the inflation targeting countries recognize more macroeconomic performance as its neighbour of not targeting and that these differences are generally attributable to the choice of this new regime.

Athanasios & Mo (2016) found a unique feature of their model is that inflation affects welfare not only through the traditional channel, i.e., through determining equilibrium real balances, but also through influencing agents' entry decisions in the financial market. They use their framework to study the effect of inflation on welfare, asset prices, and OTC (over the counter) trade volume. In contrast to most monetary models predict a negative relationship between inflation and welfare. They found that inflation can be welfare improving within a certain range, because it mitigates a search externality that agents impose on one another when they make their OTC market entry decision.

There is no universal relationship between the conduct of monetary policy and the performance of the capital market (Marinescu, Ion-Iulian, & Horobet, 2015). In USA for example, we have a strong response of the capital market to the rules monetary policy component but we do not see the same behavior for other countries. This interesting fact can only be explained by the discretionary indicator, showing that if monetary policy decisions rely more on discretion, the stock market response becomes increasingly erratic and can cause irrational responses.

(Cortes & Paiva, 2017) argued that a long-term effort of credibility construction in Brazil dating back to the 1990s suffered a setback in 2011, when the Board of Governors of the Central Bank of Brazil (BCB) was changed at the onset of the Rousseff government. They found preliminary evidence that the looser monetary policy under Rousseff's first term has contributed to a deterioration of inflation expectations and dynamics, which have become more sensitive to inflationary shocks.

Source: Bank Indonesia

Figure 1. The rate of inflation in the period 2003-2015

In Indonesia, the monetary policy with the nominal anchor began to be implemented along with the implementation of Act 23 year 1999 concerning Bank of Indonesia. In the legislation, it is stated that the task of Bank Indonesia is focused on keeping the rupiah value stable. In the implementation, Bank In-

donesia is obliged to determine the inflation targeted. Therefore, the monetary policy outlined in the Act 23 has implicitly detected that the monetary policy of meanwhile, in the explanation of Act number 23 year 1999. It is stated that the stability of rupiah and its reasonable exchange rate is part of prerequisites for achieving sustainable economic growth which in turn will improve the people's welfare.

Since the use of BI rate for achieving the inflation target, inflation remain high and fluctuating. Figure 1 shows that, there were of least five points of climax inflation and five points of anti-climax inflation in period of 2003 to 2015. During the period, the lowest inflation was at the rate of 2.41%, in November 2009, while the highest inflation was at the rate of 18.38%, in November 2005. The considerable difference between the highest and the lowest inflation rates show that the inflation fluctuation in Indonesia is still high. The inflation rate has still been high and fluctuating since the implementation of the monetary policy with the inflation targeting strategy should be paid attention to, considering that the purpose of the implementation of the policy is to meet the low and stable inflation rate.

A fairly large inflation fluctuation in Indonesia requires a method of evaluation to measure the accuracy of the method in achieving the targeted inflation. The indicators of the success of the monetary policy within the framework of the ITF are usually measured by counting efficiency. The efficiency monetary policy views the accuracy of the policy in achieving the inflation target. The accuracy is seen through how big the inflation deviation occurring from the inflation targeted. On the other hand, inflation has a trade-off relationship with the output, where the output is also the goal of economic development. Therefore, in measuring the efficiency of the monetary policy, in addition to inflation variation, the output variation is also calculated. Therefore, the efficiency of the monetary policy is usually calculated from the output variation and the inflation variation.

Research Method

There are several methods for calculating the efficiency of the monetary policy offered by economists. This paper develops a method for measuring the efficiency policy based on a formula that has been previously established. It then uses the technique to measure efficiency of the monetary policy in Indonesia.

The purpose of the monetary policy in the ITF Framework is to achieve the inflation rate targeted. The success of the monetary policy is indicated by its capability in maintaining stable inflation, called efficiency. On the other hand, inflation has trade off relationship with the output. Basically the model of efficiency measurement was made by calculating gap between optimum loss function. That is minimum output and inflation variation with the actual condition of the inflation variation and output variation. Several methods of efficiency measurement have been made by economists such as Cecchetti, Flores-Lagunes, & Krause (2006) and Briec, Gabillon, Lasselle, & Ratsimbanierana (2012).

In the methods of Cecchetti et al. (2006), efficiency measurement of the monetary policy is done in two phases. First, the identification of the minimum loss functions. The minimum loss function is formed from the determination of optimum interest rate. Further, we need identify output and inflation variation. The gap between minimum loss function and actual condition indicates the degree of the efficiency of monetary policy. The smaller gap between the optimal and the actual monetary policy, the more efficient the monetary policy.

Briec et al. (2012) developed a method for measuring the efficiency based on the theory of production Farrell (1957). In the case of constant returns to scale technology, this distance function allows to find a more efficient way of producing the same level of output given that in the new allocation the inputs are employed in the same ratio as in the original (but inefficient) allocation. This ratio is often called the measure of technical efficiency.

Furthermore Briec et al. (2012) developed a method for measuring the efficiency based Malmquist index. In production theory, the Malmquist index is a bilateral index which compares the production technology of two economies, namely the technical change and the efficiency change. In the Cecchetti's framework, the Malmquist index is defined from the Farrell measures evaluating the output–inflation variability frontier. It determines the shift of this frontier and the changes in macroeconomic performance. The use of the Malmquist index allows to separate the effects of the policy-maker and the changes in the structure of the economy. Briec et al. (2012) mentioned that the global efficiency changes can be rewritten as the product of the changes in macroeconomic performance, minimum quadratic loss, and efficiency frontier. The Malmquist index can identify the contributions of improvements in the efficiency of monetary policy and changes in the variability of aggregate supply shocks.

Optimal interest rate

The efficiency monetary policy is calculated by considering the inflation variation and the optimal output variation. Optimal output and inflation variation occurring in the interest rate results in the minimum los function. Rudebusch & Svensson (1999) stated that the optimal monetary policy was given by the equation of output and inflation as follows.

$$y_t = a_1 y_{t-1} + a_2 y_{t-2} - a_3 (i_{t-1} - E_{t-1}\pi_t) + u_t \quad (1)$$

$$\pi_t = \pi_{t-1} + \gamma y_t + \eta_t \quad (2)$$

From the equation (2) inflation expectation may be made into equation: $E\pi_{t+1} = \pi_t + \gamma E_t y_{t+1}$ and inserted into the output equation, it is abstained:

$$\begin{aligned} y_{t+1} &= a_1 y_t + a_2 y_{t-1} - a_3 (i_t - \pi_t - \gamma E_t y_{t+1}) + u_{t+1} \\ &= \frac{a_1 y_t + a_2 y_{t-1} - a_3 (i_t - \pi_t)}{1 - a_3 \gamma} + u_{t+1} \end{aligned} \quad (3)$$

If: $\theta_t = \frac{a_1 y_t + a_2 y_{t-1} - a_3 (i_t - \pi_t)}{1 - a_3 \gamma}$ so output and inflation of period t+1 is:

$$y_{t+1} = \theta + u_{t+1} \quad (4)$$

$$\pi_{t+1} = \pi_t + \gamma\theta_t + \eta_t + v_{t+1} \quad (5)$$

where $v_{t+1} = \gamma u_{t+1} + \eta_{t+1}$

The value function from the loss function is:

$$L = \min_{\theta_t} E_t \left[\frac{1}{2} (\lambda y_{t+1}^2 + \pi_{t+1}^2) + \beta V(\pi_{t+1}) \right] \quad (6)$$

Minimization of lost function with equation obstacle (4) and (5) is:

$$L = \min_{\theta_t} E_t \left[\frac{1}{2} \lambda (\theta_t + u_{t+1})^2 + \frac{1}{2} (\pi_t + \gamma\theta_t + v_{t+1})^2 + \beta V(\pi_t + \gamma\theta_t + v_{t+1}) \right] \quad (7)$$

The first order condition is

$$(\lambda + \gamma^2)\theta_t + \gamma\pi_t + \gamma\beta E_t V_\pi(\pi_{t+1}) = 0 \quad (8)$$

From the envelope theorem, it is obtained:

$$L = \pi_t + \gamma\theta_t + \beta E_t V_\pi(\pi_{t+1}) \quad (9)$$

By multiplying the equation (8) by γ, and being added to the equation (9), so it results in: $\gamma V_\pi(\pi_t) = -\lambda\theta_t$. By withdraw the time one period and making expectation, $\gamma\beta E_t V_\pi(\pi_{t+1})$ can be eliminated from the equation (8) becoming:

$$(\lambda + \gamma^2)\theta_t + \gamma\pi_t - \beta\lambda E_t \theta_{t+1} = 0 \quad (10)$$

or:

$$\theta_t = -\left(\frac{\gamma}{\lambda + \gamma^2} \right) \pi_t + \beta \left(\frac{\lambda}{\lambda + \gamma^2} \right) E_t \theta_{t+1} \quad (11)$$

Optimal condition occurs in $\theta_t = B\pi_t$. Optimal B value is:

$$\beta\lambda\gamma B^2 + (\beta\lambda - \lambda - \gamma^2) B - \gamma = 0 \quad (12)$$

Considering $\theta_t = \frac{a_1 y_t + a_2 y_{t-1} - a_3 (i_t - \pi_t)}{1 - a_3 \gamma}$, this optimal monetary policy is:

$$i_t = \left(1 - \frac{B(1-a_3\gamma)}{a_3}\right)\pi_t + \frac{a_1}{a_3}y_t + \frac{a_2}{a_3}y_{t-1} \tag{13}$$

Efficient monetary policy

Efficient monetary policy is a policy that minimizes loss as a side effect the implementation of a monetary policy. Monetary policy efficiency may be seen by comparing the actual monetary policy with the monetary policy efficiency frontier. The monetary policy efficiency frontier is reduced from the minimization of loss function for discretion monetary policy.

Loss function contains output and inflation variation like the equation (14). While λis level of tolerance of the monetary policy maker, towards the output gap variation for keeping stable inflation. In other words, λmay be required as a preference level of monetary policymakers towards the output gap variation. Several economists gave the optimal value of λ which is 0.25 or 0.3 (Walsh, 2003).

$$L(\hat{\lambda}) = (1-\beta)\, E_t \sum_{i=1}^{\infty} \beta^i (\lambda y_{t+i}^2 + \pi_{t+i}^2) \tag{14}$$

The result of equation minimization (14) with many combinations of output and inflation variation add certain level of λ will from a trade off line between output and inflation variation as shown in Figure 2. The smaller λ is the closer the trade off line to the point of origin (point 0). The monetary policy efficiency frontier for discretion policy is a tangent the trade off line of output and inflation variation.

Cecchetti et al. (2006) calculated a change of the monetary policy efficiency in an almost similar way. Cecchetti focused on the change of the monetary policy efficiency through a graphic method and mathematic calculation of loss function as a function of output and inflation variation by weighted the preference of λ and (1 – λ). The loss function can be written as follows:

$$Loss = \lambda \mathrm{Var}(\pi) + (1-\lambda)\mathrm{Var}(y), \qquad 0 < \lambda < 1 \tag{15}$$

where:

λ = parameter of central bank preference towards inflation variation
$Var(\bullet)$ = inflation deviation squared from its target or output deviation from potential output
π = inflation
y = output

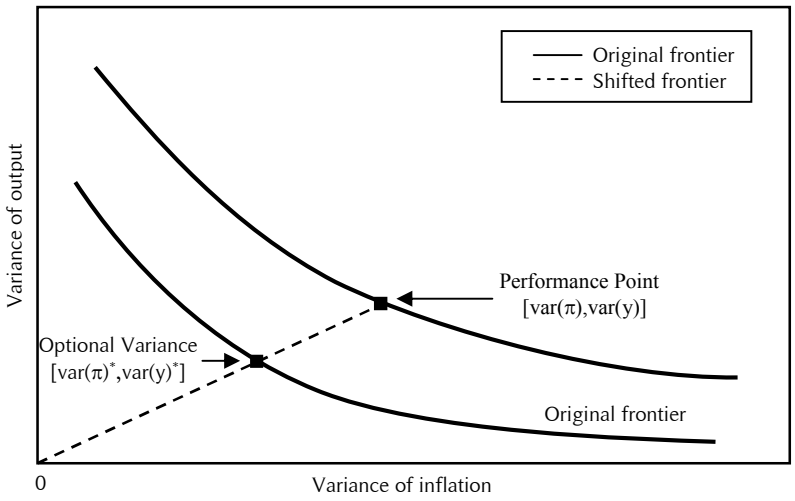

Figure 4. Monetary policy efficiency frontier (original frontier) and performance point

Based on the loss function formed, the measurement of the macroeconomic performance can be formulated at the period of i (Pi) given by the equation:

$$P_i = \lambda\, \mathrm{Var}(\pi_i) + (1-\lambda)\mathrm{Var}(y_i) \tag{16}$$

The optimal macro-economic performance (Si) is the economic performance resulting from the minimum *Pi*, with *Si* :

$$S_i = \lambda \,\mathrm{Var}(\pi_i)^* + (1-\lambda)\mathrm{Var}(y_i)^* \tag{17}$$

Where, var$(\pi)^*$ and var$(y)^*$ are inflation variance and output variance in the optimal condition. If $\Delta S = S2 - S1$ has a negative value, it indicates that the performance of economy decreases.

To determine var $(\pi)^*$ and var $(y)^*$, we can see a homothetic shift of the original frontier curve outward tangent the performance point as shown in Figure 4. The optimal variance is the intersection point between original frontier and the line drawn from the original point to the performance point.

The efficiency of the monetary policy is calculated from the distance of the actual performance toward the optimal performance. The inefficiency level for every period *i* is:

$$E_i = \lambda[\mathrm{Var}(\pi_i) - \mathrm{Var}(\pi_i)^*] + (1-\lambda)[\mathrm{Var}(y_i) - \mathrm{Var}(y_i)^*] \tag{18}$$

Then, the variable of monetary policy efficiency ΔE is calculated, based on the proportion toward ΔP that is:

$$Q = \frac{\Delta E}{|\,\Delta P\,|} \tag{19}$$

Furthermore, the average inefficiency between two periods will be calculated by assumed that central bank chooses the interest rate minimizing the loss function that is minimizing deviation squared from the inflation and output of the average target. The average is formulated as follows:

$$E(L) = E[\lambda\,(\pi_i - \pi^*)^2 + (1-\lambda)\,(y_i - y^*)^2] \tag{20}$$

Where π^* and y^* are the inflation target and the output target for every *t* taken from the average value, and π_t is the inflation level for every *t* taken from the average value.

Measurement for efficiency of monetary policy

Monetary policy is considered to be efficient if the policy generates low fluctuation of output and inflation. Low and stable inflation will encourage the output growth in the long term. High fluctuation of inflation will cause social loss, in which model is called loss function. The equation of loss function is defined as follows: $LF = \lambda$(inflation variance) + (1 - λ) (output variance). The symbol λ valued between 0 and 1, is level of tolerance of BI toward the inflation fluctuation, while the level of tolerance of BI toward the output fluctuation is 1-λ. Theoretically, output and inflation variation at time t is calculated toward the target value and its potential value.

Efficiency is measurement for optimal policy in limiting the output growth in order that inflation is not too high for the purpose of output growth stability. Optimal policy is macroeconomic policy resulting in minimal loss function. The los function used in this research is: $Loss = \lambda\mathrm{Var}(\pi) + (1-\lambda)\mathrm{Var}(y)$, where $0 < \lambda < 1$. Var (*) show deviation squared toward its target that is var $(\pi) = (\pi - \pi^*)^2$ and var $(y) = (y - y^*)^2$, where π and y are inflation and output. The inflation variability aversion for developing countries uses $\lambda = 0{,}3$ (Cecchetti et al. 2006). After λ is determined, efficiency analysis can be continued.

In this research, this efficiency that will be measured is the efficiency variable between two periods. The first period is the period before pure ITF is used or FFIT (*Full Fledged Inflation Targeting*) in 2001 (I) up to 2005 (II). The second period was the period sure ITF was implemented or FFIT in which only one nominal anchor had bed used that is the inflation occurred in 2005 (III) up to 2008 (IV).

Stages of analysis are as follows:

1. In each period, determine the least loss function value from the actual data in Indonesia by using λ = 0.3 in all quarter in the related period.
2. Forming original frontier. The curve was derived by changing the value of λ with the minimal loss function value derived at the stage 1. Some pair combinations of var(π) and var(y) are derived as a result of value of λ. Plotting var(π) in vertical axis and and var(y)in horizontal axis will from a curve of indifference or curve of efficiency frontier, in which stage is called the curve of original frontier (This curve has social MRS = λ/(1-λ)). To improve the formation of the curve of efficiency frontier to be steeper, it may be done by a simple regression of var(y) toward 1/var(π) as follows:

$$Var\,(y) = \beta_0 + \beta_1\left(\frac{1}{Var\,(\pi)}\right) + \varepsilon$$

If β_1 significant (β_0 is not significant), the curve original frontier can be formed from $Var\ (y) \times Var\ (\pi) = \beta_1$.

3. In each period var$(\pi)^*$ and *var*$(y)^*$ are graphically searcher for. The variation is obtained from the tangency point between the lines drawn from the original point to the performance point as shown in Figure 4.
4. Calculating P_i and S_i

$$P_i = \lambda \mathrm{Var}(\pi_i) + (1-\lambda)\mathrm{Var}(y_i)$$

$$S_i = \lambda \mathrm{Var}(\pi_i)^* + (1-\lambda)\mathrm{Var}(y_i)^*$$

Where P_i is economic performance and S_i is inflation and output variation in the optimal condition. P_i and S_i is calculated once each for every period of i by taking the average of π_i and average y_i in each period.

5. Calculating E_i and ΔE
E_i is a difference of P_i and S_i are $E_i = P_i - S_i$ or it can be calculated by a formula as follows:

$$E_i = \lambda[\mathrm{Var}(\pi_i) - \mathrm{Var}(\pi_i)^*] + (1-\lambda)[\mathrm{Var}(y_i) - \mathrm{Var}(y_i)^*]$$

Then it is calculated:

$$\Delta E = E_1 - E_2$$

The value of positive ΔE indicates an increase or gain of monetary policy efficiency.

6. Calculating Q

$$Q = \frac{\Delta E}{|\Delta P|}$$

The positive value of ΔP indicates an increase or gain in macro-economic performance (performance gain). Value of Q indicates the efficiency variable of the monetary policy. The value of positive Q indicates that the monetary policy is getting more efficient. If var (π) indicates inflation variable or var(y) indicates output variable, correlating between periods and is statistically significant, the optimal policy is implemented in condition $\hat{\lambda} < \lambda$ (Walsh, 2003). This research takes $\lambda \leq 0.3$.

Results and Discussion

Measurement of the efficiency of monetary policy

In this part, the efficiency of monetary policy will be calculated in the first and the second period. The first period is the period before ITF was fully used or FFIT (*Full Fledged Inflation Targeting*) in 2001 (1) to 2005 (II). The second period was the period after ITF was fully implemented or FFIT where only one nominal anchor had been used, that is the inflation occurring in 2005 (III) to 2009 (III). The stages of analysis are as follows:

Determining the least loss function

The value of λ for calculating loss function is determined through several methods i.e.: determined by central bank, choosing the value of λ recommended, or calculated. According to the method of Cecchetti et al. (2006) that country with high inflation can be uses the value of λ = 0.3; and λ = 0.8 for developed countries (The countries with low inflation). In Indonesia the quarterly inflation during, the research period was 2 percent on the average, this rate was considered high. Therefore, in this model of efficiency the value of λ = 0.3 is applied. With λ being mentioned, the value of loss function was chosen from the actual data in Indonesia in the whole quarter for each of the first and the second period. In the first period, the minimum loss function value was 0.4393 occurring in 2005 (II) and the loss function in the second period was 1.009 occurring in 2007 (II).

Forming the original frontier curve

The curve of original frontier is derived by change the value of λ with the minimal loss function obtained from the first stage. Several pair combinations of var(π) and var(y) are derived as a result of value λ. Plotting var(π) in vertical axis and and var(y) in horizontal axis will from a curve of indifference or curve of efficiency frontier, in this stage is called the curve of original frontier. There are two curves of efficiency frontier that are for the first and the second period.

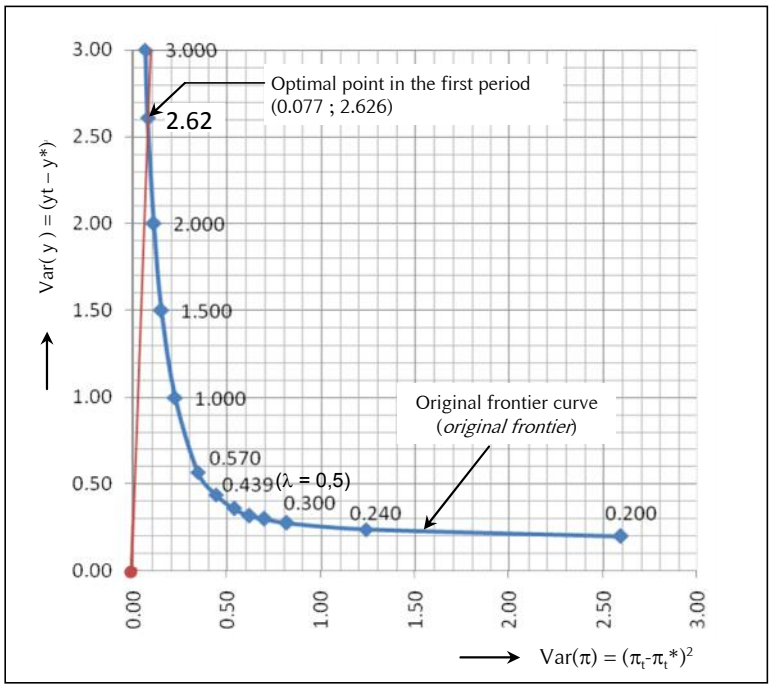

Figure 5. Original frontier curve of the first period

Annotation: original frontier curve above was the minimal loss function curve in 2005 (II). This curve was derived by shifting the value of λ in the fixed loss function value that is the minimal loss function.

The original frontier curve is symmetrical to the origin. The curve of original frontier can be seen in Figure 5. To improve the formation of the original frontier curve to be more accurate, it may be done by a simple regression of var(y) towards 1/var(λ) as follows:

$$Var(y) = \beta_0 + \beta_1\left(\frac{1}{Var(\pi)}\right) + \varepsilon$$

$$Var(y) = 0{,}043 + 0{,}201\left(\frac{1}{Var(\pi)}\right) + \varepsilon$$

This regression equation is required to seek var(π)* and var(y)* in the third stage followed by the formation process of original frontier for the second period. Figure 6 provides of pairs of var(y) and var(π) in the minimal loss function of the second period as input to make the original frontier in this period.

Like the first period, in λ =0.5 (the value of tolerance of output and inflation in the equation of loss function) had the same strength, the value of var(y) was the same as the value of var(π). This shows that the original frontier curve is symmetrical to the origin. The original frontier can be seen in Figure 6.

To improve the formation of the original frontier curve to be more accurate, a simple regression of var(y) toward 1/var(π) can be done as follows:

$$Var(y) = \beta_0 + \beta_1\left(\frac{1}{Var(\pi)}\right) + \varepsilon \;;\; Var(y) = 0{,}030 + 0{,}903\left(\frac{1}{Var(\pi)}\right) + \varepsilon$$

This regression equation is required to seek var(π)* and var(y)* in the third stage.

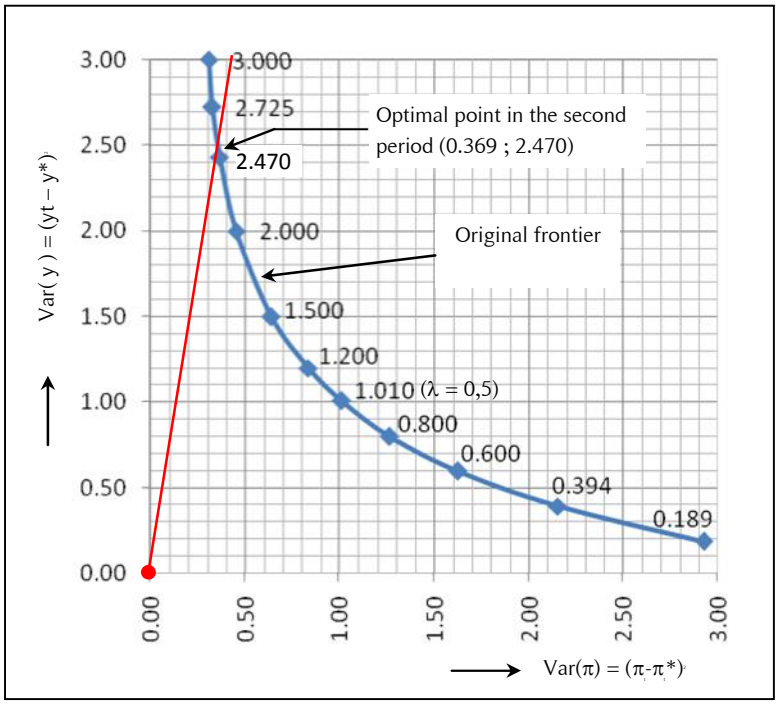

Figure 6. Original frontier curve of the second period

Searching optimal variance

Optimal variance is symbolized by var$(\pi)^*$ and var$(y)^*$, that is intersection point between lines drawn by origin point to the performance point. Performance point is the average var$(\pi)^*$ and $(y)^*$ in each period. In the first period, the average var$(\pi)^*$ = 1.07 and average var$(y)^*$ = 36.30, while in the second period, var$(\pi)^*$ = 5.03 and the average var$(y)^*$ = 33.63. The value of var$(\pi)^*$ and var$(y)^*$, according to Cecchetti et al. (2006), could be done graphically; but in this research, seeking var$(\pi)^*$ and var$(y)^*$ was done mathematically. This mathematic way is done in order to get a more accurate result.

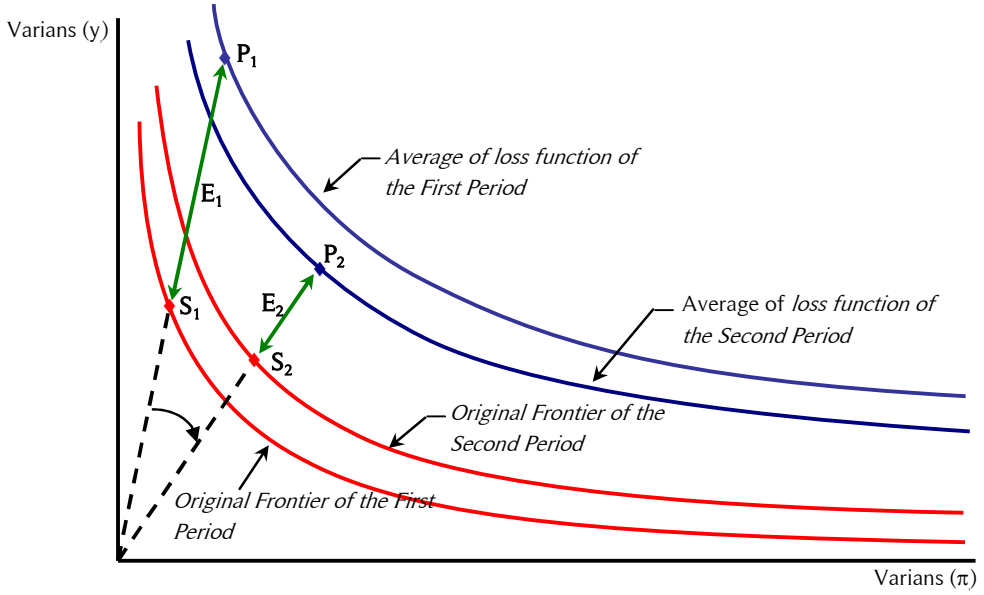

Figure 7. Original frontier and loss function curve of the first and the second period

Figure 7 is seen that the performance point (P_1) is higher compared with P_2. This means that there is an increase in the macroeconomic performance of Indonesia from the first period to the second period.

In the figure mentioned above it is also shown that E_1 is bigger than E_2 indicating that the efficiency of monetary policy is increasing. From the first period to the second period. Comparing P_1 with P_2 or E_1 with E_2 can only be done with the condition of constantλ, if λ of the first period is difference from the seconds period, P_1 and E_1 cannot be compared with P_2 and E_2. In this research the value of λ mentioned above is 0.3 both in the first and in the second period. The decrease in the value of P_2 compared with P_1 indicates that the macroeconomic performance increases due to the ITF implementation that is the inflation determination as target of monetary policy.

Figure 7 shows that the line drawn from the origin to the performance point rotates to the right. This indicates that the BI preference toward inflation in full implementation of ITF is relatively decreasing as compared with the implementation of transitional ITF. In period of full implementation of ITF, the average inflation fluctuation between quarters is bigger as compared with the period in the implementation of transitional ITF, but is output fluctuation is smaller as compared with the transitional period. Overall, social loss function in the period of full application of ITF is smaller compared with the previous period. The increase in inflation fluctuation and the decrease in output fluctuation in the full application of ITF (after July 2005) can be understood because the implementation of inflation target does not mean to ignore the output and its stability, there is still a space of flexibility in the implementation of ITF like a gradual program on disinflation and a flexible operational design. The implementation of ITF in Indonesia follows the basic principles that ITF is a framework, not a rule. The implementation of the monetary policy also considers a wider development target among other things is economic growth. Unlike the principle of full discretionary, ITF require that discretionary policy in the implementation of the monetary policy is restricted.

After inefficiency of monetary policy (E) is known then ΔE is calculated to know the efficiency variable (Q): $\Delta E = E_1 - E_2 = 23{,}886 - 23{,}241 = 0{,}645$.

The amount of ΔE is scale (not vector). The positive value of ΔE indicates an increase in the efficiency of monetary policy.

Calculating the efficiency variable (Q)

The change of efficiency is the ratio of change in efficiency to performance gain, that is:

$$Q = \frac{\Delta E}{|\Delta P|}$$

$$Q = \frac{0{,}645}{0{,}681} = 0{,}947$$

The value of Q indicates the efficiency of monetary policy. The value of Q in this research is 0,947 (positive), this indicates that monetary policy is getting more efficient. The result of this efficiency analysis indicates that the efficiency of period two (after ITF is fully implemented) is higher than the efficiency of period one (before ITF is fully implemented). By using inflation target strategy, output and inflation fluctuation become small indicating that output and inflation are relatively low and stable since ITF fully implemented.

With the inflation target being determined by BI, inflation expectation will get close to or the same as the inflation target of Bank of Indonesia by π_{t+1}, or it applies to $E_t\pi_{t+1} = \pi_{t+1}$. So bias between public inflation expectation and inflation target is getting small or zero, which in turn, will decrease the inflation fluctuation. Furthermore, the decrease in inflation fluctuation encourages the decrease in gap between actual output and potential output (output in full employment). Therefore, monetary policy becomes more efficient.

On the other hand, the decrease in inflation fluctuation will make social less function smaller. This relationship is illustrated in model of Money in the Utility Function (MUF), where inflation relationship with loss function is positive (Walsh, 2003). The higher the inflation fluctuation is the bigger the social loss function. On the contrary, the lower the inflation leads the smaller the social loss. The result of the analysis of monetary policy efficiency indicates that the efficiency is getting bigger which means that the social loss is getting smaller.

In Indonesia, the monetary policy with ITF strategy has been applied since 2000. This policy has only one, single target that is inflation. This is different from the policy which was applied before 2000 that is monetary targeting which had a multiple target.

However, in the beginning of the application of ITF policy, banking condition in Indonesia was not yet completely stable so that the inflation target strategy had not worked out well. Observation on transmission mechanism was not an easy job. While in the ITF implementation, the running of this transmission mechanism played an important role considering the mandate given to achieve the stability of prices. In the condition like this, the increase in the interest rate of monetary instrument (SBI) to absorb cartel money to go back to the banking system was after late due to the response of deposit interest rate so to encourage the incoming of cartel money to banking system required of the increase in the interest rate which was higher than it should have been.

Never the less, the obstacle mentioned was not a specific obstacle for the application of inflation target framework, because basically, monetary policy with any framework because basically, monetary policy with and framework requires the presence of a healthy financial system so that the target achievement becomes credible. A mature preparation is required so timer in applying the inflation target framework, BJ can increase inflation prediction accuracy and understanding of the monetary policy transmission in Indonesia. This preparation is required for the application of full inflation target framework.

The ITF approach has advantages compared with the monetary targeting approach. With ITF, the monetary policy may focused better on domestic issues and respond immediately every shock occurring in domestic economy. Stability of relations between monetary aggregates and inflation is not a very important issue as the success of policy does not depend on the relation mentioned above. The ITF approach enables monetary authority to use all the information available in determining the policy direction that will be taken. In addition, with ITF the public may understand easily the policy direction that has been taken due to the presence of transparency of the policy taking process and the increase in central bank accountability with regard to the explicit inflation target announcement to the public. The ITF approach may also avoid the possibility of central bank to be trapped under politic pressure. Central bank may carry out the monetary policy independently.

In Indonesia, the full-fledged implementation of ITF by leaving monetary targeting in practice had just begun since the middle 2005. The observation on empirical data in Indonesia indicated that the inflation fluctuation and the output fluctuation were relatively small since the full-fledged application of ITF (Romer, 2006). From the result of this research the monetary policy efficiency in Indonesia on the full-fledged application of ITF was higher than the monetary policy efficiency before the full-fledged application of ITF was used. Unfortunately the increase in the efficiency was not significant. This means that a longer period is required an order that is shifting from the monetary targeting to ITF can run well. The time passed was too short to evaluate significantly whether or not the policy implementation taken was successful.

The performance of Bank Indonesia to minimize the inflation and output fluctuation was relatively successful. The credibility of Bank Indonesia in controlling the inflation has begun to get better and the inflation tends to decline. The full-fledged implementation of ITF will strengthen public expectation toward the inflation decrease and speed the disinflation program being carried out. This in turn, will increase the credibility of Bank Indonesia in controlling the inflation. In addition, the inflation target containing the element of good governance for a modern central bank likes goal clarity; the transparency and accountability are parallel in the effort of Bank Indonesia to increase the credibility in the implementation of ITF. Consistence and more focus are paying close attention to the inflation are expected to encourage the output growth in a long term.

Conclusion

The efficiency of monetary policy can be measured by calculating the distance of performance point to the original frontier curve. Performance point is the average variance of inflation and the average variance of the output gap, while the original frontier curve is a curve obtained by varying the λ at the minimum loss function, where the value of λ is the degree of tolerance of Bank Indonesia to the inflation fluctuations.

This efficiency measurement method was applied to the data of Indonesia during the transitional ITF implementation period 2000-2005 and full implementation period 2005-2009. Since the monetary policy was fully implemented with the ITF on July 2005, there has been a tendency that the monetary policy efficiency increased as compared with the ITF application in the transitional period in 2000 to 2005. The monetary policy with full-fledged ITF application resulted in lower costs (inflation fluctuation and output fluctuation). This is due to the fact that the ITF policy is a set framework, starting from the instrument, targets to the policy goal.

References

Aguir, A., & Smida, M. (2015). Efficiency of monetary policy under inflation targeting. *Economics Bulletin*, *35*(1), 788–813.

Athanasios, G., & Mo, J. K. (2016). *Monetary policy and efficiency in over-the-counter financial trade* (Munich Personal RePEc Archive Paper No. 71455). Retrieved from https://mpra.ub.uni-muenchen.de/71455/

Atkeson, A., Chari, V. V., & Kehoe, P. J. (2007). *On the optimal choice of a monetary policy instrument* (NBER Working Paper No. 13398). Cambridge.

Briec, W., Gabillon, E., Lasselle, L., & Ratsimbanierana, H. (2012). On measuring the efficiency of monetary policy. *Economics Letters*, *117*(1), 182–185. https://doi.org/10.1016/j.econlet.2012.04.107

Cecchetti, S. G., Flores-Lagunes, A., & Krause, S. (2006). Has monetary policy become more efficient? A cross country analysis. *Economic Journal*, *116*, 408–433. https://doi.org/10.3386/w10973

Cortes, G. S., & Paiva, C. A. C. (2017). Deconstructing credibility: The breaking of monetary policy rules in Brazil. *Journal of International Money and Finance*, *74*, 31–52. https://doi.org/10.1016/j.jimonfin.2017.03.004

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society. Series A (General)*, *120*(3), 253–290. https://doi.org/10.2307/2343100

Marinescu, Ion-Iulian, & Horobet, A. (2015). Rules and discretion in monetary policy: Is the response of the stock market rational? *Expert Journal of Economics*, *3*(1), 50–62.

Mishkin, F. S. (2007). *Monetary policy strategy*. Cambridge: The MIT Press.

Romer, D. (2006). *Advanced macroeconomics* (Third Edit). New York: McGraw-Hill.

Rudebusch, G. D., & Svensson, L. E. O. (1999). Policy rules for inflation targeting. In C. E. Walsh (Ed.), *Monetary Theory and Policy* (Second). Cambridge: MIT Press.

Walsh, C. E. (2003). *Monetary theory and policy* (Second Edi). Cambridge: MIT Press.

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Systemic risk, bank's capital buffer, and leverage

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Abstract

This paper measures individual bank's impact on banking systemic risk and examines the effect of individual bank's capital buffer and leverage to bank's systemic risk impact in Indonesia during 2010-2014. Using Merton's distance-to-default to measure systemic risk, the study shows a significant negative relationship between bank's capital buffer and systemic risk. High capital buffer tends to lowering bank's impact on systemic risk. Bank's leverage level also influences its contribution to systemic risk, even though the impact is much lower compared to that of capital buffer impact.

Abstrak

Makalah ini mengukur dampak sistemik dari setiap bank serta menguji pengaruh *capital buffer and leverage bank* terhadap risiko sistemik perbankan di Indonesia untuk periode 2010-2014. Dengan metode Merton's *distance-to-default* sebagai pengukuran risiko sistemik, hasil riset menunjukan tingkat *capital buffer bank* secara signifikan berpengaruh negatif terhadap risiko sistemik perbankan Indonesia. Semakin tinggi *capital buffer* sebuah bank, semakin rendah dampak sistemik bank tersebut. Tingkat leverage bank memiliki pengaruh yang signifikan juga terhadap dampak sistemik sebuah bank, walau pengaruhnya jauh di bawah *capital buffer*.

Introduction

World financial crisis reveales a new problem, namely systemic risk, in which failure of a bank is correlated with many banks in a banking system. World financial crisis revealed a new problem, namely systemic risk, in which failure of a bank is correlated with other banks in a banking syst. Bank failures occur simultaneously in very short period of time, and their effect spread to other financial institution. Bank failure not only threatens banking system but also overall financial system. The fragility of the banking system due to the increasing probability of an individual bank failures threatens financial system and the economy as a whole. The stability of the banking system is no longer affected by the absolute risk of an individual bank, but rather how serious contribution of an individual bank into a failure of the banking system as a whole (Anginer, Demirguc-Kunt, & Zhu, 2014). This phenomenon directs a new orientation in update macro-prudential regulation and banking supervisions. Deposit insurance premium in almost all countries in the world today, according to Basel Committee on Banking Supervision (2012a, 2012b) has been associated with systemic impact of a bank or usually called as risk-based deposit insurance premium.

Some researchers has built some definitions of a bank's systemic impact and its measurement method. (Anginer et al., 2014) define systemic impact of a bank as correlation of bank default risk which is measured by the R^2 of the regression equation between the change of a bank default risk and the change of all banks' default risk. The high correlation of all banks' risk taking behavior increase probability of simultaneous bank failures. Adrian & Brunnermeier (2016) proposed CoVAR or Correlated VaR as a measure of a bank's systemic impact. CoVaR measures how much changes Value at Risk (VaR) of banking system as a whole is affected by a bank's VaR changes. Acemoglu, Ozdaglar, & Tahbaz-Salehi (2015)define systemic risk as the financial contagion that can be measured through inter-bank network structure so that the banks interconnections creates a propagation effect of a counterparty risk suffered by an individual bank. Elliott, Golub, & Jackson (2014)construct a model to measure banks systemic risk in the existence of cross shares ownership among banks and other financial institutions. They suggest the potential loss of all banks and financial institutions that hold shares in a bankrupt bank which trigger a chain reaction in the banking system and spread to whole financial system. Georg (2013) and Battiston, Delli Gatti, Gallegati,

Greenwald, & Stiglitz (2012) observed the impact of interbank networks to the propagation of macroeconomic shocks which influence the health of banks that can lead to a collapse of the banking system. Shin (2009) highlights securitization of bank loans that causes extended effect of bank failures to holders of the loan securitization. Gai, Halande, & Kapadia (2011) studied the networking model of inter-bank loans with unsecured claims and using numerical simulations, they showed that more complex and more concentrated financial network create more fragile banking system.

Some researchers such as Fiordelisi & Marques-Ibanez (2013) use bank's financial report data as a measure of bank default risk. Bank stability is measured from the stability of bank profitability in a given period of time and is known as the bank's Z-score. Measuring bank default risk based on accounting data has its own problems, namely the availability of accounting data, depends on the release of the financial statements and bank's accounting method make significant difference between book value and market value. These limitations prohibit accurate estimation of bank's systemic risk at specific time period.

Recent researches like Anginer et al. (2014) and Sundaresan (2013) show that measurement of bank default risk which is the most powerful and widely accepted among academics and practitioners is Merton (1974). Merton model can estimate the probability of bank default on a daily basis by using market value of bank equity in the stock market. Accommodating investors' valuation in capital markets, the probability of default generated by Merton models can reflect the actual condition of the bank, subject to assumption that capital markets are efficient. However, this is an advantage of Merton model but also its weakness. Merton model can only be used to estimate the risk of a bank which its shares are traded on the stock exchanges.

Merton model uses market value of the company's assets which reflects company's prospects and business value in the future. The market value of the assets changes over time depending on external and internal situation of the company so we may assume it moves like a random walk. The next pillar of the Merton model is that the market value of equity and debt can be modeled as a contingent claims on company's assets. Corporate debt can be considered as a contractual option to sell (put option) on the company's assets with a strike price amounting to the principal amount of debt (face value of debt). The put option is due exactly upon the maturity of the debt. On the other hand, company's equity can be modeled as a call option.

If the market value of asset (V_t) is higher than face value of debt at maturity date (F) then the creditors will receive the entire principal of debt. If the market value of the assets is lower than face value of debt, (F_t<V_t), the company is in a state of default in Merton definition, so the company is unable to pay the principal of debt. The creditors or bond holders will receive market value of company's assets (V_t) and suffered a loss, (F_t-V_t). However, if the bond holder holds a put option contract with a specification that has been described above, at the time of default, bond holders can still get the principal debt fully by exercising of the put option contracts at a strike price of debt principal. Portfolio risky bond combines with a put option can be a risk free portfolio. Price of the put option contract will be high if the probability of company default is high. So, probability of bankruptcy is reflected on the probability of the put option will be exercised. In terms of derivatives contracts, the probability of a put option contract is in-the money (Anginer et al., 2014). The more likely the bank failure, put option contract will be at the higher value (in-the money). Following Merton (1974), value of corporate debt can be modeled as a put option, while the corporate equity value can be modeled as a call option.

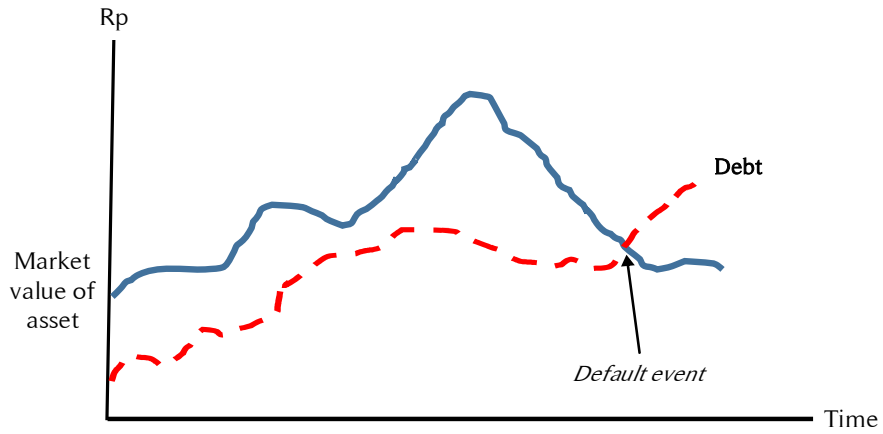

Figure 1. Default event

The estimation method of asset market value has been a focus of research implementing Merton model in the presence of variable in which the data are not available in the market (unobserved variable). Stock market value is approximated by its market value of equity that can be seen on the company's stock price traded on the stock exchange. Method of estimation of the market value of a company's assets and the volatility is becoming one of the topics of research of its own and is still growing in the context of the implementation of this model of Merton (Afik, Arad, & Galil, 2016).

Tabel 1. Debt holder pay off

		Default	
	Not default	Without option hedging	With option hedging
	$V \geq F$	$V < F$	$V < F$
Debt holder pay off	F	V	F

Some experts argue that bank's capital buffer contributes big and important parts in banking systemic risk (Acemoglu et al., 2015). Capital buffer considers risk weighted asset, not only book value of asset. Capital buffer measures more accurately bank stability than bank's asset value. Capital buffer reflects bank capacity to absorb risk independently. With enough amount of capital, bank can survive amid correlated defaults in banking system and have better resiliency in monetary crisis.

Some expert also argue that bank leverage led to greater impact to systemic risk (Campbell, Hilscher, & Szilagyi, 2008; Elliott et al., 2014). Even bank's debt does not correlate with other banks, high leverage put bank in risky position that threaten bank stability. Bank with high leverage is more susceptible to macroeconomic variable fluctuations. If susceptible banks are highly interconnected than a failure in one bank will be followed by many defaults of bank.

This study examines the effect of bank's capital buffer and leverage on banking systemic risks based on Indonesia public banks data. By observing the condition of banks in developing countries like Indonesia banking industry which consists of a lot of banks with various characteristics, the study can sharpen and extend the results of previous research in terms of the measurement of systemic risk and the factors that influence it. By using Merton's distance-to-default as the measurement of systemic risk, this study gives a scientific measure of Indonesia banks' impact on systemic risk and gives a solid foundation for regulator to classify the systemic important financial institution, understanding important factors influencing the systemic risk and develop regulatory setting to maintain banking system stability.

Research Method

Data

The study examines Indonesia banking data between 2010 and 2014. The selection of this period is to avoid the influence of the global economic crisis in 2008. The data was obtained from Thomson Reuters Data stream data for the stock market data, while monthly banks' financial statements were obtained from Indonesian Banking Directory Bank Indonesia. The criteria in determining the sample are as follows: (1) Indonesia commercial banks operated in Indonesia and its financial report for 2010-2014 is available; (2) The banks had IPO at the latest in 2008; (3) Bank was never delisted from the Indonesia Stock Exchange during the period 2008-2014; (4) Bank's shares were actively traded in the period 2008-2014; (5) Bank's shares were never under sanction of suspension. Referring to the above criteria, the number of samples that can be collected from public commercial banks listed on the Indonesia Stock Exchange are 24 banks.

Model

To empirically test the significance and the pattern of the relationship between the level of banking competition with systemic risks, this study uses a research model as follows:

$$risk_{i,t} = \alpha + \beta_1 Capital\ Buffer_{i,t-1} + \beta_2 Leverage_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where the dependent variable is banking systemic risk which is measured by using *Merton's distance-to-default.* The independent variables are bank's capital buffer and leverage.

Systemic risk measurement

To measure individual bank's default risk, the study uses contingent claim framework following(Merton, 1974). Merton Model puts value of bank's equity as a call option on the bank's assets. Bank's default probability equals the probability of that bank call option became "in the money", ie when the market value of bank assets is lower than total liabilities. Many researchers measures the probability of default by using the distance to default which is the difference between the values of the company's assets with its face value of debt. Merton's Distance to Default has proven to be a better predictor of default than accounting data based-models (Sundaresan, 2013; Campbell et al., 2008; Bharath & Shumway, 2008).

Compared to accounting data based-risk model such as Z-score, Merton's distance to default which is based on market data has several advantages. Firstly, the distance to default can be calculated with high frequency and in shorter interval period so it can estimate default risk at a particular point of time. Audited financial statements are available on annual basis or for the unaudited is monthly basis. Stock market information are available on a daily basis. Secondly, information's in the stock market usually are forward-looking so that the distance to default can reflect market perceptions on condition of the bank in the future.

Merton's distance-to-default was calculated through the method that has been widely used also in previous studies (Anginer et al., 2014; Sundaresan, 2013). This method was proposed by Merton (1974) where the value of the bank's equity markets can be modeled as a call option on the bank asset:

$$V_E = V_A e^{-dT} N(d_1) - X e^{-rT} N(d_2) + (1 - e^{-dT}) V_A \tag{2}$$

$$d_1 = \frac{\log\left(\frac{V_A}{X}\right) + \left(r - d + \frac{S_A^2}{2}\right)T}{S_A\sqrt{T}}; d_2 = d_1 - S_A\sqrt{T} \tag{3}$$

Equation (2) is the Black-Scholes-Merton formula for call option value estimation. V_A is the market value of the bank's assets, $V_E$is the market value of the bank's equity. X is the Face Value of bank debt maturing at time T and linearly interpolated for each point daily over a period using the average position beginning of the month and the end of the month. This method needs to be done in order to obtain a smooth process of asset value and avoid spikes (jumps) on the result implied default probability. The same method performed by Anginer et al. (2014) and Anginer, D., & Demirguc-Kunt (2011).r is the risk-free interest rate, and d is the percentage of the dividend to the market value of bank assets. S_A is the volatility of the bank's assets. Because the market value of bank assets and the volatility of bank asset (V_A dan S_A) are unobservable variables, both estimated by Newton iteration through equations 2 and 4 as follows Anginer et al. (2014):

$$S_E = \frac{V_A e^{-dT} N(d_1) S_A}{V_E} \tag{4}$$

S_E is the standard deviation of daily bank's stock returns rolling over one year. T is equal to 1 year. r is the Government Securities yield with one year maturity. With two variables that can be calculated from the stock market which are market value of the bank's equity and its volatility ($V_E$andS_E) and face value of debt (X) which are obtained from bank's financial statements, we can solve the problem of estimating two unobservable variables, V_A and S_A, simultaneously by using Newton's method into equation (3) and (4). The initial value entered in Newton iteration process: $V_A = V_E + X$ and $S_A = S_E V_E/(V_E + X)$. The iteration process is done by using a program optimization *Solver* in *Microsoft Excel*. In calculating volatility of bank asset (S_A), $S_E$and $V_E/(V_E + X)$ were winsorized at 5% percentile and 95% in order to reduce the influence of outliers.

After we managed to estimate the market value of bank assets and volatilities ($V_A$and S_A), then we can calculate the amount of Merton's distance-to-default through the following equation 5:

$$dd = \frac{\log\left(\frac{V_A}{X}\right) + \left(m - r + \frac{S_A^2}{2}\right)T}{S_A\sqrt{T}} \tag{5}$$

dd is the distance to default, m is the equity risk premium. We assume the equity risk premium at 6% following Anginer et al. (2014) and Campbell et al. (2008). r is the yield of Indonesia government bond with

1 year maturity. Probability of *default* (PD) is a normal transformation of bank's *distance to default,* $PD = F(-dd)$, where F is a cumulative standard normal distribution. Each bank's *distance-to-default*was calculated on monthly basis.

Using the estimation of individual banks' default risk through equation (5), we can measure a bank's systemic risk contribution to the banking system. Bank's contribution to systemic risk is default probability of banking system collapses because of simultaneous bank defaults triggered by default of an individual bank. This study uses the definition of systemic risk proposed by Anginer et al.(2014). Contribution to systemic risk is measured by correlation of a bank's risk-taking behavior with majority banks risk-taking behavior. Correlation of banks' risk taking behavior was measured by R-squared of the regression equation between changes the default risk of a bank and the average changes all existing banks' default risk.

To measure the impact or contribution of a bank to the banking systemic risk, we use a procedure proposed by Anginer et al. (2014) and Karolyi, Lee, & Van Dijk (2012) which use the R^2 obtained from equation (6) with the following formula:

$$\Delta dd_{i,t} = \alpha_{i,j} + \beta_{i,t}\frac{1}{n}\sum_{k=1,k\neq i}^{n}\Delta dd_{k,t} + \varepsilon_{i,t} \quad (6)$$

To estimate the equation 6 and obtain R-squared for each bank, we need to be measure previously the magnitude of Δdd_i which is monthly bank i's default risk changes and average change of all banks' default risk of all banks, excludes bank i, $\{\frac{1}{n}\sum_{k=1,k\neq i}^{n}\Delta dd_{k,j}\}$.

High R^2 of equation (6) for an individual bank shows this bank has been exposed to same sources of credit risk suffered by most of banks. High R squared shows banks interdependence and interconnection. Interconnected banks create amplified bank risk exposures that comes from a given risk factors. Similar risk among most banks in a country led to vulnerable banking sector. Default probability of banks becomes higher and occur simultaneously, triggered by only an increase of one or several risk factors and macroeconomic variables changes.

Capital buffer is a measure of bank's capital strength in reducing the emergence of risks that could threaten stability of the bank. In accordance with Basel II, the ratio of the minimum capital requirement is 8% of risk-weighted assets (RWA). In a simple formula required capital adequacy ratio requirement is:

$$\text{CAR} = \frac{\text{Capital}}{\text{RWA}} \quad (7)$$

where

CAR : Capital Adequacy Ratio
RWA : Risk-Weighted Asset

Capital buffer is a difference between bank's CAR and minimum required CAR (8%).
Capital buffer is calculated through following formula:

$$\text{BUF} = \text{K}_{\text{it}} - \text{K}_{\text{it}}^{\text{r}} \quad (8)$$

where
BUF is capital buffer
$K_{i,t}$ is bank i' CAR at period t
$K_{i,t}^{R}$ is minimum required CAR set by regulator

Results and Discussion

Table 2 shows descriptive statistics of Indonesia public banks' distance-to-default. Magnitude of distance-to-default show individual bank's default risk. Narrow Indonesia banks' distance to default implies a high default probability. Narrow distance to default allegedly caused by relatively high volatility of bank assets. Bank stock price volatility in Indonesia stock market leads to high volatility bank assets.

Table2. Merton's distance-to-default 2010-2014

Bank	Mean	Median	Maximum	Minimum	Std. Dev.
Mandiri	-0.26550	-0.78127	2.15257	-1.90994	1.00453
BRI	-1.97662	-0.83494	0.18288	-30.30402	4.97842
BCA	0.18761	0.14216	2.96519	-1.26701	1.01809
BNI	-0.59922	0.04803	2.35721	-7.01960	2.02590
CIMB Niaga	-0.20849	-0.06602	3.06178	-4.57107	1.33889
Danamon	0.11768	0.22401	2.10353	-1.40621	0.86430
Permata	-0.83190	-0.38788	1.77467	-10.25261	2.00762
Pan	-0.04508	0.13633	1.91540	-3.78859	1.05148
Maybank	0.15439	0.33714	2.53253	-5.23370	1.34103
OCBC NISP	-0.12065	0.06235	1.63702	-3.38739	1.06391
Bukopin	-7.27824	-1.45716	7.78307	-24.73769	8.99475
BTPN	0.83703	0.76429	2.20834	-0.95299	0.66313
Mega	-3.22387	0.26498	2.67928	-22.13659	7.66688
Mayapada	0.03009	0.29093	15.02577	-10.41570	3.64849
Artha Graha	-3.48065	-2.05645	2.59464	-20.02456	3.86885
Victoria	-3.03195	-1.68596	1.64831	-16.27373	3.68698
QNB	1.20061	0.57844	4.65111	-0.92105	1.47912
Woori Saudara	0.18493	0.32030	1.02123	-2.57728	0.56714
Windu Kentjana	-0.54411	-0.22933	2.31324	-7.99442	1.35901
MNC Internasional	0.44923	-0.75952	98.90828	-9.31776	13.34060
Capital Indonesia	-0.65742	-0.49278	5.10445	-5.95892	1.65660
Pundi Indonesia	-0.36497	-0.04029	1.67396	-5.66805	1.32404
BRI Agroniaga	-0.06663	0.07408	2.27241	-3.32697	0.85511
Bumi Arta	-2.73896	-1.36807	1.79368	-14.11766	3.28313

Table 3. Bank's contribution to systemic risk

Nama Bank	Mean	Median	Maximum	Minimum	Std. Dev.
Mandiri	0.45943	0.54298	0.73998	0.22143	0.22189
BRI	0.40785	0.55075	0.71272	0.02192	0.29188
BCA	0.69742	0.76503	0.83725	0.44538	0.15389
BNI	0.69111	0.82814	0.87208	0.08623	0.33950
CIMBNiaga	0.65988	0.81783	0.92228	0.02813	0.36928
Danamon	0.58727	0.69910	0.93770	0.23427	0.33244
Permata	0.64382	0.71225	0.95145	0.22419	0.29105
Panin	0.71192	0.80253	0.94070	0.16746	0.31244
Maybank	0.67305	0.85261	0.97289	0.01115	0.40426
OCBC	0.67724	0.71500	0.90786	0.31064	0.23045
Bukopin	0.30795	0.18986	0.86664	0.05738	0.31996
BTPN	0.62335	0.62400	0.95609	0.33043	0.25734
Mega	0.46202	0.23965	0.86685	0.19544	0.34493
Mayapada	0.46835	0.32824	0.85007	0.09734	0.34680
Artha Graha	0.54747	0.66366	0.80437	0.19696	0.27394
Victoria	0.64554	0.79497	0.93321	0.05997	0.36435
QNB	0.25750	0.13536	0.76614	0.00941	0.29615
Woori Saudara	0.67496	0.70325	0.94268	0.37856	0.22439
Windu Kentjana	0.60892	0.73683	0.94763	0.01253	0.35842
MNC Internasional	0.60896	0.79443	0.95742	0.06357	0.37763
Capital Indonesia	0.61727	0.69375	0.96371	0.02385	0.37315
Pundi Indonesia	0.66809	0.80494	0.89459	0.24497	0.27377
BRI Agroniaga	0.67390	0.75812	0.83682	0.28847	0.22015
Bumi Arta	0.54233	0.70011	0.96655	0.00155	0.43635

Based on Merton's distance-to-default, individual bank's contribution to banking systemic can be calculated. Impact of individual bank to banking system vulnerability is measured by estimating effect of changes in individual bank's distance-to-default to changes of banking systemic risk. We get estimation of an individual bank's contribution to banking systemic by estimating equations 6 and obtain the R-squared for each bank. The magnitude of the systemic impact of any bank can be seen in Table 3.

Table 3 shows majority of Indonesia banks have high R-squared, greater than 50%. This findings suggests that there are high similarity in banks' risk-taking behavior of Indonesian banking system. High R-squared indicates strong interconnection and interdependent among Indonesia banks. Correlation of bank default risk is relatively high, that it is potential to trigger a banking system collapse because of default cascades.

Table 4 shows average Indonesia banks' capital buffer and leverage. On average, Indonesia public bank has enough capital buffer to anticipate unexpected macroeconomic and monetary shock. Some small banks has high capital buffer which because they are in early phase after they sell their share to public and had not fully channeled loans. Indonesia banks' leverage also almost at same level, they still rely on conventional source of funding like bank deposits.

Table 4. Average capital buffer and leverage

Nama Bank	Capital Buffer	Leverage
Mandiri	0.07142	0.2354
BRI	0.08194	0.1732
BCA	0.07074	0.0536
BNI	0.08894	0.1163
CIMBNiaga	0.06384	0.0514
Danamon	0.09642	0.1622
Permata	0.07016	0.0833
Panin	0.09588	0.0995
Maybank	0.05292	0.0698
OCBC NISP	0.08040	0.0727
Bukopin	0.05812	0.1213
BTPN	0.14352	0.0935
Mega	0.07184	0.0951
Mayapada	0.06104	0.0832
Artha Graha	0.06714	0.0841
Victoria	0.08894	0.0524
QNB	0.15492	0.0449
Woori Saudara	0.08508	0.0888
Windu Kentjana	0.06926	0.0751
MNCInternasional	0.06153	0.0770
Capital Indonesia	0.13086	0.0705
Pundi Indonesia	0.09386	0.0920
BRI Agroniaga	0.08906	0.0515
Bumi Arta	0.11242	0.0883

To test empirical significance relationship between banking systemic risk and bank loan, we estimated the equation 1. Bank's systemic risk was transformed using the procedure proposed by Anginer et al. (2014) and Karolyi et al. (2012). The procedure transforms logistic R squared obtained from equation 6 through following formula:

$$Bank's\ i\ Systemic\ Risk\ Effect = \log\left(Rsq_{i,j}/(1 - Rsq_{i,j})\right) \quad (10)$$

Karolyi et al. (2012) argue that R^2 logistic transformation is needed because R^2 value is between 0 and 1. The descriptive statistics of the variables included in the research model can be seen in Table 5.

Table 5. Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
$Log(rsq_{i,j}/(1\text{-}rsq_{i,j}))$	0.14854	0.36716	1.55496	-2.80847	0.83906
Capital buffer	0.08584	0.08194	0.15492	0.05292	0.026005
Leverage	0.093129	0.0837	0.2354	0.0449	0.043837

Table 6. Relationship between systemic risk, capital buffer, and leverage

Variable	Coefficient	t stat
Capital buffer	-3,35	3.227***
Leverage	1,26	1.398*

R square: 0,781
Durbin-Watson stat: 2,12
F test : 48,974**
***Significant at 1% level of error
** Significant at 5 % level of error
* Significant at 10% level of error

Table 6 shows empirical test results. Capital buffer significantly affect systemic risk, and has large negative magnitude. High capital buffer induces low systemic risk. Bank which has big capital buffer is more stable and its contribution to banking systemic risk is low. Bank's leverage also affect bank's contribution to systemic risk but its magnitude lower than capital buffer. Capital buffer has more serious impact on systemic risk than bank's leverage does.

Conclusion

Indonesia public banks are highly interdependent and interconnected between individual bank's distance to default and all banks' distance of default in banking system. This finding shows that Indonesia banks have similar sources of risk and quite similar bank's risk taking behavior. Changes in individual bank may cause potential systemic impact. The linkage between banks' sources of risk and risk taking behavior are so high enough that indicate there is relatively high risk of the banking system to fail simultaneously or sequentially (default cascades) because of a bank failures.

Bank's capital buffer significantly affect bank's impact on systemic risk. More capital buffer make bank to be more stable and resilient from macroeconomic and monetary turbulence. Bank's leverage also significantly influenced bank's contribution to systemic risk but its impact far below the impact of capital buffer.

References

Acemoglu, D., Ozdaglar, A., & Tahbaz-Salehi, A. (2015). Systemic risk and stability in financial networks. *American Economic Review*, *105*(2), 564–608 . https://doi.org/10.1257/aer.20130456

Adrian, T., & Brunnermeier, M. K. (2016). CoVaR. *American Economic Review*, *106*(7), 1705–1744. https://doi.org/10.1257/aer.20120555

Afik, Z., Arad, O., & Galil, K. (2016). Using Merton model for default prediction: An empirical assessment of selected alternatives. *Journal of Empirical Finance*, *35*, 43–67. https://doi.org/10.1016/j.jempfin.2015.09.004

Anginer, D., & Demirguc-Kunt, A. (2011). *Has the global banking system become more fragile over time?* (No. 5849).

Anginer, D., Demirguc-Kunt, A., & Zhu, M. (2014). How does competition affect bank systemic risk? *Journal of Financial Intermediation*, *23*(1), 1–26. https://doi.org/10.1016/j.jfi.2013.11.001

Basel Committee on Banking Supervision. (2012a). *A framework for dealing with domestic systemically important banks*.

Basel Committee on Banking Supervision. (2012b). *Core principles for effective banking supervision*.

Battiston, S., Delli Gatti, D., Gallegati, M., Greenwald, B., & Stiglitz, J. (2012). Default cascades: When does risk diversification increase stability? *Journal of Financial Stability*, *8*(3), 138–149.

Bharath, S., & Shumway, T. (2008). Forecasting default with the Merton distance to default model. *Review Financial Studies*, *21*(3), 1339–1369.

Campbell, J., Hilscher, J., & Szilagyi, J. (2008). In search of distress risk. *Journal of Finance*, *63*(6), 2899–2939.

Elliott, M., Golub, B., & Jackson, M. O. (2014). *Online appendix: Financial networks and contagion* (Vol. 104). https://doi.org/10.1257/aer.104.10.3115

Fiordelisi, F., & Marques-Ibanez, D. (2013). Is bank default risk systematic? *Journal of Banking and Finance*, *37*(6), 2000–2010.

Gai, P., Halande, A., & Kapadia, S. (2011). Complexity, concentration, and contagion. *Journal of Monetary Economics*, *58*(5), 453–470.

Georg, C. (2013). The effect of the interbank network structure on contagion and common shocks. *Journal of Banking and Finance*, *37*(7), 2216–2228.

Karolyi, G. A., Lee, K. H., & Van Dijk, M. A. (2012). Understanding commonality in liquidity around the world. *Journal of Financial Economics*, *105*(1), 82–112. https://doi.org/10.1016/j.jfineco.2011.12.008

Merton, R. (1974). On the pricing of corporate debt: The risk structure of interest rate. *Journal of Finance*, *29*(2), 449–470.

Shin, H. (2009). Securitisation and financial stability. *Economic Journal*, *119*(536), 309–332.

Sundaresan, S. (2013). A review of Mertons model of the firms capital structure with its wide applications. *Annual Review of Financial Economics*, *5*, 21–41.

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Determinants of income inequality

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Abstract

This study examines whether changing economic structure, social conditions, and financialization are responsible for increased income inequality in Indonesia. By employing panel data of 32 provinces in Indonesia that spans from 2007 to 2013, it finds that structural change affects income inequality, increased share of finance reduces inequality, which is against the financialization hypothesis, and social conditions have expected effects on income inequality. While an increased share of both agriculture and service sectors tends to reduce inequality, an increased share of manufacture sector has no effect on inequality. This study finds that falling poverty increases inequality, implying that policy to reduce poverty might not be neutral for inequality and instead cannot prevent it from increasing. Since the higher the college participation rate the higher income inequality tends to be, it does not automatically imply that in order to reduce inequality we need to reduce the number of people who go to college. It might be the case that the college participation rate has not reached a turning point, below which its increase increases inequality, but beyond which its increases reduces inequality.

Abstrak

Penelitian ini mengkaji pengaruh perubahan struktur ekonomi, finansialisasi, dan kondisi sosial terhadap ketimpangan pendapatan. Menggunakan data panel dengan cross-section 32 propinsi di Indonesia dan rentang waktu 2007-2013, penelitian ini menemukan bahwa perubahan struktural mempengaruhi ketimpangan, kenaikan sumbangan sektor keuangan dalam PDB cenderung menurunkan ketimpangan, yang berarti bertentangan dengan hipotesis finansialisasi, dan kondisi sosial juga berpengaruh terhadap ketimpangan. Sementara kenaikan sumbangan baik sektor pertanian maupun sektor jasa dalam PDB cenderung mengurangi ketimpangan, kenaikan sumbangan sektor industri terbukti tidak mempengaruhi ketimpangan. Studi ini juga menemukan bahwa turunnya tingkat kemiskinan justru manaikkan ketimangan, sehingga kebijakan untuk menurunkan kemiskinan bisa bersifat tidak netral terhadap ketimpangan, melainkan tidak mampu membiarkan ketimpangan untuk tidak naik. Juga ditemukan bahwa kenaikan angka partisipasi kuliah justru menaikkan ketimpangan, yang mengimplikasikan bahwa angka ini belum mencapai titik belok (turning point).

Introduction

Income inequality has been increasing in recent years in most countries in the world. Figure 1 shows the downward trending labor shares of income in both advanced countries and emerging and developing countries, which is suspected of being behind the increased income inequality, while lower labor shares strongly associated with higher income inequality (measured by Gini coefficients) both across countries and over time within countries (IMF, 2017). It might be the case that increased income inequality results from falling shares of labor income. Indonesia and ASEAN countries are not excluded. The World Bank (2016) revealed that income inequality in Indonesia has been deteriorating recently. The Gini coefficient significantly increased from 0.30 in 2000 to 0.41 in 2013, 2014, and 2015. This means the pie of economic growth over the past decade has mostly been enjoyed by the top 20 percent of the population, leaving behind the remaining 80 percent (or 205 million people). Further, while the consumption per capita for the

top 10 percent of Indonesians grew by over 6 percent annually, for the poorest 40 percent it grew by less than 3 percent annually between 2003 and 2010. In the ASEAN region, in fact income in Indonesia had been distributed more fairly than in its neighboring countries over the previous three decades that ended in 2009 or 2010. However, as shown by Figure 2, due to its faster growth in Indonesia than in the other three countries since 1999, the level of income inequality in Indonesia has finally surpassed and become higher than the level in the neighboring countries since 2010.

Income distribution across regions within Indonesia also shows similar pattern. Not only does the level of inequality greatly vary across provinces, it also has increased quite significantly over the period 2008-2015, from 0.32 to 0.41 on average, as shown in Figure 3. The inequality level in Papua Barat Province is the highest and above the national average in both years, and the lowest in Kepulauan Bangka Belitung. There were 16 provinces with inequality level higher than the national average in 2008 and only 7 provinces in 2015. This means the increased inequality level over the past 7 years has been concentrated in few provinces. These 7 provinces have been experiencing more than proportionate increase in inequality level than other provinces. Specifically, Papua Barat has suffered the highest increase in the level of inequality with the Gini ratio increasing by 13 basis points, followed by DKI Jakarta and Jawa Timur with the Gini rising by 10 and 9 basis points, respectively.

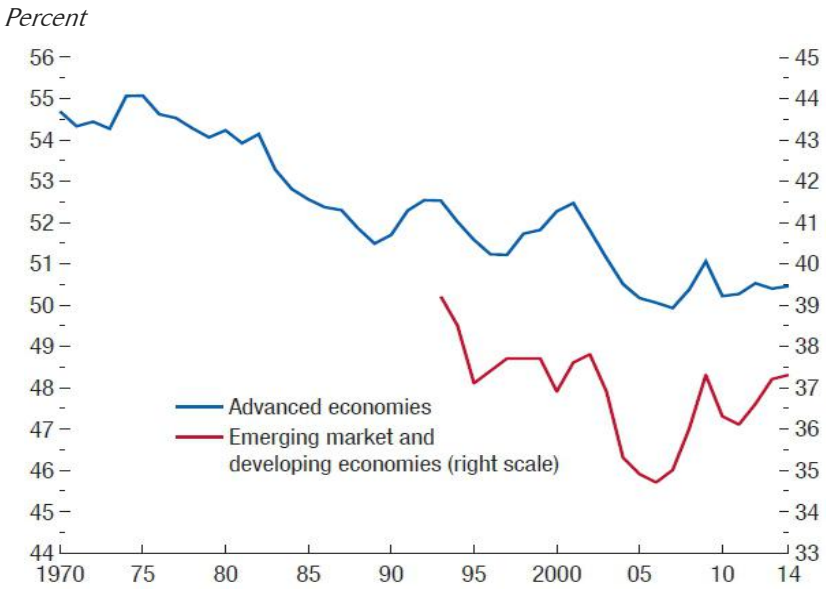


Figure 1. Labor shares of income

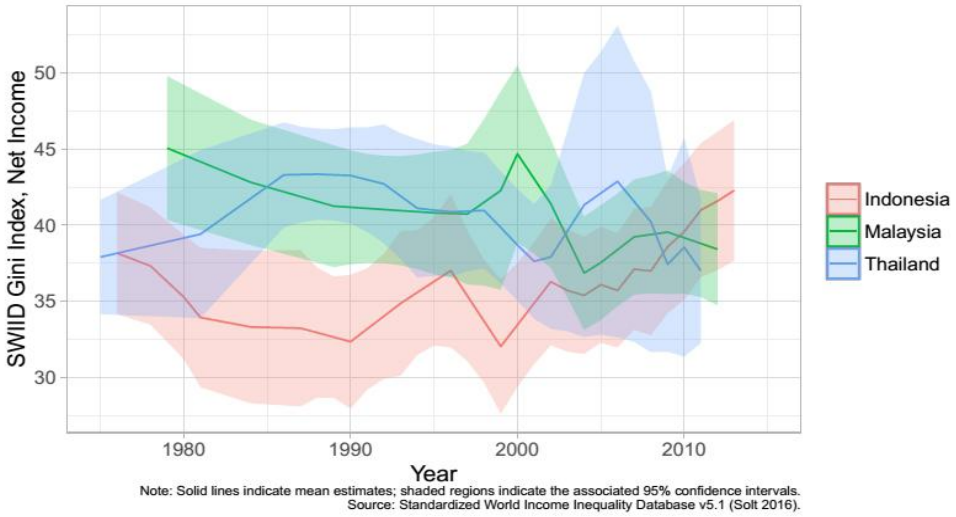
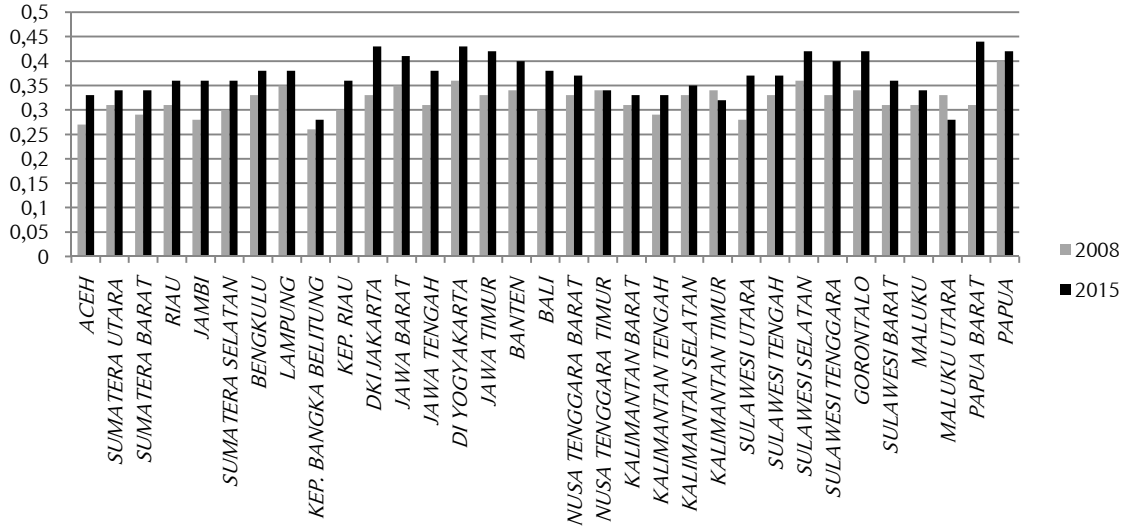


Figure 2. Income inequality in Indonesia, Malaysia, and Thailand (Solt, 2016)



Source: Statistics Indonesia, 2017

Figure 3. Gini ratio across different provinces in Indonesia in 2008 and 2015

This increased inequality has also actually been felt by the ordinary people in their daily lives. A survey conducted among Indonesians by the World Bank (2016) reports that the majority of them feel that the income distribution in Indonesia is "very unequal" or "not equal at all". The report raises a worry that regions with a higher level of inequality than the national average have 1.6 times more chances of experiencing social troubles. Not only will an unequal distribution likely produce negative effects on society, it also tends to slow down economic growth in the long run. The following questions, therefore, are worth asking. Why is it that the level of inequality differs across provinces and has been increasing over the past decade in Indonesia? What factors are responsible for these differences and the increase in the level of inequality across provinces over the past decade? Why have some provinces been experiencing more than proportionate increase in the level of inequality than other provinces over the past decade? Right answers to these questions might help provide formula as to what should be done to reduce the level of inequality across provinces and years.

In the literature various views have proposed explanations for the increased levels of income inequality. While some scholars have attributed the increased levels of income inequality to economic restructuring processes, others have suggested that changing social conditions or the combination of the two were mainly responsible for the phenomenon (Albrecht & Albrecht, 2007). Other scholars have argued that technological changes (Blanchard, 1997), globalization (IMF, 2007; Kanbur, 2015), weakening of labor's bargaining position (Blanchard & Giavazzi, 2003), and financialization (Dünhaupt, 2012, 2016; Hein, 2015; Stockhammer, 2012; Van Arnum & Naples, 2013) were responsible for the increased inequality. Financialisation can be described as an increasing importance of financial sector in the economy that tends to have impact on the distribution between wages and profits, on the one hand, and retained earnings and financial income in the form of dividends and interests, on the other (Sawyer, 2014).

In a study aimed at investigating the sources of increased income inequality in the U.S., using county-level data for the US, Albrecht & Albrecht (2007) found that social conditions were much more strongly related to inequality than economic structure. The two social conditions most strongly related to inequality included female employment and the percent of female-headed households. IMF (2007) reviewed current research that links globalization to inequality where some researchers show that globalization accentuates inequality both within and between countries, while others claimed the opposite, arguing that globalization has disintegrated national borders and prompted economic integration, lifting millions out of poverty, and closing the inequality gap. As for link between financialization and inequality, Dünhaupt (2012) attempted to determine whether financialization is responsible for the falling labor share of income in the USA and Germany. By splitting the observed profit share of the two countries into the share of retained earnings and the share of net property income (rentiers' income) as proxy for financialization, he found that for the US the important shift towards financialization occurred in the early 1980s where the share of rentiers income increased exactly at that time and remained on a higher level until the

end of the observation period, while for Germany the process started much later, in the beginning of the 1990s. Hence financialization tended to be responsible for the fall in the labor share of income in both countries during the period under study. This results is corroborated by his later study where, using dividend and interest payments of non-financial corporations to represent financialization and employing a time-series cross-sectional dataset of 13 countries over the time period from 1986 until 2007, he found support for the existence of a relationship between increasing dividend and interest payments of non-financial corporations and the decline of the share of wages in national income Dünhaupt (2016). These results found support from similar studies (Hein, 2015; Stockhammer, 2012; Van Arnum & Naples, 2013). While Hein (2015) and Stockhammer (2012) employed the shift in the financial sector share in the economy and the increase in management salaries and rising profit claims of the rentiers to capture financialization, and Van Arnum & Naples (2013) made use of the relative share of financial sector in GDP, all of them found that financialization has contributed to the falling labor income share and income inequality since the early 1980s. However, this nearly conclusive result that established the link between financialization and increased inequality relies exclusively on studies for advanced countries. Studies on the same issue for developing countries are extant.

The primary objective of this paper is to empirically investigate the behavior of income inequality in Indonesia. In particular it aims at answering the question as to why income inequality in Indonesia as a whole and across provinces has been increasing over the last decade. In doing so, following the literature, it employs the explanatory variables that represent economic structure, sociological conditions, and financialization. Unlike in (Albrecht & Albrecht, 2007; Chevan & Stokes, 2000) where the economic structure variable is measured by the proportion of labor force employed in each sector in the economy, here we measure it using the share in gross regional domestic product (GRDP) of each sector in each province. Since the sectors in the economy are disaggregated into nine sectors, the economic structure variable is broken down into nine variables that include the share in GRDP of each of the 9 sectors. One of these variables, the share in GRDP of Finance, Real Estate and Business Services (FREBS), is taken as representing the degree of financialization. This follows the financialization literature and especially the step of Van Arnum & Naples (2013) who employed the share in GDP of FIRE sector that includes finance, insurance, real estate industries as proxy for financialization in their study. The share of this sector in GRDP measures the increasing importance of financial sector in each Indonesian province whose growth might have taken place at the expense of the non-financial sector and the wage of its workers and other ordinary wage earners in general. Therefore, we hypothesize that there will be a positive relationship between the GDP share of financial sector and income inequality. Further we make use of college participation rate and absolute poverty rate as variables that represent social conditions variables, owing to (Van Arnum & Naples, 2013), instead of (Albrecht & Albrecht, 2007).

Arguably thus far there have been no similar studies conducted for Indonesia. Among the empirical studies on income inequality for Indonesia that have been conducted, most of them, for example (Akita, Lukman, & Yamada, 1999; Akita, 2003; Alisjahbana et al., 2003; Cameron, 2000; Chongvilaivan & Kim, 2016; Kaneko, Kaneko, & Managi, 2007; Leigh & van der Eng, 2009; Nugraha & Lewis, 2013) focus more on income inequality decomposition between sub regions and sub groups and income inequality measurement and its development. None of them has been investigating whether economic structural changes, sociological conditions and financialization are responsible for the change in income inequality in Indonesia. Akita (2003) applied the two-stage nested Theil decomposition method of regional income inequality, instead of personal income inequality, in China and Indonesia using a district as the underlying regional unit to measure regional income inequality. Further, Leigh & van der Eng (2009) estimated top income shares for Indonesia during 1920-2004 using taxation and household survey data and suggested that top income shares grew during the 1920s and 1930s, but fell in the post-war era, and increased again sharply during the late-1990s, coinciding with the 1997-98 economic crisis, a finding that contradicts the view that Indonesia is a relatively egalitarian society. The rest of these previous studies mainly dealt with income inequality decomposition and did not touch upon the issue attempted to address in the present study. This is the gap the present study intends to fill in and in that way contributes to the current literature on income inequality.

The remaining of this paper is organized as follows. The second part reviews the theoretical explanation for the change in income inequality and elaborates on the potential explanatory variables that are used in the empirical part. The third part of this article outlines research method that includes the dataset along with its sources and the empirical specifications of the econometric model that is used. While the fourth presents the empirical results, the last part concludes.

Possible explanations for changing income inequality

The view that regards economic restructuring processes as the main determinant of increased income inequality, especially in the United States and most developed countries, was pioneered by the study of (Kuznets, 1955). He argued that there is a tendency for the relationship between economic restructuring and inequality to follow a pattern resembling an inverted U. That is, income inequality would initially increase during the early stages of economic restructuring from a dependence on agriculture to a dependence on manufacturing, and then reach a peak, level off, and eventually decline. Kuznets noticed that as industrialization was underway in the United States in the 1800s inequality initially increased, achieved maximum in the 1890s, stabilized for several decades, and finally declined in the 1920s (Alderson & Nielsen, 2002). Thus the stages of increasing and stabilizing inequality lasted more than 100 years before it finally declined. Results from subsequent studies largely supported Kuznets pattern for the United States and other advanced economies (Lindert, 2000; Nielsen & Alderson, 1997).

However, the decline did not last forever. Income inequality began to increase in the 1970s in the United States and other advanced economies and continued through the present days, thereby following a pattern resembling an N, instead of an inverted U (Alderson & Nielsen, 2002). Not only has income inequality been growing in the U.S. as a whole since the 1970s, it also has been growing at an increasing rate and also increasing within each population subgroup (Albrecht & Albrecht, 2007). The proponents of the economic restructuring view attribute the increased income inequality over the past several decades to the economic transformation from a dependence on manufacturing to a dependence on services. Thus the economy is in a constant flux of restructuring process that inevitably results in a constant change in inequality. This view arguably has a grain of truth since the transition that has taken place is characterized by the lost of most middle income manufacturing jobs compensated by new service jobs that have a large range of quality. Some service jobs no doubt are high paying ones that include medical doctors, lawyers, accountants, and dentists (Sassen, 1990), but many others are low skilled, temporary, often informal, and low paying jobs (Bhattacharya, 2011; Dobson & Ramlogan-Dobson, 2012). The loss of middle income manufacturing jobs that have been replaced by a small proportion of high income jobs and a greater proportion of low income jobs in the service sector inevitably produces greater inequality. Hence, a greater dependence on service sector is expected to be associated with greater income inequality.

On the social camp, scholars, mostly sociologists, argue that increased income inequality largely results from the changing social conditions, instead of economic restructuring (Chevan & Stokes, 2000; Morris & Western, 1999). These social conditions include, among others, the rate of participation in the labor force of men and women, the proportion of female-headed households, and the size of the minority population. In general men used to get more employed and earn relatively higher wages than women. Therefore, the recent changes that produced lower male employment rates or higher female employment rates likely bring about losses in high male incomes compensated by generally lower female incomes and, in turn, higher levels of inequality. This line of reasoning also applies for the increased proportion of female-headed households, and size of the minority population. The higher the prevalence of female-headed households and the size of minority population the higher income inequality tend to be.

Meanwhile it has been argued that the distribution of income is also a question of how the pie of national production is divided between rent, profit and wages. There are distributional conflicts between firms and shareholders on the one hand and wage and salary earners on the other. This also means a distributional conflict between retained profits, interests and dividends on the one side and wages on the other. Empirically Dünhaupt (2016) reports that the share of income of wage earners (labors) has been shrinking in most OECD countries since the mid 1980s until the Great Recession, while the share of profits has been increasing and much of the increase was determined by rising dividend and interest payments. This arguably is one of important reasons behind the increased inequality in recent decades.

Various studies have linked the phenomena of shrinking share of wage to technological change, globalization and weakening bargaining power of labors. The IMF (2007) for example argues that the revolution in the computers and information and communication technologies have driven unskilled labors out of marketplaces to be replaced by skilled labors. The formers inevitably have to be satisfied, if lucky enough, with low paying jobs or without jobs at all. This argument is complemented by the globalization thesis that relies on the Heckscher-Ohlin model and argues that due to global competitions countries tend to specialize in the areas where they have comparative advantage (Kanbur, 2015). Therefore, countries with abundant labors concentrate on labor-intensive production, while capital-rich countries rely on capital-intensive production. Consequently, labor in the former gains more than capital owners and capital

owners in the latter win over labor. Likewise, in theory, wage share likely increases in the former and decreases in the latter. However, globalization also exerts different effects on skilled and unskilled labors in the labor-rich countries with a consequence that in the long run wages of unskilled workers will fall and wages of skilled workers will rise.

However, the technological change view fails to explain the fact that countries with similar level of technology, such as Anglo-Saxon countries and Continental European countries, have been experiencing different magnitudes of labor's shares decline, with the former having lower decline than the latter (Kristal, 2010). Similarly, contradicting the globalization thesis, developing and emerging countries have been experiencing worse decline in the labor share of income since the 1990s than in advanced countries (International Institute for Labor, 2011). Owing to these drawbacks some scholars have turned to financialization to explain increased inequality that resulted from the decline in labour's share of income (Chen & Chen, 2012; Dünhaupt, 2012, 2016; Hein, 2015; Lin & Tomaskovic-Devey, 2013; Stockhammer, 2009, 2017; Van Arnum & Naples, 2013). One important manifestation of financialization is that profits are increasingly accumulated by means of finance that include dividends, capital gains, and interests, rather than trade, producing commodities, or nonfinancial services. Therefore, financialization is often measured using increased share in GDP of the financial sector, increased emphasis on current shareholder returns, and rising household debt (Stockhammer, 2017).

At least there are two possible mechanisms by which financialization might increase the income share of rentiers and reduce the labor's share of income. First, a shift in sectoral composition of the economy where financial sector claims increasingly higher share in national income than non-financial sector in the economy can lead to an overall lower labor' share of income if their respective shares in employment are different. In his study for the US, for example, Dünhaupt (2012), found that an important part of the downward trend of the US wage share was attributed to the increase in the share of financial corporations in value added, while their share in labor employment was lower than that of the non-financial sector.

Second, financialization has increased the share of rentier incomes for the economy as a whole that include corporate earnings that accrue to dividend, interest, and other rent payments and capital gains. Palley (2013) summarizes how it happens as follows. As we know Gross domestic product (GDP) is divided between the share of capital and that of labor, and financialization has led to increased capital's share and decreased labor's share. Labor's share is in turn broken down into non-managers' share and managers' share that includes salaries and other compensations, and financialization has seen an increase in managers' share and a decrease in nonmanagers' share. While capital's share can be broken down into profits and interest income, profits are in turn distributed to financial sector and non-financial sector. Not only has financialization seen increased share of capital and decreased share of labor, it also has witnessed changing composition of capital's share, with the share of interests increasing and that of profit falling. Furthermore, there has also been an increase in the financial sector's share of total profits and a decrease in the non-financial sector's share.

Research Method

This study employs a sample of 32 provinces (out of 34 provinces, excluding Kepulauan Riau and Kalimantan Utara) in Indonesia that spans from 2007 to 2013[1]. The time dimension of the data is yearly and quite limited by data availability of Gini coefficient on provincial level. Therefore, in total the province-year combinations make up 224 observations. All the data are taken from the website of Statistics Indonesia (www.bps.go.id). Since the number of provinces and years for each variable is uniform, we have a balanced panel. Some empirical studies on income inequality that rely on panel data employ a random effect (RE) model (Agnello & Sousa, 2012; Brady & Wallace, 2000). While RE models have the advantage of estimating both variations within as well as between provinces, fixed effect (FE) models can only estimate variation within provinces with the advantage of capturing unobserved effects and hence reducing omitted variable bias (Dünhaupt, 2016). Since the provinces included in the sample arguably have different levels of development as reflected in the per capita income and economic growth, including province fixed effects, enables us to control for province specific characteristics. Nonetheless, the selection of the panel data model is also aided by conducting Chow and Hausman tests.

To test the hypotheses we will estimate the income inequality equation of the following form:

[1] The exclusion of these two provinces is due data unavailability in the time span under study.

$$GINID_{it} = \beta_0 + \beta_1 ALFF_{it} + \beta_2 MQ_{it} + \beta_3 M_{it} + \beta_4 EGWS_{it} + \beta_5 CN_{it} + \beta_6 THR_{it} + \beta_7 TC_{it} + \beta_8 FREBS_{it} + \beta_9 S_{it} + \beta_{10} PR_{it} + \beta_{11} CP_{it} + \varepsilon_{it} \quad (1)$$

where *i* and *t* denote the province and year, respectively; $GINID_{it}$ is Gini coefficient; $ALFF_{it}$ is the share in Gross Regional Domestic Product (*GRDP*) of Agriculture, Livestock, Forestry and Fishery; MQ_{it} is the share in GRDP of Mining and Quarrying; M_{it} is the share in GRDP of Manufacturing; $EGWS_{it}$ is the share in GRDP of Electricity, Gas and Water Supply; CN_{it} is the share in GRDP of Construction; THR_{it} is the share in GRDP of Trade, Hotel and Restaurants; TC_{it} is the share in GRDP of Transport and Communication; $FREBS_{it}$ is the share in GRDP of Finance, Real Estate and Business Services; S_{it} is the share in GRDP of Services; PR_{it} is Poverty Rate or the percentage of people in absolute poverty in the population; CP_{it} is College Participation Rate (in percent); β_0 is constant; $\beta_1 \ldots \beta_{11}$ are coefficients on explanatory variables; and ε_{it} is the error term.

In terms of economic structure variables, the expected effects on income inequality might follow the inverted U pattern as suggested by Phillips or the N pattern as suggested by more recent researchers. The effect of the share in GRDP of Agriculture, Livestock, Forestry and Fishery (*ALFF*) on income inequality is expected to be positive with the assumption that the share of this sector in total employment is relatively small. The share in GDP of Manufacturing (*M*), in turn, is expected to have a negative effect on income inequality, assuming that its share in total employment is relatively large. If this turns out to be the case the economy can be said to be at the later stage of the inverted U pattern. If the opposite is the case the economy is on the earlier stage of the inverted U pattern or N pattern. As for industries in the service sector, the expected effects on income inequality might be positive, in which case N pattern is followed, or negative, in which case an M pattern emerges. While in the former the share in total employment of service sector is still limited and relatively very small, in the latter its share in total employment is already relatively large. As regards the financialization hypothesis, the effect of the share in GRDP of Finance, Real Estate and Business Services (*FREBS*) on income inequality, as suggested by the literature, is expected to be positive. If this turns out to be the case the financiaization hypothesis gains support. While the effect of college participation rate on income inequality is expected to be positive, as suggested in Van Arnum & Naples (2013), the absolute poverty rate might have ambiguous effects on income inequality. The lower the absolute poverty rate the lower the income inequality tends to be. But it might be the case that a lower absolute poverty rate is associated with a higher income inequality.

Results and Discussion

Based on both Chow test and Hausman test the choice of the model is in favor of the fixed effect model. Table 1 presents the results of both the FE and RM models estimation. In terms of the sign of the coefficient, the estimated two models differ in the coefficient of only two variables, namely *MQ* and *S*. However, the estimated FEM produces more statistically significant coefficients than the estimated REM, nine and seven out of twelve, respectively. Since based on the overall statistical indicators the estimated FEM provides better results, the discussion mostly relies on the FEM results.

Table 1. Estimation results

Variable	FEM		REM	
	Coefficient	Std. Error	Coefficient	Std. Error
C	0.421***	0.046	0.328***	0.031
ALFF	-0.356***	0.117	-0.017	0.052
MQ	0.055	0.055	-0.068*	0.039
M	0.053	0.050	0.085**	0.037
EGWS	2.074	2.624	0.109	0.746
CN	1.372***	0.531	0.243	0.153
THR	-0.307*	0.188	-0.263***	0.072
TC	1.033***	0.344	0.327*	0.185
FREBS	-1.644***	0.282	-0.132	0.107
S	-0.177***	0.065	0.002	0.044
PR	-0.004***	0.001	-0.002***	0.001
CP	0.003***	0.001	0.004***	0.001
[illegible]	0.775		0.356	
[illegible]	0.723		0.323	
F *test*	14.833***		10.699***	

Notes: ***, **, * indicate 1, 5, 10 percent of significant levels respectively.

Economic structure and income inequality

There are three explanatory variables: *MQ*, *M* and *EGWS* that do not have statistically significant effects on income distribution, although the signs of the coefficients on these three variables are as expected by the hypotheses. This may mean that the change in the share in gross regional domestic product (*GRDP*) of each of these three sectors (Mining and Quarrying; Manufacturing; and Electricity, gas and water supply) does not affect income distribution. These three sectors happen to belong to the same larger group, called industry sector. Collectively, their share in the total value added increased only by 5 percentage points from 41.72 percent in 1980 to 46.78 percent in 2012, while their share in total employment increased a slightly higher by 8.57 percentage points, from 13.10 percent to 21.67 percent during the same period. Since this sector controls nearly half of the total value added but contributes only 22 percent to the total employment, an increase in its share in GDP should have increased the level of income inequality. While the finding for *MQ* and *EGWS* sectors may be understandable because their share in the *GRDP* is quite small, as shown in Figure 5, it is quite questionable for *M* sector, since its share in the *GRDP* is comparatively the highest and its share in labor absorption tends to be small. Therefore, the increase in its share in the *GRDP* should have increased income inequality as indicated by the positive sign of the coefficient, which is the case if we use the result from the estimated REM. At least as long as the sign is concerned for *MQ*, *EGWS*, and *M* sectors or if the result from the REM for *M* sector is used, the result is in line with (Albrecht & Albrecht, 2007), although they found significant negative sign for manufacturing because they use the share in total employment of manufacturing. Further this result is more consistent with the early stage of the inverted U pattern of Kuznets (1955) and his later supporters (Lindert, 2000; Nielsen & Alderson, 1997) than the latter stage of N pattern. The industrialization process indicated by increased share of the industry sector in GDP is associated with increased income inequality. This is the case at early stage because a shift in the share in GDP from agriculture to industry is not smoothly followed by a shift in the share in total employment. Therefore, the estimated effect of agricultural sector (*ALFF*) should be negative in order to support this conclusion.

However, if the statistically not significant result for manufacturing sector turns out to be what is supported by what really happens on the ground, its share in total employment must have been comparatively large. This might be the case because the manufacturing sector in Indonesia largely adopts a labor-intensive technology. Therefore, it can be seen as a good sign in that the structural change from an agricultural-dominated economy to a manufacturing-dominated economy is not detrimental to income distribution. In fact, there is still one subsector of the industry sector, namely construction (*CN*) sector, which will be discussed later. The question then is where have the variety of income inequality levels across provinces and the increased inequality level over the last decade come from? The construction sector might be one of them.

The result for the remaining 8 explanatory variables show that each has a statistically significant effect on income distribution, with three of them having estimated signs of coefficients not as expected by the hypotheses. The share in *GRDP* of each of the following 5 sectors (*ALFF*, *CN*, *THR*, *TC*, and *S*) is found to have statistically significant effect on income distribution with the sign of coefficient as suggested by the hypotheses. First, an increased share in *GRDP* of *ALFF* sector that includes agriculture, livestock, forestry and fishery reduces income inequality. This is expected since, as shown in Table 2, this sector provided 35 percent of total employment, while creating only 14.50 percent of total value added in 2012. Hence, a smaller portion of value added should be shared by a larger portion of people. Accordingly, the larger is the share of this sector in *GRDP,* given its share in total employment, the lower the level of income inequality. This result as we have suggested above supports the early stage inverted U pattern. This finding may also mean that provinces with smaller share in *GRDP* for *ALFF* sector tend to have higher level of income inequality. Similarly, the fact that the share of *ALFF* sector in *GRDP* has declined overtime might have contributed to increased level of income inequality over the past decade. Therefore, if the level of income inequality is to decrease one of possible ways is by increasing the share in *GRDP* of this sector or decreasing its share in total employment across provinces and time.

Second, the share of construction (*CN*) sector in *GRDP* positively affects the level of income inequality. This sector is the only subsector in the industry sector with the share in *GRDP* having a statistically significant effect on income inequality as suggested by the hypothesis. Since at national level its share in *GDP* has constantly increased overtime from 5.51 percent in 2000 to 10.05 percent in 2014, its share in total employment should be disproportionately the smallest in the industry sector. This might imply that provinces with higher *GRDP* shares for construction sector tend to have higher level of inequality. There-

fore, one of possible ways to reduce the level of income inequality is not by reducing its share in *GRDP* but by increasing its share in total employment by absorbing more people across provinces and overtime. If this sector is taken as a subsector in the industry sector the result supports Kuznets (1955) and his later supporters (Lindert, 2000; Nielsen & Alderson, 1997). But if it is categorized as a subsector of service sector the result is more consistent with the N pattern (Alderson & Nielsen, 2002).

Third, as for the sector comprising trade, hotel and restaurant (*THR*), an increase in its share in *GRDP* tends to reduce the level of income inequality. Similarly the share in *GRDP* of service (*S*) sector also negatively affects the level of income inequality. At more aggregate level these two sectors belong to the same larger group, called Service sector (with capital S to distinguish it from the subsector service), that absorbed the highest portion of total employment, 43.24 percent, while creating 38.72 percent of total value added in the economy in 2012, as reported in Table 2. Arguably a great portion of that employment share must have been provided by the *THR* and *S* sectors, especially through informal activities in trade, food stalls, and family servants, so that the greater is their share in *GRDP* the lower the level of income inequality. Likewise, a more equal distribution of income may be attempted by increasing the share in *GRDP* of these two sectors across provinces and times. Looking at this share overtime, as seen in Figure 5, it has not changed much over the period 2000-2014 and as a result it is the variety across provinces that is likely more responsible for the level of income inequality. The prevalence of informal activities in these sectors is unique to developing countries such as Indonesia. As a result it is quite possible that the inverted U pattern or the N pattern, which were constructed based on the experience of advanced countries, has not been or will never actually be replicated in developing countries. If in advanced countries the shift in the share of total employment between the three main sectors is in order, first, from agriculture to manufacturing, and subsequently from manufacturing to service, in developing countries the shift arguably is more simultaneous. Hence, the stage of increased inequality of the inverted U turn will probably last quite long, besides that according to the experience of the U.S. this stage lasted more than 100 years.

Finally, although transport and communication (*TC*) sector also belongs to the Service sector, its share in *GRDP* has a positive effect on income inequality. The larger is its share in *GDRP* the higher the income inequality level. Figure 5 shows that its share in *GRDP* has steadily increased over the period 2000-2014, although not quite significant. It might be the case that its share in employment in the Service sector is disproportionately very small, since transport is quite capital intensive and communication jobs require specific skills. Therefore, in order to reduce income inequality its capacity to employ more people across provinces and time should be enhanced. The disruption of transport industry by swift emergence of online-based public transport, which is transforming from a company-based transport system to a broad-based sharing system, might likely be able to employ significantly more people than before. This, in turn, will likely improve the distribution of income.

Financialization and income inequality

The share in GRDP of the sector that includes finance, real estate and business services (*FREBS*) is found to have a negative and statistically significant effect on income inequality. This finding seems to be against the financialization hypothesis that argues that the increasing dominance of the financial sector in the economy tends to be detrimental to income distribution (Hein, 2015; Stockhammer, 2009). That is, the result suggests that the increasing share of this sector in GDP even improves income distribution. At least if the result from the REM is used, it has no effect on income distribution or financialization is absent. In particular, the result is not consistent with the result of Van Arnum & Naples (2013), because although they employ the same measure of financialization as in this research, the share in GDP of financial sector, their result supports the financialization hypothesis. One likely reason is that arguably the *FREBS* sector in Indonesia is still developing and far from dominant and, as shown in Figure 5, its share in *GDP* has been very small and declining over the last decade, from 8.31 percent in 2000 to just 7.65 percent of *GDP*. Further, its share in total employment might be relatively higher than its share in GDP, especially through better and wider access for the people to finance. Another likely reason is that since the share in GDP of financial sector is not the only measure of financialization, the variable currently used is not a good measure of financialization and therefore other variables suggested in the literature, such as the share in GDP of rentier income (interest and dividend payments and capital gains) are worth attempting. However, such variable is impossible to employ in the current research due to lack in data.

Alternatively, what is more relevant argument is probably the one that belongs to the financial inclusion hypothesis that says that the increased share of financial sector in GDP tends to be associated with

greater and wider accesses of the people to financial facilities and hence more business opportunities and in turn more equal distribution of income (Beck, Demirgüç-Kunt, & Levine, 2007; Demirgüç-Kunt, Levine, Demirgûç-Kunt1, & Levine2, 2009).

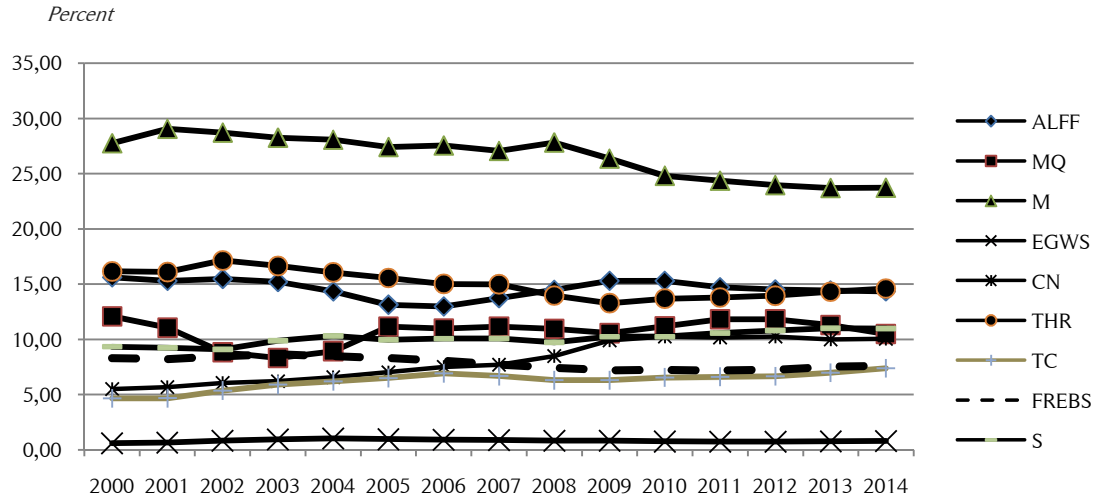


Figure 5. GDP share of each of 9 (nine) sectors in the economy

Social conditions and income inequality

The result for the poverty rate is against the commonly held hypothesis. Decreased poverty rate is expected to decrease income inequality. But the result suggests the opposite. Decreased poverty rate increases income inequality. It is quite possible that increased income inequality is associated with falling poverty rate if as a whole the proportion of population living under the poverty line declines due to a significant growth in per capita income and at the same time the larger proportion of the income growth is enjoyed by the top 20 percent of the population. Indeed over the last decade poverty rate has been steadily declining, while the income inequality level has been increasing. Therefore apparently reduced poverty rate increases income inequality. This might imply that increased per capita income across provinces and times have successfully reduced poverty rate but at the same time have increased income inequality. Therefore, policy measures specifically designed to reduce poverty does not necessarily reduce income inequality. There is no such thing as one fits for all.

The last explanatory variable is college participation rate (*CP*). The finding suggests that the higher the university participation rate the higher the income inequality level. This goes with the common wisdom and supports Van Arnum & Naples (2013). The college participation rate in this study employs the data of the university participation rate of the population between the age of 18 and 24 years. It is widely recognized that university education is costly and not many Indonesian people of that age category can afford it. It is suspected that those who enjoy university educations mostly come from middle and upper class families. Accordingly, the more of the youth from these families enrolled in university education the worse is the distribution of income. This is partly because they have higher probability of winning highly skilled job opportunities with better pays than those without university education.

Conclusion

Seven variables are found to have effects on income inequality. Although with expected signs, the *GRDP* shares of sectors that include Mining and Quarrying; Manufacturing; and Electricity, Gas and Water Supply, turns out to have no effect on income distribution. As expected an increase in the GRDP share of *ALFF* sector that includes agriculture, livestock, forestry, and fishery tends to reduce income inequality. This implies that provinces with smaller share in *GRDP* for *ALFF* sector tend to have higher level of income inequality, that declining trend in the share of *ALFF* overtime might have contributed to increased level of income inequality over the past decade, and if the level of income inequality is to decrease one of possible ways is by increasing the GDP share of this sector or decreasing its share in total employment across provinces and times. While the GRDP share of construction is found to positively affect income

inequality, the GRDP share of service sector that includes trade, hotel, and restaurant tends to negatively affects income inequality. As a result, a more equal distribution of income might be attempted by decreasing the former and increasing the latter across provinces and times. Further, it is found that the larger is the *GRDP* share of transport and communication the higher the income inequality, likely because of the job-saving nature of the sector. The online transport system revolution might likely affect the result. This study does not find support for the financialization hypothesis. Against the hypothesis, increased importance of financial sector tends to reduce income inequality. If the variable measuring financialization is correct, the result might be more consistent with the financial inclusion hypothesis. This study also finds that falling poverty increases inequality, implying that policy to reduce poverty might not be neutral for inequality and instead cannot prevent it from increasing. Since the higher the college participation rate the higher income inequality tends to be, it does not automatically imply that in order to reduce inequality we need to reduce the number of people who go to college. It might be the case that the college participation rate has not reached a turning point, below which its increase increases inequality, but beyond which its increases reduces inequality.

Refrences

Agnello, L., & Sousa, R. M. (2012). How do banking crises impact on income inequality? *Applied Economics Letters*, *19*(15), 1425–1429. https://doi.org/10.1080/13504851.2011.631885.

Akita, T. (2003). Decomposing regional income inequality in China and Indonesia using two-stage nested theil decomposition method. *Annals of Regional Science*, *37*(1), 55–77. https://doi.org/10.1007/s001680200107.

Akita, T., Lukman, R. A., & Yamada, Y. (1999). Inequality in the distribution of household expenditures in Indonesia: A theil decomposition analysis. *The Developing Economies*, *37*(2), 197–221. https://doi.org/10.1111/j.1746-1049.1999.tb00231.x.

Albrecht, D. E., & Albrecht, C. M. (2007). Income inequality: The implications of economic structure and social conditions. *Sociological Spectrum*, *27*(2), 165–181. https://doi.org/10.1080/02732170601118153.

Alderson, A. S., & Nielsen, F. (2002). Globalization and the great u-turn: Income inequality trends in 16 OECD countries. *American Journal of Sociology*, *107*(5), 1244–1299. https://doi.org/10.1086/341329.

Alisjahbana, A. S., Yusuf, A. A., Chotib, Yasin, M., Soeprobo, T. B., National Institute for Development Administration (NIDA), T., & Foundation, T. F. N. (2003). Understanding the determinants and consequences of income inequality in Indonesia. In *Bangkok Conference on Comparative Analysis of East Asian Income Inequalities* (pp. 1–26).

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, *12*(1), 27–49. https://doi.org/10.1007/s10887-007-9010-6.

Bhattacharya, P. C. (2011). Informal sector, income inequality and economic development. *Economic Modelling*, *28*(3), 820–830. https://doi.org/10.1016/j.econmod.2010.10.007.

Blanchard. (1997). The medium run. *Brookings Papers on Economic Activity*, *1997*(2), 89–158. https://doi.org/10.1353/eca.2010.0000.

Blanchard, O. O., & Giavazzi, F. (2003). Macroeconomic effects of regulation and deregulation in goods and labor markets. *Quarterly Journal of Economics*, *118*(3), 879–907. https://doi.org/10.1162/00335530360698450.

Brady, D., & Wallace, M. (2000). Spatialization, foreign direct investment, and labor outcomes in the American states, 1978–1996. *Social Forces*, *79*(1), 67–105. https://doi.org/10.2307/2675565.

Cameron, L. A. (2000). *Poverty and inequality in Java: Examining the impact of the changing age, educational and industrial structure*. *Journal of Development Economics* (Vol. 62). https://doi.org/10.1016/S0304-3878(00)00079-1.

Chen, S.-W., & Chen, T.-C. (2012). Untangling the non-linear causal nexus between exchange rates and stock prices: New evidence from the OECD countries. *Journal of Economic Studies*, *39*(2), 231–

259. https://doi.org/10.1108/01443581211222671.

Chevan, A., & Stokes, R. (2000). Growth in family income inequality, 1970–1990: Industrial restructuring and demographic change. *Demography*, *37*(3), 365–380. https://doi.org/10.2307/2648048.

Chongvilaivan, A., & Kim, J. (2016). Individual income inequality and Its drivers in Indonesia: A theil decomposition reassessment. *Social Indicators Research*, *126*(1), 79–98. https://doi.org/10.1007/s11205-015-0890-0.

Demirgüç-Kunt, A., Levine, R., Demirgûç-Kunt1, A., & Levine2, R. (2009). Finance and inequality: Theory and evidence. *Source: Annual Review of Financial Economics*, *112334*, 287–318. https://doi.org/10.1146/annurev.financial.050808.114334.

Dobson, S., & Ramlogan-Dobson, C. (2012). Inequality, corruption and the informal sector. *Economics Letters*, *115*(1), 104–107. https://doi.org/10.1016/j.econlet.2011.11.034.

Dünhaupt, P. (2012). Financialization and the rentier income share – evidence from the USA and Germany. *International Review of Applied Economics*, *26*(4), 465–487. https://doi.org/10.1080/02692171.2011.595705.

Dünhaupt, P. (2016). Determinants of labour's income share in the era of financialisation. *Cambridge Journal of Economics*, *41*(1), 283–306. https://doi.org/10.1093/cje/bew023.

Hein, E. (2015). Finance-dominated capitalism and re-distribution of income: A Kaleckian perspective. *Cambridge Journal of Economics*, *39*(3), 907–934. https://doi.org/10.1093/cje/bet038.

IMF. (2007). World economic outlook: Globalization and inequality. *World Economic Outlook*, (1955), 31–65. https://doi.org/10.1093/esr/jcn046.

IMF. (2017). *World economic outlook: Gaining momentum? World Economic Outlook April 2017*.

International Institute for Labor. (2011). *Full Report - World of work report 2011: Making markets work for jobs*. *World of Work Report* (Vol. 2011). https://doi.org/10.1002/wow3.30.

Kanbur, R. (2015). Globalization and inequality. *Handbook of Income Distribution*, *2*, 1845–1881. https://doi.org/10.1016/B978-0-444-59429-7.00021-2.

Kaneko, S., Kaneko, S., & Managi, S. (2007). Income inequality changes during periods of economic recovery in Indonesia. *Empirical Economics Letters*, *6*, 307–313.

Kristal, T. (2010). Good times, bad times: Postwar labor's share of national income in capitalist democracies. *American Sociological Review*, *75*(5), 729–763. https://doi.org/10.1177/0003122410382640.

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, *45*(1), 1–28. https://doi.org/10.2307/2118443.

Leigh, A., & van der Eng, P. (2009). Inequality in Indonesia: What can we learn from top incomes? *Journal of Public Economics*, *93*(1–2), 209–212. https://doi.org/10.1016/j.jpubeco.2008.09.005.

Lin, K.-H., & Tomaskovic-Devey, D. (2013). Financialization and U.S. income inequality, 1970-2008. *American Journal of Sociology*, *118*(5), 1284–1329. https://doi.org/10.1177/0002716206296734.

Lindert, P. H. (2000). Chapter 3. Three centuries of inequality in Britain and America. *Handbook of Income Distribution*. https://doi.org/10.1016/S1574-0056(00)80006-8.

Morris, M., & Western, B. (1999). Inequality in earnings at the close of the twentieth century. *Annual Review of Sociology*, *25*, 623–657. https://doi.org/10.1146/annurev.soc.25.1.623.

Nielsen, F., & Alderson, A. S. (1997). The Kuznets curve and the great u-turn: Income inequality in U.S. countries, 1970 to 1990. *American Sociological Review*, *62*(1), 12–33. https://doi.org/10.2307/2657450.

Nugraha, K., & Lewis, P. (2013). Towards a better measure of income inequality in Indonesia. *Bulletin of Indonesian Economic Studies*, *49*(1), 103–112. https://doi.org/10.1080/00074918.2013.772941.

Palley, T. I. (2013). *Financialization*. London: Palgrave Macmillan UK. https://doi.org/10.1057/9781137265821.

Sassen, S. (1990). Economic restructuring and the American city. *Annual Review of Sociology*, *16*, 465–490. https://doi.org/10.2307/2083278.

Sawyer, M. (2014). What is financialization? *International Journal of Political Economy*, *42*(4), 5–18. https://doi.org/10.2753/IJP0891-1916420401.

Solt, F. (2016). The standardized world income inequality database*. *Social Science Quarterly*, *97*(5), 1267–1281. https://doi.org/10.1111/ssqu.12295.

Stockhammer, E. (2009). The finance-dominated accumulation regime, income distribution and the present crisis. *Papeles de Europa*, *19*, 58–81.

Stockhammer, E. (2012). Financialization, income distribution and the crisis. *Investigacion Economica*, *71*(279), 39–70. https://doi.org/10.1093/cje/bev024.

Stockhammer, E. (2017). Determinants of the wage share: A panel analysis of advanced and developing economies. *British Journal of Industrial Relations*, *55*(1), 3–33. https://doi.org/10.1111/bjir.12165.

Van Arnum, B. M., & Naples, M. I. (2013). Financialization and income inequality in the United States, 1967-2010. *American Journal of Economics and Sociology*, *72*(5), 1158–1182. https://doi.org/10.1111/ajes.12036.

World Bank. (2016). *Indonesia's rising divide*. *World Bank Group*. Retrieved from http://documents.worldbank.org/curated/en/267671467991932516/Indonesias-rising-divide.

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Trading system of food commodity

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Abstract

Most of food commodities in the Central Java are produced and traded in the local market. The aim of this research is to analyse internal and external factors determining trade of food commodities and analyse its trade model in Central Java. Research data consist of both primary and secondary that were analysed according to SWOT and Location Quotient (LQ) methods. The analysis of internal factors suggests that the availability and the quality of food commodities as well as the regulations related to traditional markets still need to be improved. The analysis of external factors proves that the local production is subject to be increased. Based on LQ results it shows that the agricultural sector in Central Java is highly specialised and has a strong base sector.

Abstrak

Sebagian besar komoditas pangan di Jawa Tengah diproduksi dan diperdagangkan di pasar local. Tujuan penelitian adalah untuk menganalisis faktor internal dan eksternal yang menentukan system perdagangan komoditas pangan dan sekaligus memodelkan system perdagangan pangan di Jawa Tengah. Data penelitian meliputi data primer dan sekunder yang dianalisis menggunakan metode SWOT dan *Location Quotient* (LQ). Analisis internal menunjukkan bahwa ketersediaan dan kualitas komoditas pangan termasuk kebijakan pengelolaan pasar tradisional perlu ditingkatkan. Analisis eksternal membuktikan bahwa produksi pangan lokal masih perlu ditingkatkan. Berdasarkan hasil LQ menunjukkan bahwa sektor pertanian di Jawa Tengah cenderung terspesialisasi dan merupakan sektor basis ekonomi.

Introduction

The total value of food production in Indonesia tends to increase every year. According to the database of the Central Bureau of Statistics of the Republic of Indonesia the total output of food crops increased by 46% between 2000 and 2014 equivalently to IDR 112 trillion to IDR 146 trillion respectively. However, the increase of the food crops production was lower than the growth of the total sector.

Central Java is one of the most important regions of Indonesia in terms of both food production and food supply. The province has an over 1 million hectares of the arable land. The provincial government promotes sustainable agricultural development and support economic welfare of farmers in the region. The index of economic welfare of farmers living and working in Central Java Province increased from 97.20 to 105.33 during 2008 - 2013 period. In the same period, the national index for farmers in Indonesia increased from 97.07 to 104.62. The situation in Central Java is slightly better than that of the national level. This research is focused on the analysis of trading system of food commodity in the Central Java Province. In addition, this research also analyses the trade specialization of food commodity using location quotient (LQ) method.

The importance of the analysis is aligned to the study of Bonnard & Sheahan (2009); Chandra & Lontoh (2010); Jensen (2010); and Sen & Majumder (2011). The study of the local trading system in Central Java suggests that there are three basic ways to sell food products, which are as follows: 1) purchase from farmers and direct sales of goods to consumers, 2) indirect purchase from farmers and direct sales of goods to consumers and 3) indirect purchase of imported goods and direct sales to consumers. There are also certain internal factors determining trade of food commodities in Central Java such as the availability of goods produced in the local market and the level of prices; and food crops are limited and not durable, in consequence their availability is lower and merchants cannot sell them frequently. On the other hand,

the group of external factors consist of basic needs of communities in terms of food crops supply as well as the number of competitors.

This paper is relevant to the results of empirical studies conducted by Bonnard & Sheahan (2009), Chandra & Lontoh (2010); Jensen (2010); and Sen & Majumder (2011). Bonnard & Sheahan (2009) emphasised the significance of both market analyses and market mapping in order to explain the development of trade of goods and services. The market analysis and market mapping can provide valuable details concerning the market such as: information linkages among traders and regions in the regional market system; information related to food security in the market system; monitoring and evaluation of the regional food trade as well as useful information for policymakers.

Chandra & Lontoh (2010) concluded that all the efforts related to food security as well as an open economy in the environment of the global trading system are becoming more and more important issues for the ASEAN countries. Consequently, it is worth emphasising that ASEAN countries stated at the end of 2015 that the regional food security will be perceived as one of the most important issues for the ASEAN Economic Community. According to Jensen (2010) the sustainable food system including the production, distribution, trade and consumption is an important concern for stakeholders. It seems certain that both local and regional approaches to food systems will affect societies and will be vital for future development. Whereas according to Sen & Majumder (2011) the introduction of the fair trade policy is becoming more and more important and it should be widely applied. The way to implement fair trade rules is a standardisation process and certification of agricultural commodities. This statement leads to the critical discussion, which is certainly crucial and related to issues such as justice, equity as well as sustainable trade of food commodities.

Research Method

This research uses both primary and secondary data. Primary data were collected from the survey with 350 respondents (traders) in the province of Central Java conducted in early 2016. The sampling technique is a purposive sampling method or respondents were selected in accordance with the objectives of this research. Primary data consist of information related to food commodity trading system, such as: trade patterns and trade channels as well as internal and external factors affecting food commodities. Secondary data are mostly economic indicators that is 2000 constant price GRDP of the agricultural sector during 2000-2014.

Data were analysed according to three methods: descriptive, SWOT analysis (internal and external factors) and the location quotient (LQ) method. A descriptive method was used in order to explain a trading system used by food traders in the region of Central Java. The main purpose of SWOT analysis is analysis the internal and external factors affecting food trade in Central Java. The purpose of using LQ is to measure local specialisation of a sector or an industry in a specific region and compare it to a larger region, usually a country. It is possible to distinguish two types of LQ method: static location quotient (SLQ) and dynamic location quotient (DLQ). The goal of the SLQ method is to analyse comparative advantages of the agricultural sector in Central Java and its relative position in the country in the 2000-2014 period. On the other hand, the DQL method was used to evaluate the growth rate of the agricultural sector and compare it to the national average in the same period. This part of the research is related to the studies carried out by Mack & Jacobson (1996). SLQ and DLQ can be calculated according to the following formulas:

$$SLQ = \frac{qi/qr}{Qi/Qn} \tag{1}$$

where:
SLQ = *Static Location Quotient* coefficient
Qi = GDP generated by the agriculture in Indonesia
qi = (regional) GDP generated by the agriculture in Central Java
Qn = GDP of the Republic of Indonesia
qr = (regional) GDP of the Central Java Province

According to the formula the value of the LQ > 1 means that the sector has a regional competitive advantage, therefore the region where the sector is located is able export its products to other regions or abroad. Contrary, if the value of the LQ<1 the region is likely to import products from other regions or countries.

$$DLQ_{ij} = \left[\frac{\left(1+g_{ij}\right)/\left(1+g_j\right)}{\left(1+G_i\right)/\left(1+G\right)} \right]^t = \frac{IPPS_{ij}}{IPPS_i} \quad (2)$$

where:

DLQ_{ij} = Index of the economic potential of the agriculture in Central Java
g_{ij} = GDP growth rate of the agriculture in Central Java
g_j = GDP growth rate of Central Java
Gi = GDP growth rate of the agriculture in Indonesia
G = GDP growth rate of Indonesia
t = The analysed period of time expressed in years (2014 – 2000)
$IPPS_{ij}$ = Potential development index of the agriculture in Central Java
$IPPS_i$ = Potential development index of the agriculture in Indonesia

The value of the DLQ>1 can be interpreted as a higher potential of the agricultural sector in Central Java in comparison with an average for Indonesia. Consequently, the value of the DLQ < 1 means that the agriculture in this specific region has a lower potential than the sector in other regions or the country as a whole.

Results and Discussion

In this research 43 basic food commodities are taken into consideration. These commodities are as follows: Rice, Paddy Rice, Corn, Cassava, Sweet, Potato, Peanuts, Soybeans, Green Beans, Red Onion, Garlic, Potato, Cabbage, Chili, Tomato, Carrot, Long Beans, Bean, Cucumber, Leaf Onion, Sawi, Red Beans, Eggplant, Chayote, Kale, Spinach, Mango, Rambutan, Duku, Star Fruit, Durian, Banana, Bark, Orange, Pineapple, Papaya, Melon, Watermelon, Avocado, Guava, Water, Apple, Mangosteen, Jackfruit, and Sawo. According to the Central Bureau of Statistics there are huge differences in the growth rate of food production. It is worth pointing out that the average annual growth rate achieved the highest value for mango and the lowest value for garlic, 341,23% and –10,50% respectively. Furthermore, it is necessary to emphasise that mango producers are supported by the government's policy through the establishment of the food processing industry. On the other hand production of garlic is limited due to competitors from low-lying lands in other regions. Further development of the production of other basic food commodities also depends on the government's programmes that support their production, e.g. by providing subsidies on seeds, fertilisers, extension of arable lands and technology.

Trade and production of livestock commodities in Central Java concern 13 products, which are as follows: Horse, Beef Cattle, Milch Cows, Buffalo, Goat, Sheep, Pork, Kampong Chicken, Broiler, Chicken, Duck, Quail, and Rabbit. The average annual growth rate of livestock commodities also varies, the highest average growth rate was achieved by beef cattle and the lowest one by buffalo, 655.86% and –6.23% respectively. The government has made certain efforts to support beef cattle business development in terms of both upstream (farmers) and downstream processes (markets and consumers).

Table 1. Distribution of respondents by commodities and gender

No	Commodity	Gender			
		Male		Female	
		Respondents	%	Respondents	%
1	Paddy rice	8	2.29	27	7.71
2	Fruits	8	2.29	27	7.71
3	Chicken meat	7	2.00	28	8.00
4	Beef	8	2.29	27	7.71
5	Fish	9	2.57	26	7.43
6	Corn	12	3.43	23	6.57
7	Soybean	10	2.86	25	7.14
8	Vegetables	9	2.57	26	7.43
9	Eggs	9	2.57	26	7.43
10	Tubers	2	0.57	33	9.43
	Total	82	23.43	268	76.57

Fishery commodities produced and traded in Central Java consist of 8 products, which are as follows: Marine Fisheries, Fish Pond, Fish Field, Swimming Fish, Fish Cage, Fish Reservoir, Fish River, and Fish Swamp. The highest growth rate has been achieved in the production of fish farming cage systems (19.82%). Fish farming is a highly demanded way of producing fishery commodities owing to the favourable conditions in Indonesia and especially in Central Java. On the other hand, marine fisheries are still limited because the local capital is not enough to boost this sector. Another crucial issue for fish production is a local consumption pattern. Further improvements of these conditions is absolutely necessary to stimulate business growth and to maximise the productivity in this sector. The survey is based on 350 respondents working as merchants in Central Java. The groups were divided in accordance with commodities and gender of respondents (see Table 1).

Table 2. Types of products sold by respondents

No	Commodity	Types of commodity
1	Paddy rice	Ciherang rice, IR 64, pandan, Rojolele, cisadane, organic paddy rice
2	Fruits	Avocados, grapes, apples, Duku, guava, orange, kedondong, mango, mangosteen, melon, snake fruit, sapodilla, watermelon, papaya
3	Chicken meat	Kampung chicken, broiler chicken
4	Beef	Beef super, regular beef, offal
5	Fish	Pomfret, milkfish, tilapia, carp, squid, cork, snapper, catfish, tilapia, sale, salmon, tuna, tuna, shrimp
6	Corn	Yellow corn, white corn
7	Soy	Local and imported
8	Vegetables	Broccoli, green beans, peppers, leeks, japan, green beans, kale, sprouts, cauliflower, potatoes, cabbage, cabbage, betel nut, pepper, melon, cabbage, lettuce, celery, cucumber, eggplant, tomato, carrot
9	Eggs	Broiler chicken eggs, chicken eggs, duck eggs, quail eggs
10	Tubers	Yams, cassava, tales

Table 2 provides the information about the most important types of commodities in traditional food markets. It is worth emphasising that the commodities traded in traditional markets and presented in the Table 2 are supposed to match local demand (a city or a district as a whole).

Internal and external factors of food commodity trading

Table 3. Internal and external factors determining trade of food commodities

Internal Factors	External Factors
Strengths:	**Opportunities:**
a. Most of food commodities are produced by local farmers; b. Merchants can easily get products suitable for customers; c. Food commodities are offered at affordable prices for local consumers; d. Quality of the services offered by local merchants is usually quite high; e. Good quality of local food commodities.	a. Food commodities are the basic need of societies; b. Goods deliveries are guaranteed by local producers, however certain delays should be taken into consideration; c. Government policies aimed to support and revitalise traditional markets; d. Government policies intended to improve the quality and increase the production capacity of local farmers.
Weaknesses:	**Threats:**
a. Some food commodities are vulnerable to the seasons changes and weather; b. Short expiry dates of food commodities; c. The space of market stalls is usually very limited; d. Limited storage space for stock (e.g. lack of warehouses, just the traditional storage methods) e. Merchants have to deal with various types of fees.	a. A relatively high number of competitors in the market; b. Some of the competitors (merchants) sell their products outside the traditional markets; c. A better quality of the imported products, which are offered at competitive prices (it depends on foreign exchange rates) d. In case of crop failures it is necessary to look for suppliers from other regions or countries.

Internal and external factors of food commodity trade in Central Java are described in the Table 3. The group of internal factors consists of strengths and weaknesses of the trade. On the other hand, external factors include indicators such as opportunities and threats. In general, it is possible to claim that the

strength of food commodity trade in Central Java is the quality and supply of products. Nevertheless, production of food commodities is vulnerable to climate changes and short expiry dates of products. Furthermore, the trade of food commodities in Central Java needs further improvements of distribution channels performance. In order to make distribution channels more efficient it is crucial to shorten supply chains, decrease cost of transportation and to improve the regulations related to traditional markets.

The negative impact of external factors on food trade shows that the government of the Central Java Province should regulate the market of food commodities. The main purpose of the proposed regulations is to improve market access for local products. Moreover, the regulations should also include tools to supervise and control both quantity and quality of imported food commodities. Nevertheless, there is still a great potential for local products because of the size of the local market. Therefore, the current situation of the producers in Central Java should be perceived as an opportunity. The regulations could support local producers and encourage them to compete efficiently with imported products, which are a direct threat for local food commodities.

Table 4. Development strategy of food commodity trade

Strengths & Opportunities: a. Intensification and expansion of agriculture in order to maximise the productivity; b. Improving the quality of food commodities in post-harvest processing and warehousing; c. Determining trade policies in terms of food commodities.	**Strengths & Threats:** a. Revitalisation of traditional markets: b. Introduction of legal frames in terms of food trading in traditional markets: c. The local government should support development of warehouses for food commodities in order to maintain their quality and support merchants.
Weaknesses & Opportunities: a. The local government plays an important role in promoting the quality of food commodities; b. Merchants should give clear and accurate information about the quality and prices of food commodities; c. Merchants should cut some costs of local food commodities to boost sales.	**Weaknesses & Threats:** a. The local government should encourage traders to focus their business on sales of local commodities; b. Traders should establish business relations with farmers associations.

The analysis of food trade in Central Java can lead to various solutions. However, taking both internal and external factors into consideration it is possible do determine a basic framework of such a strategy. Consequently, according to the findings of this research it is necessary to emphasise some crucial policies that should be considered by the government of Central Java. The main policy is that the revitalisation process of traditional markets revitalization is becoming more and more important issue and it is crucial to attract more customers and improve the management. In addition, the revitalisation of traditional markets could also be used to organise the presence of traders at traditional market areas and outside of it in a transparent manner. Regulations on food trade system are also essential to improve the distribution, pricing and quality of food commodities in Central Java. Merchants should also implement some strategic changes in their business activity, such as providing clear and accurate information concerning quality and prices of food commodities; and establishing business cooperation between associations of traders and farmers in order to ensure availability and quality of food commodities.

Food trading system in Central Java province

In Central Java there are two trading patterns of food crops: a) deliveries of food crops to local merchants from a regional commodity supplier in accordance with a period and a form of payment; and b) direct regional sales of food crops to consumers in accordance with a period and a form of payment. According to the survey conducted with 350 respondents working as traders in the region of Central Java it is possible to distinguish certain patterns of food trading. The pattern of trade depends on types of commodities, these patterns are as follows:

1. Type 1: Purchasing from farmers and direct sales to consumers. This method of sales is usually used in terms of commodities such as rice, local fruits, chicken, local beef, fresh water fish (aquaculture), corn, local soybeans, vegetables, eggs, and tubers
2. Type 2: Indirect purchase from farmers or producers and direct sales to consumers. This model is used in case of products such as sea fish, local beef, corn, local soybeans, vegetables and local fruits. Consequently, a merchant relies on agents (brokers) providing products from farmers and producers

3. Type 3: The last model of trade is based on indirect import of goods and direct sales to consumers. Merchants usually apply this model to sell products such as fruits, beef and soybeans

The first type of a trading model of food commodities in Central Java is based on a short distribution channel. In this model traders rely on direct deliveries from producers and farmers. It means that all parties are located in the same region. The model of the first type of food trading can be seen in the Figure 1. The model includes four elements: input, process, output and impact. Input elements consist of information about the availability of food products from farmers, quality of goods and pricing of products. Process elements of this model explain characteristic of sales at traditional markets, commodity segregation based on quality, pricing of commodities in the market (having considered costs of transportation, marketing, fees, interests, and the risk of damage to food commodities). The output element is supposed to explain sales of food commodities to consumers, business profits and fees. The impact elements of this model are supposed to explain a relatively low level of prices, which is related to a relatively short distribution chain, development of agriculture in the region and efforts to improve the welfare of both producers and traders.

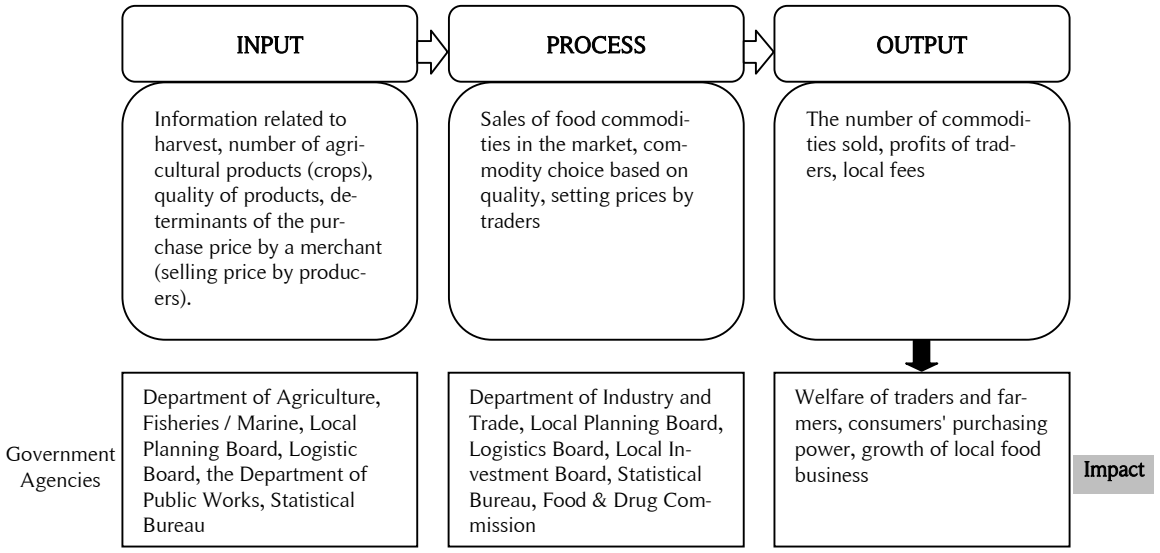


Figure 1. Trading model of food commodities in Central Java type 1

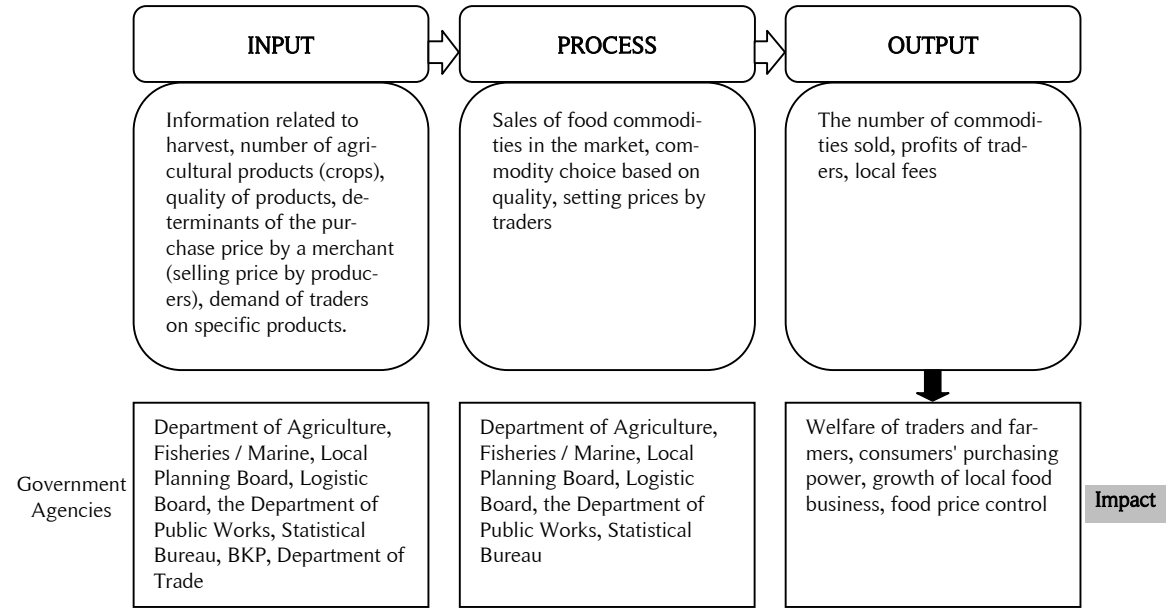


Figure 2. Trading model of food commodities in Central Java (Type 2)

The type 2 model is applied if there is a demand for goods produced outside of Central Java. In this model traders at traditional markets contact suppliers from the region of Central Java. These suppliers already have business relations with certain customers (other traders) located in the specific market. In this model the prices are given by suppliers. Thus, the prices of food commodities will be relatively higher for the consumers because of the profits gained by agents (brokers). In consequence, this model has certain disadvantages, especially high prices for consumers. However, an important advantage of this pattern is a direct access to products guaranteed by specialised parties, therefore traders can focus on core business instead of looking for new sources of food commodities. Under these circumstances more products should be available on the market.

The second model also includes four elements: input, process, output and impact (Figure 2). Input elements provide the information about availability of food commodities from producers (farmers) to suppliers and the information about demand on specific products from traders. Therefore, at this stage both the quality of food commodities and their pricing depends on agents (suppliers). The process is supposed to provide further details about pricing and sales of food commodities at this stage. Output of the model describes further details concerning sales, profits of traders and fees (taxes). The last group consists of impact for improving the welfare of traders and farmers, consumers' purchasing power, control food prices and growth of local food business.

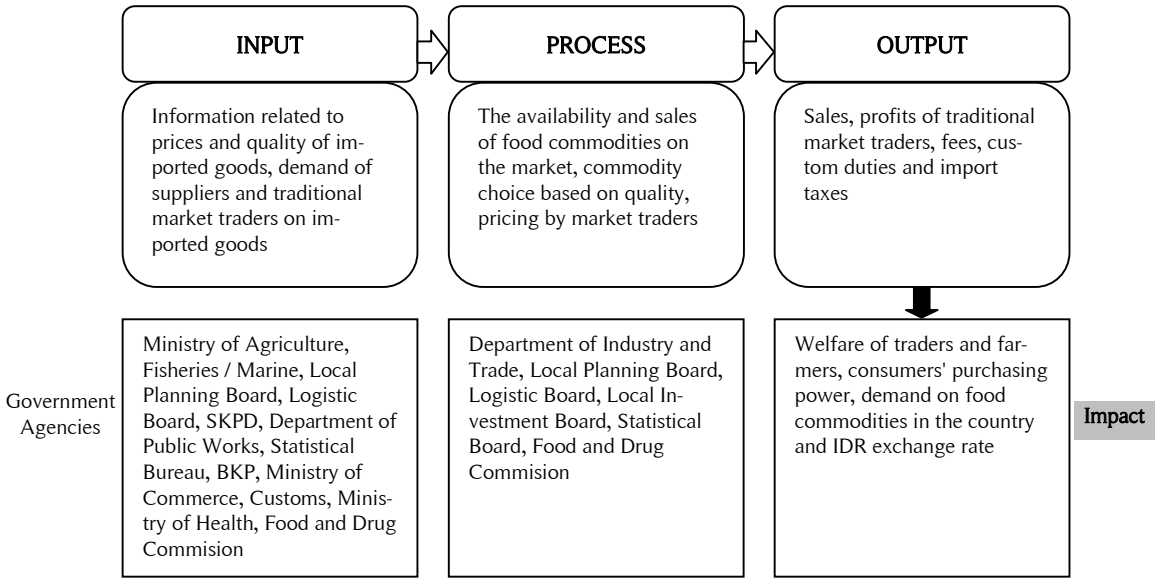


Figure 3. Trading model of food commodities in Central Java (Type 3)

Type 3 models the trading system with more distribution channels and more complicated one because goods are imported by Indonesian companies. Consequently, there is no fixed amount of goods in the market and the prices are vulnerable to fluctuations of exchange rates of foreign currencies (especially US Dollar to Indonesian Rupiah).

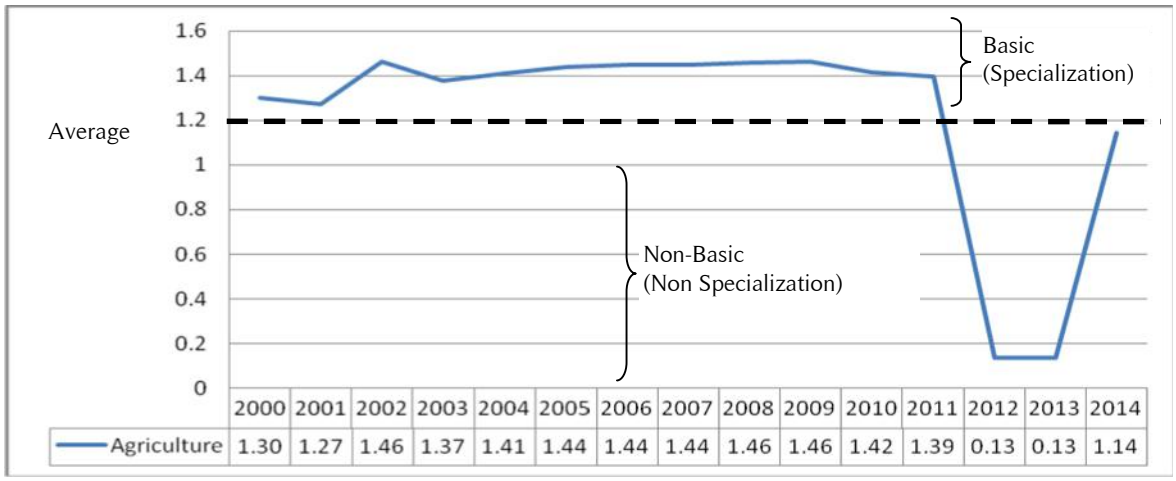
In this model traders are obliged to contact suppliers who provide goods directly from importers. Therefore, Javanese suppliers have to rely on the availability of food commodities distributed by Indonesian importers. In consequence, both suppliers (agents) and traders are dependent on food commodities provided by importers. It is worth emphasising that in terms of consumption it is possible to reduce this dependency and uncertainty with local substitutes. The substitution is possible only in case of certain products, it is also crucial to take consumers' approach into consideration. Preferences and habits of customers can cause low price elasticity of demand, which is why certain consumers will not decide to choose local substitutes instead of imported goods in case of price fluctuations. Consequently, it seems that the quality of imported goods is perceived as the most important factor determining their choice.

The third model of food trade includes elements such as input, process, output and impact. Input provides information concerning availability of goods, prices and quality of imported food commodities, information needs and the availability of food commodities imported by suppliers, and the information concerning demand of traders. At this stage, the pricing (in Indonesian Rupiah) of imported food com-

modities depends on both importers and suppliers. Process describes the availability of food commodities and sales operations conducted by traders. The pricing process and sorting of food commodities is based on their quality. Consequently, at this stage the final price of goods depends on all parties (importers, suppliers and market traders). The output of the model explains sales, profits of traditional market traders, fees, custom duties and import taxes. Therefore, according to this information it is possible to describe welfare of traders, consumer purchasing power, balance of demand and supply in the country, prices and Indonesian Rupiah exchange rates.

Regional analysis of agricultural sector

Regional analysis of the agricultural sector was conducted using SLQ and DLQ methods. The description of the agricultural sector illustrates products and commodities which are available in the province of Central Java. SLQ and DLQ calculation results can be seen in Figure 4 and 5. According to SLQ analysis in the 2000-2011 period the agricultural sector in Central Java can be perceived as the basic sector (specialised) in comparison with the national agricultural sector. Moreover, in the analysed period (2000-2010) the DLQ results show that the agricultural sector in Central Java is growing faster than the national average for the agriculture.

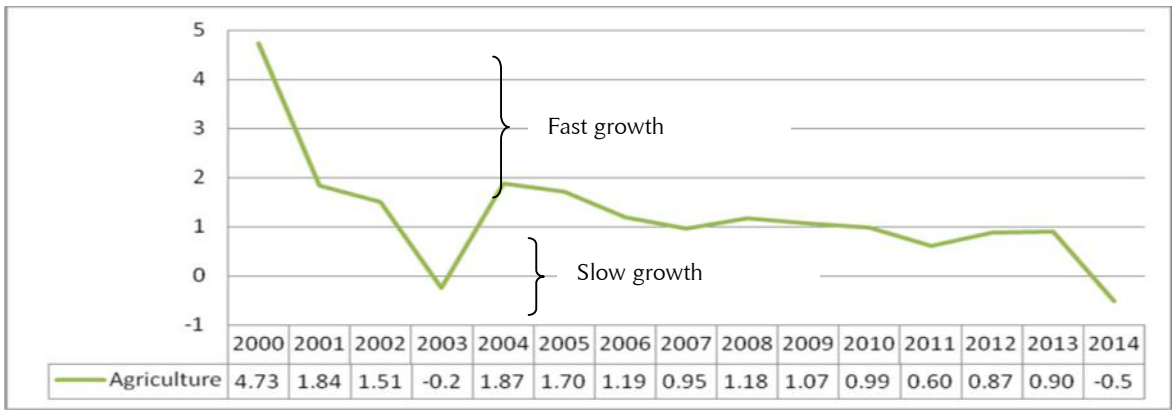


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agriculture	1.30	1.27	1.46	1.37	1.41	1.44	1.44	1.44	1.46	1.46	1.42	1.39	0.13	0.13	1.14

Note: Provisional data for 2014

Figure 4. Curve of calculation results of SLQ analysis of the agriculture in Central Java

According to the results of SLQ and DLQ analyses concerning the agricultural sector in Central Java it is possible to emphasise the following findings. Firstly; the agricultural sector as a provider of food commodities is one of the priority sectors in Central Java. Secondly; Farmers, traders and the local government have taken advantage of the province's potential and play an active role in supporting the development of this sector as a profitable business and a crucial part of the economy of Central Java.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agriculture	4.73	1.84	1.51	-0.2	1.87	1.70	1.19	0.95	1.18	1.07	0.99	0.60	0.87	0.90	-0.5

Note: Provisional data for 2014

Figure 5. Curve of calculation results of DLQ analysis of the agriculture in Central Java

Conclusion

Trade of food commodities in the region of Central Java Province is mostly based on local products. The local producers should enhance production and boost consumption of local commodities. However, based on SWOT analysis there are still two important issues facing by local communities: the availability of products based on local needs and the quality of food commodities.

Furthermore, there are three types of trading patterns in Central Java: a short, medium and long distribution channels. Under these circumstances the local government should establish and implement local regulations on trade of food commodities. In addition, the regional analysis shows that the growth of the sector is stable and higher than the national average. According to SLQ and DLQ calculations it is possible to claim that the agriculture can be also perceived as a basic (specialised) sector of Central Java in comparison with other regions or even the Indonesian economy. The implication of this research is the local government in Central Java Province should conduct local policy on food trade and security. It can be referred on Briones (2011); (Konandreas (2012); Jayne, Sturgess, Kopicki, & Sitko (2014) and (Murwatiningsih, Nihayah, & Oktavilia, 2013). Farmer groups should cooperate with sellers in traditional market to control supply and price. This research is limited to food trade patterns in Central Java. Therefore, further research should take into considerations factors such as competitiveness of local business and its influence on further growth of the agricultural sector in Central Java.

References

Bonnard, P., & Sheahan, M. (2009). *Commodity market maps and price bulletins: tools for food security analysis and reporting*. Washington.

Briones, R. M. (2011). *Regional cooperation for food Security: The case of emergency rice reserves in the ASEAN plus three* (ADB Sustainable Development Working Paper Series No. 18).

Chandra, A. C., & Lontoh, L. A. (2010). *Regional food security and trade policy in Southeast Asia the role of ASEAN series on trade and food security – policy report 3*. Canada.

Jayne, T. S., Sturgess, C., Kopicki, R., & Sitko, N. (2014). *Agricultural commodity exchanges and the development of grain markets and trade in Africa: A review of recent experience* (IAPRI Working Paper No. 88).

Jensen, J. (2010). *Local and regional food systems for rural futures* (RUPRI Rural Futures Lab Foundation Paper No. 1).

Konandreas, P. (2012). *Trade policy responses to food price volatility in poor net food-importing countries* (ICTSD Issue Paper No. 42). Geneva.

Mack, R. S., & Jacobson, D. S. (1996). Core periphery analysis of the European Union: A location quotient approach. *Journal of Regional Analysis and Policy*, *26*(1), 3–21.

Murwatiningsih, M., Nihayah, D. M., & Oktavilia, S. (2013). Competitiveness of leading commodities to support developing region of agro tourism. *Economic Journal of Emerging Markets*, *5*(2), 135–148. https://doi.org/10.20885/ejem.vol5.iss2.art6

Sen, D., & Majumder, S. (2011). Fair trade and fair trade certifi cation of food and agricultural commodities promises, pitfalls, and possibilities. *Environment and Society: Advances in Research*, *2*, 29–47.

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Effect of economic growth on income inequality, labor absorption, and welfare

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Abstract

This research aims to analyze the effect of economic growth on income inequality, labor absorption and economic welfare in Indonesian provinces. A 165 observations of panel data was analyzed using path analysis. The result showed that the economic growth has significant negative effect on income inequality in Indonesian provinces but it has no significant effect on both labor absorption and economic welfare. The labor absorption has significant positive effect on income inequality even though it has no significant effect on economic welfare. In addition, the economic welfare is not significantly influenced by the income inequality.

Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh pertumbuhan ekonomi terhadap ketimpangan pendapatan, penyerapan tenaga kerja dan kesejahteraan masyarakat provinsi-provinsi di Indonesia. Ada 165 observasi data panel yang kemudian dianalisis dengan menggunakan analisis jalur. Hasil penelitian menunjukkan bahwa pertumbuhan ekonomi berpengaruh signifikan terhadap ketimpangan pendapatan di provinsi-provinsi di Indonesia namun tidak berpengaruh signifikan terhadap penyerapan tenaga kerja dan kesejahteraan ekonomi. Sementara itu penyerapan tenaga kerja memiliki pengaruh positif signifikan terhadap ketimpangan pendapatan meskipun itu tidak berpengaruh signifikan terhadap kesejahteraan ekonomi. Selain itu kesejahteraan ekonomi juga tidak dipengaruhi secara signifikan oleh ketimpangan pendapatan.

Introduction

Economic growth is a macro indicator of successful development so that all countries strive to achieve high economic growth in order to create the public welfare, especially for developing countries. In fact, the rapid economic growth turned out to be followed by the widening of income inequality, both among household income and regions due to the absence of trickledown effect. Inequality of development among regions is caused by several things such as differences in potential, demographic conditions and employment, social and cultural conditions, and infrastructure (Armstrong & Taylor, 2000). These differences raise the classification of developed and underdeveloped regions. The quite large differences in economic growth between regions in the early stages of development have resulted in inequality in income distribution among regions. In the long run, since the factors of production in the regions are getting optimized in the development period, the difference in the rate of growth of outputs between regions will tend to decline. It is marked by the increasing of average per capita income (Kuznets, 1955); Williamson, 1965).

The results of those studies are not consistent with studies from Bhanumurthy & Mitra (2004) in India and Panizza (2002) in America who found that the higher rate of economic growth is more often associated with lower income inequality. Inequality is a necessary condition to get economic grows faster since the beginning of development is to boost the rate of growth that concentrated in one or several areas. Increased employment indicates that economic growth has been able to create jobs either in terms of number, productivity and efficiency. Creation of high employment opportunities will have an impact on increasing people's purchasing power and ultimately the welfare of society will increase. Classical economists such as Adam Smith, David Ricardo, and Thomas Robert Malthus argued that when people get

a job they will be able to improve the welfare of people, but if they do not get a job it means they will be unemployed and would depress into lower living standards. According to Okun (1975) economic growth and unemployment have close negative relationship. It means that when economic growth increases, the unemployment will be reduced.

The success of economic development is a prerequisite for improving the quality of life (Sen, 2005). The success of economic development can be seen from the three basic values of development that are life-sustenance (the ability to provide basic needs), self-esteem (needs to be appreciated), and freedom (freedom to choose). The increasing of human development quality indicates an increase in social welfare (Romer, 1994).

Economic growth is successful if it can reduce income inequality, increase labor absorption and improve social welfare. Indonesia's economic growth is likely to increase year by year, but it does not automatically guarantee the increasing of prosperity and economic welfare in all provinces. Based on the description, the purposes of this study are to examine and to analyze the effect of economic growth on income inequality, labor absorption and economic welfare in Indonesian provinces. This study is relevant to be done due to the difference of characteristics in each province of Indonesia.

Economic growth is the long term increase in production capacity of a country to provide a variety of economic goods to its citizens. Economic growth can be driven by several factors. Kuznets (1955) said economic growth is associated with the blend effects of high productivity and large population. Growth in productivity is the most important, as explained by Adam Smith, this productivity growth brings in an increase in living standards. Economic growth depends on the availability of the supply of production factors (population, labor and capital accumulation) and the rate of technological progress (Solow, 1997), while according to Romer (1994) factors that affect the process of economic growth are coming from inside (endogenous) as technology advances and investment in science. Technology and science are two decisive factors of fast or slow pace of the economy of a country. Investment in human capital will improve the productivity of the capital. Economic growth according to Perroux does not appear at the same time and only occurs in a few places that are the center (pole) of growth with different intensities. The more basic activity the more opportunity to the area to spur faster growth. Meanwhile, according to Rosenstein-Rodan (1943) rapid industrialization is indispensable for the continuity of sustainable economic growth, and the strategy to build a variety of industries concurrently should be used to create a more equitable distribution of income.

The imbalanced economic growth among regions will cause income inequality, a condition in which there are the differences in the level of per capita income between regions and between people. The extreme inequality of income would lead to economic inefficiency and increase the number of poverty. Income inequality among regions should receive attention in development since extreme income inequality can lead to economic inefficiency. At any level of average income, the higher inequality will lead to narrower the population that is eligible to earn a loan or other credit sources. Moreover, the extreme income inequality would undermine social stability and solidarity as well as an represents injustice to society.

The pattern of development and the level of inequality in development found in some countries are not similar. According to Grossman & Helpman (1989) inequality between regions both in terms of revenue and growth is caused by rapid population growth and migration from rural to urban areas, the flow of trade, capital and people that moved from the underdeveloped region to more developed region. Meanwhile, differences in the development achieved by a region are also causing development gaps.

The differences in the progress of economic development between regions will pose a backwash effect that dominates the spread effect, and regional economic growth is a process that is not equilibrium. Backwash effect is the negative impact perceived by a region for the economic expansion of other more developed regions, while the spread effect is the beneficial effect on the region for the economic expansion of some other areas. If the difference between the two regions narrow, it means there is a good outcome for the trickling down effect. Meanwhile if the difference between the two regions get further away it means there is a process of polarization (polarization effect).

Economic growth and equality in income distribution is often a trade off and not easy to achieve correspondingly. Kuznets argued that at the early stages of growth, income distribution tends to deteriorate, but at the later stage it will be improved. This observation is widely known as the concept of Kuznets Inverted U Curve (Kuznets, 1955). Different circumstances occured in advanced countries where the environmental conditions are generally in better in terms of infrastructure and facilities and the quality of human resources. Furthermore socio-cultural barriers in the development process is almost nonexistent.

Under these conditions every chance and development opportunitiy can be exploited in a more evenly distributed among regions. As a result, the process of development in the advanced countries will tend to reduce the inequality of development among regions. This Neo Classical theory is then empirically tested for accuracy by Williamson (1965) through the study of the development gaps among regions in the developed countries and the developing countries.

According to Okun's law, of any 2.2 percent economic growth rate, labor absorption increased by one percent (Barro & Sala-I-Martin, 2004). A minimal unemployment rate (4% per year) will be achieved if all of the production capacity (full employment) are used so it is very important to maintain the economy to be in a state of full employment. In line with the economic development in general, employment opportunities will evolve from the primary sector (agriculture and mining) to the secondary sector (manufacturing industry), while the services sector has a relatively small growth.

Indonesia with its large population tends to have the excess of labor, where the majority of Indonesian population is in rural areas and absorbed in the agricultural sector. The excess of workers in one sector will contribute to the growth of output and the supply of workers in other sectors. The absorbtion of the excess labor in the industrial sector (the modern sector) by the informal sector will lead to the increasing of wage levels in rural areas gradually and this will reduce the income disparity between rural and urban areas, so that the excess supply of workers does not cause problems on economic growth. Instead the excess labor is precisely the capital to accumulate income, assuming the movement of labor from the traditional sector to the modern sector runs smoothly and never becomes too much. The interaction between the two sectors is initiating and accelerating development (Ranis, Stewart, & Ramirez, 2000).

The growth of population and labor force is regarded as one of the positive factors that spur economic growth. The impact depends entirely on the ability of the economic system to absorb and productively use the extra workers. This ability is further influenced by the rate of capital accumulation and the availability of support inputs such as managerial and administrative skills. The dominant factors affecting the expansion of employment opportunities are namely demography, geographical position and natural resources, economic conditions, social and cultural conditions and political factors. Investments also determine the number of employment. The greater the investment and its labor intensive, the higher the jobs are created. The higher elasticity of employment indicates that any economic growth is capable of creating greater employment opportunities and it can be used as an indicator to analyze whether economic activity is capital intensive or labor intensive. Economic growth is said to be successful if it can improve the welfare of the society. Public welfare of a country cannot be achieved simply by increasing economic growth, but it must be followed by improvement in the standard of living, the ability to cope with subsistence, improvement of quality of life and human development (Sen, 2005). Welfare relates positively to income per capita, but negatively associated with poverty and inequality, which means that enhancement of per capita income will increase prosperity, while enhancement of income inequality and poverty will decrease the welfare of society. Human Development Index (HDI) is one of the indicators used by the United Nations to measure the welfare of the society on the development of consumption, health, and education.

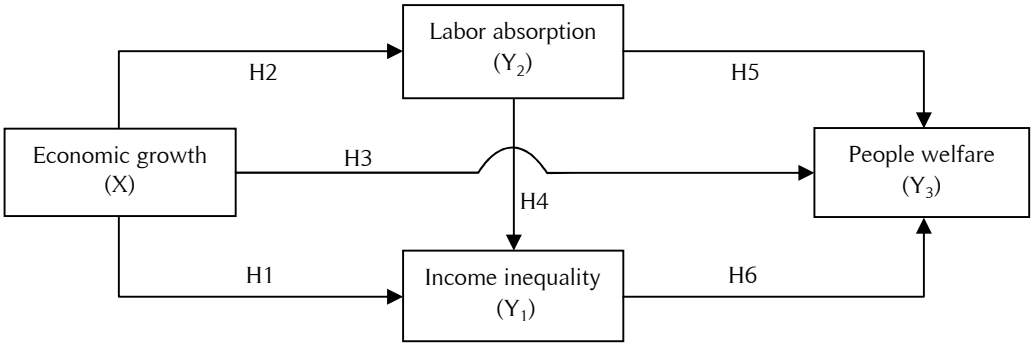
Research Method

The variables in this study include exogenous variables that is economic growth (X) as well as endogenous variables, namely income inequality (Y1), labor absorption (Y2) and people welfare (Y3). Economic Growth (X) is the change in the value of Gross Domestic Regional Product (GDRP) per year at constant prices in 2000 generated by each province of Indonesia that is expressed in percent. The economic growth at constant prices data is used with a reason to get a more accurate picture and to avoid misleading results because of the effects of inflation. Income Inequality (Y1) is the difference in GDRP per capita at constant prices in 2000 among provinces expressed in Williamson index in each province. Labor Absorption (Y_2) is the total labor force working in each sector in each province of Indonesia during the research period, expressed in units of people. People Welfare (Y_3) is a decent condition that exhibits the state of a society that can be seen from the living standards of the people and is expressed in units of index that is the Human Development Index (HDI).

This study uses secondary data from 33 provinces in Indonesia, and does not include the North Kalimantan province considering the newly formed province in 2012. The study is conducted by census with time series data from 2006 (considering there is newly formed province in 2004, namely West

Sulawesi) to 2010 (five years) combined with a cross section data consists of 33 provinces, thus becoming the data panel of 165 observations.

Based on the theoretical studies and the empirical results that show the relationship between variables, the conceptual framework of the study is developed as shown in Figure 1 and the research hypothesis as follows:



Source : writer design

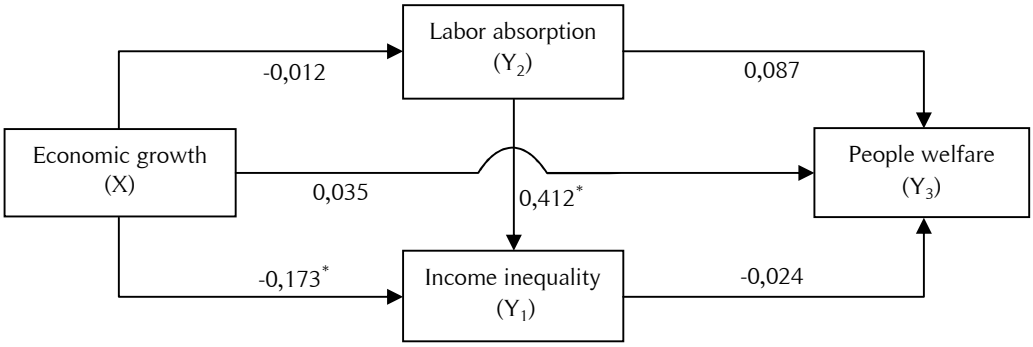
Figure 1. Conceptual framework of the study

Hypothesis 1 (H1) : Economic growth significantly influences income inequality
Hypothesis 2 (H2) : Economic growth signifantly influences labor absorption
Hypothesis 3 (H3) : Economic growth signifantly influences people welfare
Hypothesis 4 (H4) : Labor absorption significantly influences income inequality
Hypothesis 5 (H5) : Labor absorption significantly influences people welfare
Hypothesis 6 (H6) : Income inequality significantly influences people welfare

All hypotheses are tested by using path analysis developed as a model for studying the direct or indirect effect of exogenous variables on endogenous variables. This analysis is one option in order to study the dependence in the model and is an excellent method to explain if there is a large set of data to be analyzed and to seek causal. Path analysis is used to examine the relationship between a causal model that has been formulated based on theoretical considerations and specific knowledge.

Results and Discussion

In the first path analysis is required a test of the data that will be incorporated into the model. Because the data used in this study is secondary data and panel data, therefore it is not necessary to test the data. After processing the data, then of the three models can be expressed in graph of path analysis as shown in Figure 2.



Source: Processed primary data
Where : * = Significant on α = 0.05

Figure 2. The effect of exogenous variable on endogenous variable

The coefficient of path parameter can be seen from the result for inner weights. To assess the significance of the hypothesized structural path can be seen from the T-statistic which is greater than or equal to 1.96. The test results are shown in Table 1.

Table 1. The test results of path coefficient

Variable	Path coefficient	t	Sig	Test results
Economic growth (X) on income inequality (Y1)	-0,173	0,471	0,015	Significant
Economic growth (X) on labor absorption (Y2)	-0,012	-0,152	0,879	Not Significant
Economic growth (X) on people welfare (Y3)	0,035	0,438	0,662	Not Significant
Labor absorption (Y2) on income inequality (Y1)	0,412	5,874	0,000	Significant
Labor absorption (Y2) on people welfare (Y3)	0,087	1,005	0,316	Not significant
Income inequality (Y1) on people welfare (Y3)	-0,024	-0,270	0,788	Not significant

Source: Processed primary pata

The estimation of coefficient parameter of effects between two variables shows that there are two significant paths, with a negative coefficient parameter that is the effect of economic growth on income inequality, and with a positive coefficient parameter that is the effect of labor absorption on income inequality, so the hypothesis in the model can be accepted. While the 'not significant' paths are the effect of economic growth on labor absorption, the effect of economic growth on people welfare, the effect of labor absorption on people welfare, and income inequality on people welfare.

Hypothesis one, economic growth has negative and significant effect on income inequality. This means that increasing economic growth will cause a decline in income inequality. This is due to the higher economic growth will boost production capacity so that the per capita income will also be increased which indicates the improvement of people's income so that the income inequality has narrowed. This study found that there is no trade off between economic growth and income inequality. The economic growth in fact has managed to reduce income inequality year by year, yet the level of income inequality itself is actually categorized quite high. Another finding is that despite the income inequality in some areas belongs to low category or in other words the income distribution is relatively even, nevertheless this evenness occurs at a low rate of per capita income; where it also reflects the low welfare of society. The results of this study reject Kuznets (1955) and Williamson (1965).

The study found that the economic growth achieved is able to increase the output and income per capita as well as further to reduce the number of income inequality in each province. In other words the income distribution has improved. Factors that cause the economic growth to have a significant effect on reducing income inequality can be assessed through the contribution of sectoral economic growth. Nationally, economic growth of Indonesia proved to be the contribution of the secondary sector amounted to 20,98 percent and the tertiary sector for 33,9 per cent, a sector that grows faster and higher, while the contribution of the primary sector to the economic growth of only 6,19 percent.

The empirical findings of this study support the study by Van Der Eng (2009), where in the 1970s Indonesia showed an increase in inequality and it further diminished until 1997. The Indonesia's case shows that rapid economic growth does not necessarily lead to a significant increase in income inequality. In addition the result of this study is confirmed by the study by Barro (2000), Panizza (2002), (Papanek & Kyn, 1986), and Bhanumurthy & Mitra (2004) who found that high growth will reduce income inequality.

Hypothesis two, economic growth has a negative and not significant effect on labor absorption. This finding means that the higher the economic growth, the lower the labor absorption but the effect was not significant. This is due to several factors. First, an indication of the poor quality of economic growth can be seen from the labor absorption rate which is relatively low and slow to increase. Second, the increasing economic growth tends to be driven by increased consumption and not followed by increased investment thus job creations are very slow and too little labor absorbed. Third, most of labor absorption occurs in the primary sector with low productivity. Fourth, the primary sector which absorbs more labor has the smallest elasticity. Fourth, the disparity between sectoral economic growth and the sectoral labor absorption. The primary sector which is labor-intensive and has a major contribution to GDP, grows slowly and were below GDP growth. Instead the secondary and tertiary sectors always showed higher growth than GDP growth but little labor absorption because it used capital-intensive technology.

The empirical findings suggest that the economic growth has negative and not significant effect on labor absorption. Nationally, an indication of the poor quality of economic growth can be seen from the employment rate which is relatively low and slow to increase. Another factor is the main source of economic growth that occurs is not supported by the investment but is supported by the amount of household consumption expenditure, in the amount of 55,46 percent, where consumption expenditure can not create jobs directly, while investment is only amounted to 22,00 percent. The lack of contribution and growth of the investment component made labor absorption low compared to the number of labor force.

Economic growth's insignificant effect on labor absorption is also caused by the majority of labor absorption occurs in the primary sector with low productivity. Subsequently, the causes of economic growth's insignificant effect on labor absorption can be seen by the elasticity of workers. Based on the three main sectors namely the primary sector, the secondary sector and the tertiary sector, the primary sector has the smallest elasticity with values of 0,06% and followed by 0,63% of the secondary sector and tesier sector with the greatest elasticity of 1,02%. This means that every 1% increase in the value added of industrial sector will increase elabor absorption by 1,02%. This shows the effectiveness of industrial sector in absorbing labor force in line with its increase in sectoral output, despite only a few region in Indonesia whose economy relies on the industrial sector, the majority of them are supported by the agricultural sector. Another factor that leads to economic growth insignificant effect on labor absorption can also be seen from the Labor Force Participation Rate (LFPR). Developing countries like Indonesia are likely to encounter faster labor force growth than the growth of employment opportunity.

Hypothesis three, economic growth has positive and not significant effect on people welfare. This finding means that the increase in economic growth is followed by the increase in the welfare of society although the effect is not significant. This is due to the economic growth is supported by low productivity sectors. Sectoral differences in labor absorption will then affect the level of per capita income and affect the purchasing power. Furthermore, this will affect the value of HDI as a proxy for prosperity. Another factor that causes the effect of economic growth is not significant to the people welfare is a difference in terms of acceleration of changes of each indicator in the Human Development Index (HDI). The most volatile indicator is real spending per capita, while the indicator of life expectancy, literacy rates and years of schooling require a longer time to increase its value.

Hypothesis four, labor absorption has positive and significant effect on income inequality. This finding means that the increase in labor absorption actually increases income inequality among provinces in Indonesia. This is due to the majority of absorbed workers has low productivity so the income level is low and it affects the level of income per capita. Provinces whose GDRP is dominated by secondary and tertiary sectors have higher per capita income than the regions whose economy is dominated by agriculture, so that it contributes to income inequality.

The study found that economic growth has positive but not significant effect on people welfare. The insignificant effect of economic growth on people welfare is due to the economic growth which is supported by sectors with low productivity. Nationally, economic growth in Indonesia proved to be the contribution of the secondary sector (20.98 percent) and tertiary sector by 33,9 percent where these sectors grow faster and higher, while the contribution of the primary sector to the economic growth is only 6,19 percent in which this sector grows slower and lower.

Sectoral differences in labor absorption will then affect the level of income per capita in each province. The provinces with a dominant role of secondary and tertiary sectors tend to have higher per capita incomes and this will affect people's purchasing power as one of the indicators of HDI. Conversely due to the labor absorption of most provinces in Indonesia is in the primary sector, the income is improved but still lower than the secondary and tertiary sectors. Furthermore, this will affect the purchasing power as one of the indicators of HDI. Low purchasing power or real spending per capita will affect the fulfillment of people needs for education and health, which will influence the achievement of HDI.

Another factor that causes the effect of economic growth is not significant on people welfare is a difference in terms of acceleration of changes of each HDI indicator. The most volatile indicator is real spending per capita, The most volatile indicator is real spending per capita, while the indicator of life expectancy, literacy rates and years of schooling require a longer time to increase its value. This means that though economic growth continues to increase nationally and provincially, but it is not always followed by the improvement of people welfare (high HDI). This is due to differences in the acceleration of changes of HDI indicators in each province. Furthermore, if economic growth is compared with the increase in HDI, it is known that the increase of HDI is very little, less than one percent compared to the rate of economic growth. HDI value generally have a tendency to slow down after reaching a relatively high value.

Nationally, the sector with the lowest labor productivity is the primary sector which is equal to 0,54 whereas the primary sector, especially agriculture, was the sector with the most labor-intensive, especially in rural areas. This is due to the agricultural sector is dominated by low-educated labor force and does not require special skills of its workforce. While the highest labor productivity is secondary sector that is equal to 1,82. As this sector is capital-intensive, so workers of this sector are required to have certain education and skills.

Accordingly, although the secondary and tertiary sectors have a lower labor absorption than the primary sector, but labor productivity in these two sectors are very high because the sectors are capital-intensive and technology-intensive so that they produce much more output and also earn higher income. This means that there will be inequality among provinces with different sectoral role either in the primary, secondary and tersier sector. Provinces whose GDRP is dominated by secondary or tertiary sectors have much higher per capita income than the regions whose economy is dominated by agriculture, so this affects income inequality among regions, especially within the same region (within disparity).

Hypothesis five, labor absorption has positive but not significant effect on people welfare. This finding means that the increased labor absorption tends to improve the people welfare but the effect is not significant. This is due to the disparity between sectoral labor absorption with sectoral productivity and income. The primary sector absorbs most labor but its labor productivity is low so income is also low. The provinces with dominant role of secondary and tertiary sectors tend to have higher per capita incomes and this will affect people's purchasing power as one of the indicators of HDI. Low purchasing power or real spending per capita will affect the fulfillment of people needs for education and health, and it will further affect the people welfare.

Another factor that causes the insignificant effect of labor absorption on people welfare is the differences in sectoral income. The primary sector income is lower due to lower labor productivity. Unlike the secondary and tertiary sectors, the productivity is much higher so that the income generated by these sectors is also better. These sectors are generally capital-intensive and technology-intensive, it is usually concentrated in the city and the labor absorption is very low. This sectoral difference in elabor absorption will affect the level of income per capita in each province.

Hypothesis six, income inequality has negative but not significant effect on people welfare. This finding means that the lower the income inequality has the potential to improve people's welfare of provinces in Indonesia although the effect is not significant. Reduction of income inequality indicates the relative improvement in income distribution so that more and more people who have the purchasing power. Another finding is that despite there are low income inequality in some areas or in other words the income distribution is relatively even, but the evenness occurs at the low level of per capita income; where it also reflects the low welfare of society. The other factor that causes not significant effect is the difference in terms of acceleration of changes of each HDI indicator.

The empirical finding suggests that income inequality has negative but not significant effect on people welfare. The insignificant effect of income inequality on the welfare is caused by differences in sectoral contributions. Provinces whose GDRP is dominated by secondary or tertiary sectors have much higher per capita income than the regions whose economy is dominated by agriculture.

Another factor that causes the insignificant effect of income inequality on people welfare is caused by differences in sectoral productivity. The revenue of primary sector is lower because its labor productivity is low. Unlike the secondary and tertiary sectors, the productivity is much higher so that the revenue generated by these sectors is also better. These sectors are generally capital-intensive and technology-intensive, usually concentrated in the city and the labor intensive is very low. These sectoral differences in labor absorption will affect the level of income per capita in each province.

The insignificant effect of income inequality on the people welfare appears in some provinces with high income inequality yet they encounter improvement of people's welfare above the national average. The provinces with the primary sector economy tend to have lower per capita income than the provinces with secondary and tertiary sectors. Furthermore, these conditions will affect the achievement of HDI value of each province. The insignificant effect is due to different pattern which occured in some provinces. This indicates that the development among the provinces in Indonesia has not been evenly distributed and neither do the public welfare conditions.

Conclusion

The overall results of this study indicate that economic growth significantly affects income inequality, but insignificantly affects labor absorption and people welfare. Labor absorption significantly affects income inequality but insignificantly affects people welfare. Income inequality also insignificantly affects people welfare. The results of this study prove that despite increased economic growth can reduce income inequality, but this economic growth is not optimal in terms of labor absorption and does not automatically improve people welfare. This study also finds that there is no trade off between economic growth and income inequality.

References

Armstrong, H., & Taylor, J. (2000). *Regional economics and policy* (3rd ed.). Blackwell.

Barro, R. J. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth*, *5*(1), 5–32. https://doi.org/10.1023/A:1009850119329.

Barro, R. J., & Sala-I-Martin, X. (2004). *Economic growth second edition* (2nd ed.). Massachusetts: MIT Press.

Bhanumurthy, N., & Mitra, A. (2004). Economic growth, poverty, and inequality in Indian States in the prereform and reform periods. *Asian Development Review*, *21*(2), 79–99.

Grossman, G. M., & Helpman, E. (1989). *Growth and welfare in a small open economy* (NBER Working Paper No. 2970). Cambridge, MA.

Kuznets, S. (1955). The American economic review. *The American Economic Review*, *45*(1), 1–28.

Okun, A. M. (1975). *Equality and efficiency*. Washington DC: Brooking Institution Press.

Panizza, U. (2002). Income inequality and economic growth: Evidence from American data. *Journal of Economic Growth*, *7*(1), 25–41. https://doi.org/10.1023/A:1013414509803.

Papanek, G. F., & Kyn, O. (1986). The effect on income distribution of development, the growth rate and economic strategy. *Journal of Development Economics*, *23*(1), 55–65. https://doi.org/10.1016/0304-3878(86)90079-9

Ranis, G., Stewart, F., & Ramirez, A. (2000). Economic growth and human development. *World Development*, *28*(2), 197–219. https://doi.org/10.1016/S0305-750X(99)00131-X

Romer, P. M. (1994). The origins of endogenous growth. *The Journal of Economic Perspectives*, *8*(1), 3–22. https://doi.org/10.1257/jep.8.1.3

Rosenstein-Rodan, P. N. (1943). Problems of industrialisation of Eastern and South-Eastern Europe. *The Economic Journal*, *53*, 202–211.

Sen, A. (2005). Human rights and capabilities. *Journal of Human Development*, *6*(2), 151–166. https://doi.org/10.1080/14649880500120491

Solow, R. M. (1997). Is there a core of usable macroeconomics we should all believe In? *American Economic Review*, *87*(2), 230–32.

Todaro, M. P., & Smith, S. C. (2006). *Economic development* (9th ed.). Pearson.

Van Der Eng, P. (2009). *Growth and inequality: The case of Indonesia, 1960-1997.* (Munich Personal RePEc Archive No. 12725). Muenchen.

Williamson, J. G. (1965). Regional inequality and the process of national development: A description of the patterns. *Economic Development and Cultural Change*, *13*(4, Part 2), 1–84. https://doi.org/10.1086/450136.

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The impact of crime on foreign direct investment

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Abstract

This study examines the impact of crime incidence on Foreign Direct Investment (FDI) in Indonesian provinces. This study uses panel data covering 31 provinces for the period 2005 to 2015. We involve Total Crime, Property Crime, Violence, Vandalism, Arson, Fraud, Homicides and Kidnapping as variable of crime. The results show that crime variables have significant impact on FDI. We find that for every increase in total crime incidence per 100,000 people by ten percent, FDI is expected to decrease by approximately 0.95 percent. The results of this study suggest that besides boosting economic growth, stimulating infrastructure development, and lowering the provincial minimum wages, government needs to pay attention to crime incidence in each province. Government should allocate adequate resources to minimize the crime rate.

Abstrak

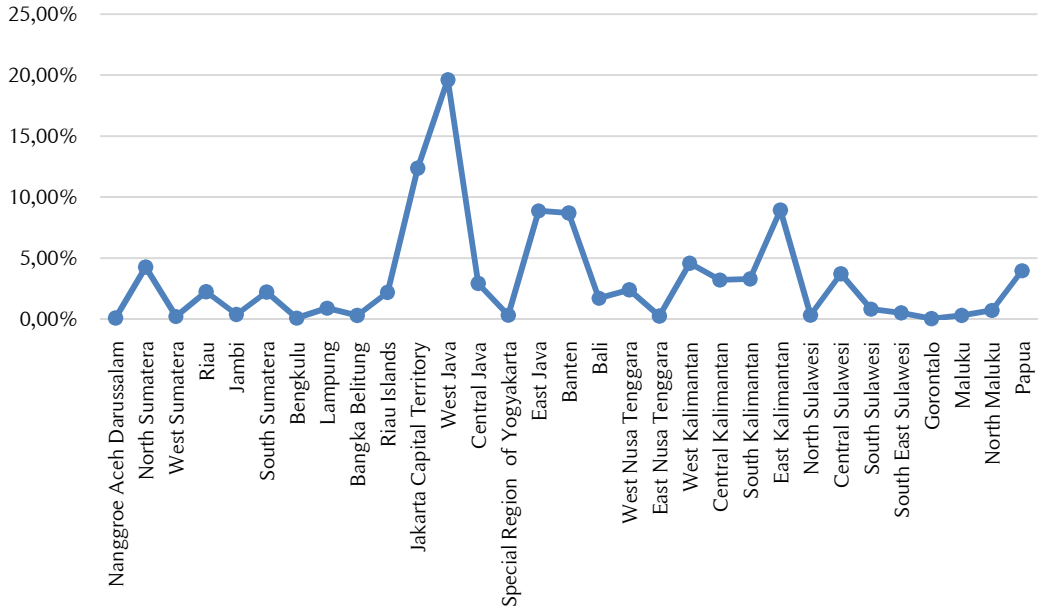
Studi ini mengkaji dampak kejadian kejahatan terhadap investasi asing (FDI) di provinsi-provinsi di Indonesia. Penelitian ini menggunakan data panel dari 31 provinsi yang mencakup periode 2005 sampai 2015. Kami melibatkan *Total Crime, Property Crime, Violence, Vandalism, Arson, Fraud, Homicides and Kidnapping* sebagai variabel kejahatan. Hasilnya menunjukkan bahwa variabel kejahatan berpengaruh signifikan terhadap FDI. Kami menemukan bahwa untuk setiap peningkatan jumlah kejadian kejahatan per 100.000 orang hingga sepuluh persen, FDI diperkirakan akan turun sekitar 0,95 persen. Hasil penelitian ini menunjukkan bahwa selain mendorong pertumbuhan ekonomi, merangsang pembangunan infrastruktur, dan menurunkan upah minimum provinsi, pemerintah perlu memperhatikan insiden kejahatan di setiap provinsi. Pemerintah harus mengalokasikan sumber daya yang memadai untuk meminimalkan tingkat kejahatan.

Introduction

The implementation of FDI in various regions in Indonesia is still facing difficulties. The approval FDI at the regional level is still unevenly distributed and it is mainly concentrated in specific provinces. By the end of 2015, provinces in Java Island dominated FDI acceptance at an around 55% of total FDI, and only 45% of it was received outside Java Island. As shown in Figure 1, West Java province received 19.60% of FDI, followed by Jakarta Capital Territory (12.36%), East Kalimantan (8.92%), East Java (8.86%), Banten (8.68%), leaving other provinces receiving only 1% to 3%.

A good investment climate is one of the essential factors needed to attract investors. We could assume that the internal situation in Indonesia is one of the considerations for investment decisions in Indonesia. Mukherjee, Wang, & Tsai, (2012) mentioned that some factors may affect the investment climates, namely the political stability, macro-economic situation, corruption, the easiness to get credit, crime rate, government regulation, law supremacy, infrastructures, labor regulation and telecommunication.

Security issues, like crime within the destination country, are an important consideration for investors. Generally, crime affects investment negatively through two main channels: direct channels and indirect channels as studied by Dadzie, Blanco, & Dony (2014). The direct impact of crime on investment is delivered through the cost of setting up a business. Indirect channels are carried by complementary factors related to human, social and institutional factors. A high level of crime, especially violence, causes damage or loss of property and infrastructure and creates insecurity resulting in investors' spending for additional security guards and equipment.



Source: Indonesia Investment Coordinating Board (2015)

Figure 1. FDI per-province in Indonesia (2015)

There has been little research specifically studying the relationship between FDI and criminal activities in Indonesia. Moreover, most of the studies on FDI in Indonesia tend to focus on national level analyses rather than disaggregating the analysis to the regional level. Some studies have confirmed that crime hinders investment in several countries. Brock (1998) finds that relatively higher FDI is attracted to the regions of Russia where the level of crime is lower. Another study by Madrazo-Rojas (2009) finds that violent organized crime has a negative impact on FDI in Mexican states. Lastly, Daniele & Marani, 2011, find a negative association between organized crime and FDI in Italian provinces. More recently, Albanese & Marinelli, 2013 find that in Italy, criminal acts significantly weaken productivity. According to their study, crime decreases FDI. Regions with lower crime rates tend to have higher productivity than areas with a high crime incidence. Therefore, a high crime rate could be considered as an additional risk or additional cost impairing an investor's decision to invest money.

Research Method

Data and variables

Due to data availability in Indonesia, there was difficulty in obtaining all the variables mentioned in previous studies. To circumnavigate this difficulty, this study attempts to answer the research questions listed in Chapter I, by optimizing the use of the available data from various relevant sources. This study uses provincial level data from 31 provinces in the years 2005 to 2015.

The dependent variable in this study is the FDI inflow received by the provinces of Indonesia. Data was obtained from the Indonesia Investment Coordinating Board (IICB) for the years 2006-2015. To avoid potential bias and to capture the real condition of investment in Indonesia, the FDI realization is used as the proxy. Additionally, this study employs cumulative FDI due to a strong correlation between FDI inflow and cumulative FDI. Related to fact that investors tend to invest in the regions with a high industrial concentration, this study uses the cumulative FDI (in US million dollars) as the proxy for industrial concentration. However, due to data availability, this variable is represented by the data from year 1990. This variable is expected to be positively significant to FDI inflow in Indonesian provinces. On the other hand, the independent variables in this study, as the determinants of FDI inflows are obtained from the (Statistics-Indonesia, 2006).

This study employs both the total crime rate and detailed or specific crime rate as the proxy of crime variables. Total crime is the sum of criminal activities in general on every 100,000 people in one year. Meanwhile, specific crime categories crime activities into arson, vandalism, theft, violence and kid-

napping per 100,000 people in one year. Data was obtained from 2007 to 2014 periods. In a highly insecure environment, individuals, firms, and governments must suffer significant security costs, making fewer resources available for investment. Thus, the crime rate could be considered as an additional risk or additional cost for doing business so it is expected to have negative nexus in determining FDI inflow

In terms of business related information, domestic investors tend to have wider access to information compared to foreign investors. In other words, there is asymmetric information. Therefore, in many cases, domestic investment could be used as the signaling indicator about the internal economic situation in the investment destination regions. Considering that assumption, it was expected that domestic investment has a positive effect in determining the FDI inflow. In this study, data of this variable, domestic investment (billion Rupiah) was obtained from, the Indonesia Investment Coordinating Board (IICB) in the years 2005-2014.

As discussed in Chapter II, several previous studies claimed that market size determines FDI inflow. Market size indicates the volume of the local market as well as consumer's purchasing power on that region. From the producer point of view, a large market size is crucial in maintaining the lower cost of production through a lower utility cost by producing and selling products at a larger scale. Therefore, market size is expected to have a positive correlation with FDI inflow in each region. In this study, the indicator of market size is represented by total population residing in each province and also provincial GDP per capita (in thousand Rupiah) in the period 2005-2014

Reliable infrastructure is crucial in supporting production activities. For instance, companies need roads to transport materials as production inputs. In this study, roads are used as proxies for infrastructure. ROAD measures the length of roads in a province (in kilometers) in the period 2005-2014, is expected to have a positive relationship with FDI inflow.

Unemployment rate indicates the availability of labor. An adequate labor supply improves the flexibility of companies to select and hire workers that suit their needs. However, a high labor supply in a region tends to relatively lower the regional minimum wage. Therefore, the variable of unemployment, using unemployment rate during period 2005-2014, was expected to have positive nexus in determining the FDI inflow. Moreover, wages are expected to have a negative effect on FDI inflows. A low wage tends to attract more investors since it potentially lowers the production costs. In this study, WAGE is provincial minimum wage per month in Rupiah during 2005-2014.

Empirical analysis

One of the objectives of this study is to examine the factors that determine FDI inflow at the provincial level in Indonesia. By employing panel data analysis, the economics model of this study is specified as the following:

$$FDI = f(Crime, X) \tag{1}$$

where dependent variable is realization of FDI inflow in the provinces and X is a set of control variables and Crime is a measure of crime incidence. FDI decisions are likely to be based on information from the previous year, so all the independent variables on the assumption are lagged by one year. The basic equation takes the following form:

$$\begin{aligned} \ln FDI_{i,t} &= \alpha + \beta_1 \ln Crime_{i,t-1} + \beta_2 \Delta \ln CFDI_{i,t-1} + \beta_3 \ln DI_{i,t-1} + \beta_4 \Delta \ln GDP_{i,t-1} \\ &+ \beta_5 \ln POP_{i,t-1} + \beta_6 \ln ROAD_{i,t-1} + \beta_7 \ln PORT_{i,t-1} + \beta_8 \ln UNEM_{i,t-1} \\ &+ \beta_9 \Delta \ln \mathrm{WAGE}_{i,t-1} + v_{i,t} \end{aligned} \tag{2}$$

where *i* represents 31 provinces in Indonesia, *t* time in years from 2006-2015. This study analyzes using a natural logarithm form for all variables that are consistent with previous studies with some changes. *CFDI* proxies the cumulative FDI; *DI* refers to domestic investment; *GDP* represents provincial GDP per capita; *POP* proxies the number of residents; *ROAD* refers to the length of road infrastructure; *UNEM* proxies the availability of labor; *Wage* is provincial minimum wage per month.

In estimating the model, Pooled-Least Squared method was used, followed by Fixed Effect and Random Effect Models. To choose the most appropriate estimator, Hausman test, F-tets and Breush-Pagan

test were used. Considering that in this panel data analysis, the data consists of cross section data with different data size and different variances, the Wald Test and Breusch-Pagan/Cook-Weisberg test are used to check for the existence of heteroscedasticity problem. The estimation results are analyzed derived in the next chapter.

Table 1. Data description

Variable	Description	Expected Sign
LFDI	Logarithm form of FDI Inflow in the provinces from 2006-2015 (million $)	
LTCRIME	Logarithm form of Total crime is a measure of the incidence of crime association per 100,000 inhabitants, for the periods 2005-2014	negative
LVIOLENCE	Logarithm form of violence is a measure of the incidence of violence association per 100,000 inhabitants, for the periods 2007-2014	negative
LVANDALISM	Logarithm form of vandalism is a measure of the incidence of vandalism association per 100,000 inhabitants, for the periods 2007-2014	negative
LARSON	Logarithm form of arson is a measure of the incidence of arson association per 100,000 inhabitants, for the periods 2007-2014	negative
LPROPERTY_CRIME	Logarithm form of property crime is sum of arson and vandalism association per 100,000 inhabitants, for the periods 2007-2014	negative
LFRAUD	Logarithm form of fraud is a measure of the incidence of fraud association per 100,000 inhabitants, for the periods 2007-2014	negative
LHOMICIDES	Logarithm form of homicides is a measure of the incidence of homicides association per 100,000 inhabitants, for the periods 2007-2014	negative
LKIDNAPPING	Logarithm form of kidnapping is a measure of the incidence of kidnapping association per 100,000 inhabitants, for the periods 2007-2014	negative
LCFDI	Cumulative FDI (million $), calculation from 1990	positive
LDI	Logarithm form of domestic investment (billion Rp.), for the periods 2005-2014	positive
LGDPWO_CAP	Logarithm form of Per Capita Gross Regional Domestic Product at 2000 Constant Market Prices by provinces, 2005-2014 (thousand Rp.)	Positive
LPOP	Logarithm form of Population by provinces, 2005-2014	positive
LROAD	Logarithm form of length of road as proxy for infrastructure (KM), 2005-2014	positive
LWAGE	Logarithm form of Provincial Minimum wage per Month, 2005-2014 (Rp.)	negative
LUNEM	Logarithm form of unemployment, 2005-2014	positive

Results and Discussion

Table 2 displays the descriptive statistics of each variable. All the variables are in natural logarithm form, where the independent variables are lagged by one year. The data employed in this study is annual data. Currently, Indonesia consists of 34 provinces; however, due to data availability this study will use the data from 31 provinces in Indonesia during 2005 – 2015. The sampled provinces, along with the data of total crime incidence and FDI acceptance for each province are listed in Table 2.

As stated in the previous chapter, our sample is categorized into three groups: Outside Java and Bali Island; Java and Bali Island; and Full Sample. The sample size in each group varies. In the Outside Java and Bali Island group, sample size ranges from 176 to 220, the sample size ranges from 72 to 90 in the Java and Bali group, and the sample size ranges from 248 to 310 in the Full Sample group. FDI Inflow, Total Crime, Cumulative FDI, Domestic Investment, GDP per Capita, Population, Road, and Wage variables have a maximum sample size of 310. The sample size variation is due to the study period which also varies. FDI Inflow, Total Crime, Cumulative FDI, GDP per Capita, Population, Road, Unemployment and Wage variables are taken from the years 2005-2015; however, the remaining variables are sourced from 2007 to 2014 data.

Table 3 shows Descriptive Statistics of all variables that used in this study and with the Table 4. we can see the natural logarithm form of those Variables. The FDI Inflow variable has a mean value of 4.126 with a maximum value of 9.203 and a minimum value of -6.908. The largest total FDI inflow for a decade (2006 – 2015) was contributed by DKI Jakarta province, followed by West Java and Banten in the amounts of $47,679 million, $36,599 million, and $17,835 million, respectively. However, Gorontalo province and East Nusa Tenggara province received the lowest FDI inflow at $85.36 million and $121.358 million respectively. For the Crime variable, Total Crime scored 5.051 with a minimum value of 2.565 and a maximum value of 6.323. The lowest mean of the Crime variable is for the Kidnapping variable, with a

minimum value of -9.210 and a maximum value of 1.293. North Sulawesi and Gorontalo province, ranked as the region with the highest crime rate in the decade with crime incidence of 4068 and 3411 crimes for every 100,000 people respectively.

Table 2. Descriptive statistics 1

Variables	Outside Java and Bali Island			Java and Bali Island			Full sample		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Dependent variable									
FDI	220	276.8	448.7	90	1,420	1,987	310	608.7	1,245
Independent variable									
Crime variable									
Total Crime	220	206.6	97.51	90	137.1	91.54	310	186.5	100.8
Property Crime	176	6.987	6.032	72	2.972	2.881	248	5.821	5.612
Violence	176	26.79	19.26	72	13.52	14.05	248	22.94	18.87
Vandalism	176	6.465	5.883	72	2.789	2.673	248	5.397	5.419
Arson	176	0.522	0.575	72	0.200	0.183	248	0.424	0.528
Fraud	176	15.222	10.442	72	16.57	21.23	248	15.614	14.396
Homicides	176	1.153	0.935	72	0.455	0.334	248	0.950	0.867
Kidnapping	176	0.325	0.549	72	0.230	0.264	248	0.298	0.485
Control variable									
Cumulative FDI	220	1,349	1,830	90	12,251	15,598	310	4,514	9,850
Domestic Investment	220	1,233	2,195	90	4,270	6,820	310	2,115	4,327
GDP per Capita	220	9,004	6,895	90	10,157	11,241	310	9,339	8,389
Population	220	3.973e+06	2.963e+06	90	1.659e+07	1.533e+07	310	7.636e+06	1.033e+07
Road	220	14,534	9,343	90	16,366	12,315	310	15,066	10,308
Wage	220	949,388	347,469	90	798,895	349,475	310	905,697	354,158
Unemployment	220	6.961	2.707	90	7.363	3.882	310	7.078	3.093
Number of region		**22**			**9**			**31**	

Table 3. Descriptive statistics 2

Variables	Outside Java and Bali Island			Java and Bali Island			Full sample		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Dependent variable									
FDI	220	3.521	3.536	90	5.604	2.509	310	4.126	3.402
Independent variable									
Crime variable									
Total Crime	220	5.199	0.565	90	4.691	0.722	310	5.051	0.655
Property Crime	176	1.207	2.140	72	0.393	1.385	248	0.970	1.983
Violence	176	2.962	0.955	72	2.019	1.122	248	2.688	1.092
Vandalism	176	0.980	2.475	72	0.301	1.455	248	0.783	2.246
Arson	176	-1.762	2.632	72	-2.928	2.271	248	-2.100	2.583
Fraud	176	2.280	1.727	72	2.240	1.027	248	2.268	1.554
Homicides	176	-0.101	0.708	72	-1.064	0.785	248	-0.380	0.851
Kidnapping	176	-2.873	3.044	72	-2.474	2.054	248	-2.758	2.795
Control variable									
Cumulative FDI	220	6.194	1.694	90	7.793	2.457	310	6.658	2.074
Domestic Investment	220	4.957	2.963	90	6.116	3.191	310	5.294	3.071
GDP per Capita	220	8.898	0.615	90	8.895	0.718	310	8.897	0.646
Population	220	14.95	0.698	90	16.16	0.978	310	15.30	0.961
Road	220	9.372	0.682	90	9.410	0.775	310	9.383	0.709
Wage	220	13.70	0.357	90	13.51	0.419	310	13.64	0.385
Unemployment	220	2.015	0.359	90	2.02	0.464	310	2.016	0.391
Number of region		**22**			**9**			**31**	

Noted: All the variables are in natural logarithm form. For the variables that have zero values, we do the natural log transformation in the following way: $Ln(x) = \ln(x+0.0001)$ if $x \geq 0$

Table 4. Correlation matrices

Variable	FDI Inflow	Cumulative FDI	Domestic Investment	GDP per Capita	Population	Road	Wage	Unem-ployment	Total Crime	Property Crime	Violence	Vandalism	Arson
FDI Inflow	1												
Cumulative FDI	0.746***	1											
Domestic Investment	0.681***	0.749***	1										
GDP per Capita	0.545***	0.695***	0.555***	1									
Population	0.491***	0.670***	0.573***	0.230***	1								
Road	0.301***	0.357***	0.401***	0.073	0.689***	1							
Wage	0.296***	0.207***	0.257***	0.30***	-0.138**	0.058	1						
Unemployment	0.003	0.244***	0.094	0.27***	0.257***	0.002	-0.18***	1					
Total Crime	-0.128**	-0.227***	-0.186***	0.17***	-0.481***	-0.21***	0.152**	-0.088	1				
Property Crime	-0.18***	-0.240***	-0.281***	-0.033	-0.327***	-0.069	0.171***	-0.125*	0.614***	1			
Violence	-0.22***	-0.293***	-0.323***	0.027	-0.446***	-0.060	0.188***	-0.036	0.762***	0.635***	1		
Vandalism	-0.147**	-0.216***	-0.261***	-0.011	-0.310***	-0.09***	0.152**	-0.111*	0.608***	0.954***	0.627***	1	
Arson	-0.147**	-0.147**	-0.180***	-0.065	-0.169***	0.135**	0.118*	-0.146**	0.431***	0.652***	0.471***	0.562***	1

In 2014, West Java province had a GDP (real GDP, constant 2000) of 408,320 billion IDR, making it one of the top-three with the highest GDP, while Gorontalo province with a GDP of only 3917 billion IDR ranked in the bottom-three. Furthermore, in the *Population* variable which is measured by the number of residents as proxy for market size, West Java is the most populated region, leaving Gorontalo with the smallest population.

Table 3 shows the difference between Java and Bali Island, and Outside Java and Bali Island for all variables. There is a statistically significant difference between these two group. Java and Bali Island receive FDI inflows greater than Outside Java and Bali Island. The difference is about 2.08 and it is statistically significant at 0.01level. Java and Bali Island have fewer crime incidents compared to the regions Outside Java and Bali. The mean of total crime rate in Java and Bali Island is 4.7 crimes. The difference between both groups is 0.50 and it is statistically significant at 0.01 level. These statistics confirm our assumption that a region with a high crime rate would have small FDI inflows.

Furthermore, the total of Cumulative FDI, Domestic Investment and Population variable in Java and Bali Island is higher than in the other groups. Meanwhile, Outside Java and Bali Island has a larger total minimum provincial wage. The difference is about 0.193 and it is statistically significant at 0.01 level. Thus, it implies that a region would have a larger FDI inflow, if a region has a higher population and domestic investment while maintaining a lower minimum wage.

Table 4 identifies the correlation significances and the signs of each independent variable with the dependent variable. The variable Crime (Total Crime, Violence, Arson, Vandalism, and Property Crime) and control variable (Wage) are negatively statistically significant and correlated with FDI Inflow. On the other hand, the variables Cumulative FDI, Domestic Investment, GDP per Capita, Road and Unemployment are positively statistically significant and correlated with FDI Inflow. Furthermore, the small value of VIFs (less than 4.0) indicate no presence of multicollinearity.

Since panel data also consists of cross sectional data, the heteroscedasticity problem occurred. Therefore, several tests to select the most consistent model were conducted. This study used the basic equation proposed in Chapter III. The result of the Wald Test, Breush-Pagan/ Cook-Weisberg Test for heteroscedasticity and Wooldridge test for autocorrelation in panel data test clearly reject the H_0 hypothesis, implying that our data has a heteroscedasticity and autocorrelation problem. To alleviate this problem, this study employs Driscoll-Kraay standard errors. Additionally, Table 5 shows a small value of the p-value of Breusch-Pagan Lagrangian Multipier Test. It indicates that the Random effect model is consistent, over the Pooled least squared. In addition, from F-test and Hausman Test, the Fixed effect model is consistent over the Pooled least squared and Random effect models. From the Breusch-Pagan Lagrangian Multipier, F-test and Hausman Test, we can conclude that in general, the Fixed effect model is consistent and adequate, therefore our analysis will use the Fixed effect model with Driscoll-Kraay standard errors.

Table 5. Test for model selection

Test	Result
Wald Test	Chi(31)=2037.75; p-value=0.0000
Breusch-Pagan / Cook-Weisberg Test for heteroscedasticity	F(1, 277)=8.14; p-value=0.0047
Wooldridge Test for autocorrelation in panel data	F(1, 30)=12.592, p-value=0.0013
Breusch-Pagan Lagrangian Multiplier Test	Chibar(01)==72.75; p-value=0.0000
F-test	F(30, 240) =12.44; Prob>F=0.0000
Hausman Test	Chi(8)=260.72; p-value=0.0000

Note:
: The null is homoscedasticity; : The null is constant variance; :The null is no first order autocorrelation; :The null hypothesis that the Pooled-OLS is consistent, over the Random Effect model; :The null hypothesis that the Pooled-OLS is consistent, over the Fixed Effect model; :The null hypothesis that the Random Effects model is consistent, over the Fixed Effects model.

Table 6 shows the main results of this study, estimating the logarithm form of FDI Inflow with lag of logarithm form of Total Crime and lag of logarithm form of control variables for the period 2005-2015. Meanwhile, columns 2-8 present the results of regressing lag of logarithm form of certain crimes (Property Crime, Violence, Vandalism, Arson, Fraud, Homicides, and Kidnapping) and lag of logarithm form of control variables. All of the results use the fixed effect model with Driscoll-Kraay standard errors.

In Table 6, the Fixed effect model fits the data well at the 0.05 significance level (prob > F(8,6) = 0.000). The value of R-squared is 0.622. It indicates that this model can explain 62.2 percent of the total

sample variation in logarithm of FDI Inflow across provincial Indonesia. Most of the parameters of independent variables (Total Crime and control variable) are statistically significant. Total Crime and GDP per Capita at the 0.1 significance level; Cumulative FDI at the 0.05 significance level; and Domestic Investment, Population, Road, and Unemployment at the 0.01 significance level. On the other hand, only the variable Wage is statistically insignificant.

It is undeniable that market size is approximated by the logarithm form of number of provincial residents and the logarithm form of provincial GDP per capita, have significant positively related to FDI inflow. For every one percent increase in the provincial population and GDP per capita, FDI inflow is expected to increase by 7.25 and 8.07 percent respectively, holding all other variables constant. Furthermore, when cumulative FDI, domestic investment and road as proxy for infrastructure increase by ten percent, FDI inflow will increase by 9.2, 1.0, and 20.7 percent respectively, holding all other variables constant. On the other hand, if unemployment increases by ten percent, provincial Indonesia will lose FDI inflow on average by 9.5 percent, holding all other variables constant. This finding confirms Constantinou (2011) that a large pool of unemployed may imply cheap labor costs and is likely to encourage location, but high unemployment might, also, imply powerful unions which hinder inflows.

Table 6. Estimation results (Model 1)

VARIABLES	*FDI Inflow*	
	Coeff	Std. error
Total Crime	-0.0951*	0.0477
Δ *Cumulative FDI*	0.916**	0.330
Domestic Investment	0.102***	0.0285
Δ *GDP per Capita*	7.251*	3.258
Population	8.075***	0.842
Road	2.075***	0.471
Δ *Wage*	-0.146	0.139
Unemployment	-0.954***	0.215
Constant	-137.2***	15.33
Observations	279	
Number of groups	31	
R-Squared	0.622	
F overall model (Prob>F)	0.0000	
Note: *** p<0.01, ** p<0.05, * p<0.1		

The focus variable in this study is the variable Crime. As seen on the Table 6, logarithm form of Total Crime is significantly negatively related to FDI Inflow. Every increase of crime incidence per 100,000 people by ten percent, FDI inflow is expected to decrease by approximately 0.95 percent. Setting the crime rate at the zero level or considering that there is no crime incidence per 100,000 people during period 2005-2014, there will be an additional FDI inflow to Indonesia of about 151.1 million dollars. However, when we set the crime rate in its mean value, the results show that there will be an additional FDI inflow to Indonesia of about 93.46 million dollars. Thus, crime incidence leads to losing an additional 57.64 million dollars of FDI inflow.

Moreover, Table 7 shows that not every type of crime significantly affects FDI inflow. Only property crime and violence are negatively significantly correlated with FDI inflow in Indonesia. In contrast to model 1, labor cost in models 2 and 3 are statistically significant; however, unemployment is not statistically significant. Both models 2 and 3 fit the data well at the 0.05 significance level with the value of R-squared at 0.455 and 0.456 respectively. As seen in both equations, for every increase of both property crime and violence incidence per 100,000 people by ten percent, FDI inflow is expected to decrease by 0.82 and 1.64 percent respectively, holding all other variables constant.

In general, this study supports the result of the previous studies related to the determinants of FDI Inflow such as Tan & Tang (2016); Dadzie et al. (2014); Ashby & Ramos (2013); Madrazo-Rojas, (2009); and etc. From all of model specification proposed in this study, all control variables have a significant influence on FDI Inflow and the variable Crime is negatively significantly related to FDI Inflow. This finding confirms the study by Daniele & Marani (2011) that conducted a panel analysis using data from 103 provinces during the period 2002-2006, and found that foreign investors perceived organized crime "as a signal of a socio-institutional system unfavorable for FDI".

Table 7. Estimation results (Model 2-8)

VARIABLES	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	FDI Inflow	*FDI Inflow*	*FDI Inflow*	*FDI Inflow*	*FDI Inflow*	*FDI Inflow*	*FDI Inflow*
Property Crime	-0.0821*						
	(0.0373)						
Violence		-0.164*					
		(0.0790)					
Vandalism			-0.0579				
			(0.0467)				
Arson				-0.0103			
				(0.0179)			
Fraud					-0.0283		
					(0.0274)		
Homicides						0.278	
						(0.175)	
Kidnapping							-0.0374
							(0.0290)
Δ *Cumulative FDI*	0.822**	0.827**	0.818**	0.816**	0.808**	0.708*	0.850**
	(0.316)	(0.314)	(0.317)	(0.302)	(0.313)	(0.295)	(0.337)
Domestic Investment	0.159*	0.160*	0.161*	0.161*	0.161*	0.165*	0.155*
	(0.0740)	(0.0759)	(0.0743)	(0.0752)	(0.0747)	(0.0716)	(0.0707)
Δ *GDP per Capita*	6.339*	6.770*	6.358*	6.278*	6.338*	6.013*	6.246*
	(3.071)	(3.307)	(3.137)	(3.025)	(3.088)	(2.924)	(2.981)
Population	11.47***	11.75***	11.36***	11.37***	11.28***	11.80***	11.64***
	(0.863)	(1.071)	(0.824)	(0.799)	(0.779)	(1.023)	(1.177)
Road	3.432**	3.332***	3.405**	3.399**	3.415**	3.314**	3.335***
	(0.946)	(0.884)	(1.000)	(0.997)	(0.965)	(0.929)	(0.897)
Δ *Wage*	-0.284**	-0.278**	-0.282**	-0.277**	-0.278**	-0.239**	-0.274**
	(0.0975)	(0.0935)	(0.0947)	(0.0927)	(0.0936)	(0.0937)	(0.0897)
Unemployment	-0.473	-0.344	-0.455	-0.367	-0.387	-0.354	-0.302
	(0.378)	(0.481)	(0.361)	(0.420)	(0.409)	(0.363)	(0.436)
Constant	-203.6***	-206.9***	-201.7***	-202.2***	-200.7***	-207.7***	-205.8***
	(19.73)	(23.65)	(19.55)	(19.60)	(19.27)	(22.39)	(24.70)
Observations	217	217	217	217	217	217	217
Number of groups	31	31	31	31	31	31	31
R-Squared	0.455	0.456	0.454	0.452	0.452	0.460	0.455
F overall model (Prob>F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Conclusion

The results support the current literature by confirming that Cumulative FDI, Domestic Investment, GDP per Capita, Population and Road significantly positively influence the FDI Inflow variable and Crime and Wage exert a significantly negative effect on FDI Inflow. It is found that for every increase in total crime incidence per 100,000 people by ten percent, FDI inflow is expected to decrease by approximately 0.95 percent. A high crime incidence in a region, could lead to that region being undesirable for investment due to its negative image. In general, the crime rate influences the investment decisions in terms of location.

This study suggests that besides boosting economic growth, stimulating infrastructure development, and lowering the provincial minimum wages, government needs to pay attention to crime incidence in each province. Government should allocate adequate resources to minimize the crime rate. When policies can successfully lower the incidence of crime, it is expected that the investors will respond positively and choose to invest in the province. Therefore, the effectiveness of policies related to crime, play an important role in foreign investment.

References

Albanese, G., & Marinelli, G. (2013). Organized crime and productivity: Evidence from firm-level data. *Rivista Italiana Degli Economisti*, *18*(3), 367–394. https://doi.org/10.1427/74922

Ashby, N. J., & Ramos, M. A. (2013). Foreign direct investment and industry response to organized crime: The Mexican case. *European Journal of Political Economy*, *30*, 80–91. https://doi.org/10.1016/j.ejpoleco.2013.01.006

Brock, G. J. (1998). Foreign direct investment in Russia's regions 1993 95. Why so little and where has it gone? *Economics of Transition*, *6*(4), 349–360. https://doi.org/10.1111/j.1468-0351.1998.tb00053.x

Constantinou, E. (2011). Has Foreign Direct Investment exhibited sensitiveness to crime across countries in the period 1999-2004? And if so, is this effect non-linear? *Undergraduate Economic Review*, *7*(1), 1–31.

Dadzie, C., Blanco, L., & Dony, C. (2014). *Study on Crime and Investment in Latin America and the Caribbean*. United States. Retrieved from http://pdf.usaid.gov/pdf_docs/PA00K4WM.pdf

Daniele, V., & Marani, U. (2011). Organized crime, the quality of local institutions and FDI in Italy: A panel data analysis. *European Journal of Political Economy*, *27*(1), 132–142. https://doi.org/10.1016/j.ejpoleco.2010.04.003

Madrazo-Rojas, F. (2009). *The effect of violent crime on FDI: The case of Mexico 1998--2006*. Georgetown University.

Mukherjee, A., Wang, L. F. S., & Tsai, Y. (2012). Governance and Foreign Direct Investment Is there a two-way relationship ?*Trade and Development Review*, *5*(1), 37–51.

Statistics-Indonesia. (2006). *Statistical Year Book of Indonesia 2005/2006*. Jakarta.

Tan, B. W., & Tang, C. F. (2016). International Journal of Economics and Financial Issues. *Examining the Causal Linkages among Domestic Investment, FDI, Trade, Interest Rate and Economic Growth in ASEAN-5 Countries*, *6*(1), 214–220.

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Financial independence of regencies and cities in Central Java

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Abstract

This research aims to identify and to map the financial independence of the local government. This research uses ratio analysis to identify the financial independent analysis and typology to map the local government financial level. The research indicates that the financial independence tends to increase in all regions. Based on the financial independent analysis, Semarang and Tegal have lower financial dependence with the consultative relationship pattern rather than 33 other regions that have higher financial dependent level with the instructive relationship pattern. The mapping results of financial independence are in the following: ten cities or regencies have self-financial dependency below the average toward the central government, seven regencies have self-sufficient above the average toward the central government, and eighteen regencies have self-sufficient below the average toward the central government.

Abstrak

Penelitian ini bertujuan untuk mengidentifikasi dan memetakan kemandirian keuangan pemerintah daerah. Penelitian ini menggunakan analisis rasio untuk mengidentifikasi analisis independensi dan tipologi keuangan untuk memetakan tingkat keuangan pemerintah daerah. Hasiln penelitian menunjukkan bahwa kemandirian finansial cenderung meningkat di semua daerah. Berdasarkan analisis independensi keuangan, Semarang dan Tegal memiliki ketergantungan finansial yang lebih rendah dengan pola hubungan konsultatif dibandingkan dengan 33 daerah lain yang memiliki tingkat ketergantungan finansial lebih tinggi dengan pola hubungan instruktif. Hasil pemetaan independensi keuangan adalah sebagai berikut, 10 kota atau kabupaten memiliki ketergantungan mandiri di bawah rata-rata terhadap pemerintah pusat, 7 kabupaten memiliki swasembada di atas rata-rata terhadap pemerintah pusat dan 18 kabupaten telah berada di bawah swadaya rata-rata terhadap pemerintah pusat.

Introduction

Economic development is an effort to create employment opportunities, to have livelihood and to provide a solid foundation for sustainable development (Muti'ah, 2017). Economic development has become an important part in the Indonesian administration since the decentralization era. This is because economic development has a broad and thorough scope in all aspects in accordance with the main characteristic that is multidimensional. Therefore, economic development serves as one measure of the success of a country. Further, Simanjuntak & Mukhlis (2015) stated that the difference in the condition of each country would require special handling.

The process of economic development of a country is influenced by the shape of the government pattern. In Indonesia, there has been a change in the government pattern from centralized to decentralized governance. The actual impact of fiscal decentralization for a country depends on the style of the existing institutions in the governance of a country (Junadi, Maski & Khusaini, 2013). This style is centralized by the government pattern, which is the implementation of a centralized approach that produces a state of the stronger dependence of a region on the central government. In its progress, the centralized system becomes a barrier to the implementation of the regional government because the problem-solving or the regional development should be with the approval of the central government. Lestari & Kholis (2016) stated that the formulation of policies, programs, and development activities in a region also need to consider the objectives of the national development. The central government still has to be involved in providing

resources in terms of funding, training, and capacity building programs and continues to monitor the local government programs or the policy implementation (Mamogale, 2014).

Therefore, in 1999 the governmental pattern in Indonesia was changed to decentralization. The implementation of decentralized pattern is expected to accommodate the paradigm change of government, to prioritize the principles of democracy, social participation, equity and justice, to pay attention to the potential differences and diversity, and to be able to prevent the disintegration of a nation. Known as a regional autonomy program, decentralization also aims to accelerate the economic growth and to reduce the regional development disparities among the regions and to improve the quality of public services (Nufus, Supratikta, & Muchtar, 2017). Paul, Renyaan, Ubud, & Idrus (2012) stated that the regional autonomy in Indonesia is viewed as a strategy to respond the local communities' demands on three main issues those are sharing of power, distribution of income, and independence of management system. According to Ratang (2016), fiscal decentralization provides broadly autonomy for the government to conduct the local financial management oriented to public interest.

Gousario & Dharmastuti (2015) stated that regional autonomy is not only to eliminate the disintegration of a nation, but also to improve the efficiency and effectivenessof the financial resource management in order to improve the welfare and service to the community. In other words, Cigu (2014) stated that the financial decentralization is realized by disposing of sufficient resources to ensure their own expenses and at the same time to achieve the decentralized powers with the help of the local public finance. Fiscal decentralization as a follow-up of decentralization encourages the region to manage the regional finance by optimizing the resources and potential of the region. The form of fiscal decentralization is the Regional Budget, which consists of postal receipts, expenditure, and regional financing.

The essence of autonomy or decentralization is democratization and empowerment. Regional autonomy as the embodiment of democracy means the equality relationship between the center and the regions, where regions have the authority to regulate and manage the interests, needs and aspirations of their people (Viphindrartin & Cahyo, 2016). The implementation result of regional autonomy shows the success or collapse through increased welfare of society. The unchanged or even lower welfare of a society shows the collapse of regional autonomy. On the other hand, the success of regional autonomy should be seen from the growing prosperity of society (Badrudin & Siregar, 2015).

Postal receipt becomes an important part in the implementation of fiscal decentralizationbecause the local revenue represents the ability of the local governments to provide the funds as a source of regional management in certain periods. Based on the data from the (Directorate General of Fiscal Balance, 2014), the postal revenues in the Regional Government Budget in 2010 to 2014 are shown in Table 1.

Table 1. Summary of postal revenues in regional government budget in 2010-2014 in national range (in million rupiah)

Items	2010	2011	2012	2013	2014
Revenues	314,486,000	459,893,000	551,947,000	652,862,000	759,476,113
Local Revenues	71,852,000	90,393,000	112,745,000	140,302,000	180,347,447
Balance Funds	292,281,000	327,368,000	380,984,000	432,697,000	482,221,112
Other Legitimate Local Revenues	22,205,000	42,132,000	58,218,000	79,866,000	96,907,544

Source: Directorate General of Fiscal Balance 2010 – 2014.

All sources of local revenues from 2010 to 2014 tend to increase. However, the balance funds still dominate the national source of local revenue (Table 1). This means that the local governments still depend on the revenues derived from the external parties such as the central government, whereas various efforts have been made to reduce the financial dependence as stated in the Legislation No. 29 of 2009 on local taxes and levies with the aim of strengthening the taxation.

Based on the data from the (Directorate General of Fiscal Balance, 2014), the Java-Bali region becomes the regional group with a proportion of balance funds to the smallest total fund compared to other regions in Indonesia. In the region, viewed from the aggregate local revenue growth of regencies/cities in provinces, the revenue growth of Central Java Province is still below the average.

In the implementation of regional autonomy, the tax may represent people's participation in the local development measured by the tax ratio. The higher the tax ratio is, the greater the tax revenues will

be and so the more freely the government will finance its revenues. Based on the data from the (Directorate General of Fiscal Balance, 2014) Directorate General of Fiscal Balance (2014), of 33 provinces in Indonesia, nine provinces have the tax rate above the average. In Java-Bali region, Central Java Province has the lowest tax ratio value of 0.3, which means that the average of taxes levied by the local government of regencies/cities in Central Java Province is 0.3% of the GDP of non-oil and gas.

Moreover, the success of regional autonomy can also be seen from the fiscal space, which is the flexibility level of the local government in utilizing the budgets for local priorities. In Java and Bali, Central Java Province gets the second lowest rank of all provinces in Indonesia. The interesting thing is that Central Java province as the autonomous region in Java-Bali region has the greatest receipt capability of Region Own Source Revenue among other regions but has very little fiscal space. Based on these conditions, it is very interesting to know more deeply about the finances in Central Java Province. Based on the data from the Directorate General of Fiscal Balance, the Composition of Regional Government Budget Revenue in Central Java Province can be seen in Table 2.

Table 2. Composition of aggregate regional government budget revenue in regencies and cities in Central Java province in 2010 – 2014 (in million rupiahs)

Year	2010	2011	2012	2013	2014
Local Revenues	2,958.17	3,726.29	4,885.40	6,091.50	8,849.41
Balance Funds	22,481.24	24,682.10	29,472.91	31,710.86	34,113.12
Other Legitimate Revenues	1,149.40	1,643.95	1,487.13	1,319.25	2,111.64

Source: Directorate General of Fiscal Balance 2010-2014.

Table 2 shows that all sources of local revenues have increased every year. The balance fund becomes the greatest income source compared to other income sources. Therefore, the role of central/provincial government in the implementation of regional autonomy in the regencies/cities in Central Java Province is still great.

Based on the above explanation, it can be concluded that during the process of decentralization in progress, the results of implementation of regional autonomy of each region is different and the role of central government in the local governance is still great. The characteristics of a region that is capable of implementing the regional autonomy are as follows: (1) the local financial capability, which means that the region should have the authority and the capability to explore the financial sources, to manage and use its own finance that is sufficient to finance the governmental implementation, and (2) the dependence on central assistance should be as minimum as possible to make the region own source revenue part of the largest financial resources so that the role of local government becomes even greater. It is important to analyze the financial condition of local government, the local financial independence, and the mapping of local financial independence. This is conducted in an effort to achieve the success of regional autonomy.

Research Method

This research uses descriptive quantitative method, which is a research that uses numerical and graphical methods to identify the patterns of a number of data, to summarize the information contained in the data, and to present such information in the desired form. The object of research consists of 35 regencies/cities in Central Java Province. The data used in this research is secondary data in the form of data pooling. The data collection is conducted by using the documentation based on the Supreme Audit Agency of Republic of Indonesia, Representative of Central Java Province, the Directorate General of Fiscal Balance, the Central Bureau of Statistics of Central Java Province, and other literatures.

The data analysis in this research uses the ratio analysis and typology. Ratio analysis is used to identify the financial condition of the region, which consists of:

(1) Short-term solvency, which is used to know the capability of local government in ensuring the short-term liabilities. The formula is:
   a. Ratio A = (cash/cash equivalents + short-term investments)/short-term liabilities
   b. Ratio B = (cash/cash equivalents + short-term investments + credit)/short-term liabilities
   c. Ratio C = (current assets/short-term liabilities).

(2) Long-term solvency, which is used to know the capability of local government in ensuring the long-term liabilities. The formula is:

a. Ratio A = total assets/long-term liabilities
b. Ratio B = total assets/total liabilities
c. Ratio C = equity of investment funds/total liabilities

(3) Service level solvency, which is used to know the capacity of local government to provide public service needed and desired by the people. The formula is:
a. Ratio A = total capital/total population
b. Ratio B = total assets/total population
c. Ratio C = total expenditure/total population

(4) Budget solvency, which is used to know the capacity of local government to produce income to cover the operation during the finance budget period. The formula is:
a. Ratio A = (total revenue – Special Allocation Funds)/(total expenditure – capital expenditure)
b. Ratio B = (total revenue – Special Allocation Funds)/operational expenditure
c. Ratio C = (total revenue – Special Allocation Funds)/personnel expenditure
d. Ratio D = total revenue/total expenditure.

(5) Finance flexibility, which is used to know the capability of local government to cover the debt load. The formula is :
a. Ratio A = (total revenue – Special Allocation Funds – personnel expenditure)/(principal payment + interest expenditure)
b. Ratio B = (total revenue – Special Allocation Funds – personnel expenditure)/total liabilities
c. Ratio C = (total revenue – Special Allocation Funds – personnel expenditure)/total long-term liabilities
d. Ratio D = (total revenue – Special Allocation Funds)/total liabilities.

Local financial independence aims to describe the regional dependence on the external funding sources and the levels of people's participation in the local development. In this research, the local financial independence can be seen by using the ratio analysis tools as follows:

Financial dependence ratio

The ratio of local financial dependence can be calculated by comparing the amount of transfer revenues received by the region to the total local revenues. The higher the ratio is, the greater the value of dependence level of the local government on the central government will be. Besides, the dependence level of the region indicates the capability of the local government to finance its local expenditure. Classification of dependency can be seen in Table 3 below:

Table 3. Classification of local dependence rate

Ratio (%)	Summary
<= 25	Fiscal dependence is very little,which means that budget financial performance is excellent
26 – 50	Fiscal dependence is good enough, which means that budget financial performance is good enough
51 – 75	Fiscal dependence is great enough, which means that budget financial performance is not so good
76 – 100	Fiscal dependence is very great, which means that budget financial performance is very bad

Financial independence ratio

Financial independence ratio is used to determine the capability of local government to finance its own activities of governance, development, and services to the people who have paid taxes and levies as the required source of income. The formula is Local Revenues/Central or Provincial Government Assistance/and Loan. From the independence ratio calculation results, there is a pattern of relationship between the central government and local governments. Classification of this kind of relationship can be seen in Table 4.

Typology is conducted to map the regions based on the financial independence. The mapping results are in the form of groups, in which each group's characteristic will be identified with the income approach. The typology of financial independence based on the ratio of financial independence and dependence can be seen in Table 5.

Table 4. Relationship of local capability level

Independence Ratio (%)	Local Finance Capability	Independence Level	Pattern of Relationship
<= 25	Very Low	Incapable	Instructive
25 – 50	Low	Not independent Enough	Consultative
51 – 75	Medium	Independent Enough	Participative
76 – 100	High	Independent	Delegative

Table 5. Typology of local financial independence based on ratio of local financial independence and dependence

	TKtD > TKtD	TKtD < TKtD
TKD > TKD	Group I Independent region which dependencelevel is below the average	Group II Independent region which dependence level is above the average
TKD < TKD	Group III Dependent region which dependence level is below the average	Group IV Dependent region which dependence level is above the average

Explanations:
TKDi = Rate of independence ratio of region i
TKD = Average rate of local finance independence ratio
TKtDi = Rate of local finance dependence ratio of region i
TKtD = Average rate of local finance dependence ratio

Based on Table 5, the results of the typology of local financial independence consist of four groups. The classification of each group is:

1. Group I is the regions that have greater rate of independence ratio than the average of independence ratio and have smaller rate of local financial dependence ratio than the average of local financial dependence ratio. Regions in group 1 are categorized as independent which level of financial dependence on the central government/province is below the average.
2. Group II is the regions that have greater rate of independence ratio than the average of independence ratio and have greater rate of local financial dependence ratio than the average of local financial dependence. Regions in Group II are categorized as independent which level of financial dependence on the central government/province is above the average.
3. Group III is the regions that have smaller rate of independence ratio than the average of independence ratio and have smaller rate of local financial dependence ratio than the average of local financial dependence ratio. Regions in Group III are categorized as dependent which level of financial dependence on the central government/province is below the average.
4. Group IV is the regions that have smaller rate of independence ratio than the average of independence ratio and have greater rate of local financial dependence ratio than the average of local financial dependence ratio. Regions in Group IV are categorized as dependent which level of financial dependence on the central government/province is above the average.

Results and Discussion

The government financial condition indicates the capability of the local government to meet its liabilities (short-term liabilities long-term liabilities, operational liabilities, and the liabilities to provide services to the public), to anticipate the unexpected events, and to run the finance efficiently and effectively. The data processing results show the aggregate financial condition of the regencies/cities in Central Java Province in 2010 - 2014 as seen in Table 6.

It can be concluded that the government financial condition of the regencies/cities in Central Java Province in 2010-2014 is in the improving state. Although the value of short-term solvency is fluctuating, it is still very liquid to ensure the payment of short-term liabilities. Even the very high value for this ratio indicates that the local government has the excessive current assets that are better used to provide services to the public.

Table 6. Aggregate financial condition of regencies/cities in Central Java Province in 2010 – 2014

	2010	2011	2012	2013	2014
Short-term Solvency	25.78	18.15	33.58	26.80	34.70
Long-term Solvency	1,159	1,498	2,199	3,653	11,943
Budget Solvency	1.25	1.22	1.26	1.28	1.30
Financial Flexibility	145.87	643.41	340.98	1,297.69	3,624.46
Service Level Solvency (Rp)	1,283,237	1,547,990	1,742,752	1,939,282	2,155,990

The rate of long-term solvency indicates an upward trend. This indicates that the capability of local government in Central Java Province from 2010 to 2014 is getting stronger. Therefore, the local government has a great opportunity to obtain funding from external parties when facing financial difficulties. The use of the loan must be adapted to the legislation in force, for example, the use of the loan is only for the capital expenditure.

The trend that the rate of the service level solvency increases, which means that the local government has improved in providing services to the people. For budget solvency, the rate tends to fluctuate but the government has been stated to be able to fund the local operation activities without funding transfers from the central government in the form of special allocation funds. However, the higher rate of the budget solvency ratio is getting better because there are more of the local government revenues that can be used to finance the local operational expenditure.

Last, the rate of financial flexibility shows an upward trend. This means that the local governments are more flexible to use the budget at any time when there are the unexpected expenses such as debt maturities, disasters, and many others. Financial independence in the research is measured by using the financial dependence ratio and the financial independence ratio. The results and discussion of these ratios are:

1. Financial dependence ratio

Local financial dependence ratio is used to determine the capability of the local government to finance its expenditure without depending on the fund aid from external parties. The result of the calculation of financial dependence ratios can be seen in Table 7.

Table 7. Ratio average of financial dependence of regencies/cities in Central Java Province in 2010-2014

Local Government	Average (%)	Rank	Local Government	Average (%)	Rank
Demak Regency	90.89	1	Semarang Regency	84.48	19
Purworejo Regency	89.45	2	Pati Regency	84.31	20
Wonogiri Regency	89.38	3	Cilacap Regency	84.21	21
Pemalang Regency	89.18	4	Purbalingga Regency	83.47	22
Klaten Regency	89.09	5	Kudus Regency	83.30	23
Jepara Regency	88.65	6	Magelang City	83.25	24
Blora Regency	88.29	7	Banyumas Regency	83.21	25
Brebes Regency	88.19	8	Boyolali Regency	82.86	26
Temanggung Regency	88.10	9	Kendal Regency	82.67	27
Grobogan Regency	88.00	10	Wonosobo Regency	82.58	28
Magelang Regency	87.91	11	Salatiga City	82.14	29
Sragen Regency	87.65	12	Rembang Regency	81.35	30
Batang Regency	87.59	13	Pekalongan City	81.02	31
Karanganyar Regency	86.62	14	Sukoharjo Regency	78.89	32
Kebumen Regency	86.62	15	Surakarta City	78.48	33
Pekalongan Regency	86.56	16	Tegal City	73.05	34
Tegal Regency	86.38	17	Semarang City	66.18	35
Banjarnegara Regency	84.75	18	Average	84.54	

It can be seen that the average dependence ratio in Central Java province is 84.54%. Demak becomes a region with the highest dependence level in Central Java Province with a rate of 90.89%, which means that the budget performance is still very bad. This is because the fiscal capacity of the local government is so low that the central government pours the public allocation fund that is relatively large.

Different things happen in Purworejo Regency, which has the second highest level of financial dependence in Central Java Province. If the trend of the financial dependence ratio of Purworejo tends to fluctuate in 2010 – 2014, this indicates that the local government has not been able to maintain or increase its local capability.

The autonomous region with the lowest level of financial dependence is Semarang City. Semarang has an average ratio of 66.18% of financial dependence because the economic potential is greater than other regions, as seen from the rate of GDP of Semarang City that is the largest one compared with other regions. Besides, the local government is also always able to achieve the effectiveness of its local revenue.

Of 35 autonomous regions in Central Java province, 33 regencies/cities are stated to have so large financial dependence level that the budget performance is still considered very bad. As for the other two autonomous regions, Semarang City and Tegal City are stated to have so large financial dependence level that the budget performance is considered unfavorable.

Therefore, the government should encourage the achievement of optimization of the local resources that encourage increasing the local revenue. The increase in local revenue is expected to reduce the proportion of transfer revenue to the local government. Besides, the role of transfer revenue in the form of profit sharing also cannot be excluded because the local role affects the magnitude of the profit sharing.

2. Regional autonomy ratio

The ratio of local independence is used to view the capability of the local government to finance the local activities and the relationship between the local government and the central government. The results of the ratio calculation of the financial independence can be seen in Table 8.

Table 8. Average of financial dependence ratio of regencies/cities in Central Java Province in 2010 – 2014

Local Government	Average (%)	Pattern of Relationship	Rank	Local Government	Average (%)	Pattern of Relationship	Rank
Semarang City	44.42	consultative	1	Magelang Regency	12.01	constructive	19
Tegal City	33.42	consultative	2	Sragen Regency	11.92	instructive	20
Surakarta City	23.89	instructive	3	Jepara Regency	11.85	instructive	21
Magelang City	20.06	constructive	4	Batang Regency	11.81	instructive	22
Salatiga City	19.49	constructive	5	Purworejo Regency	11.15	instructive	23
Pekalongan City	18.22	constructive	6	Tegal Regency	11.15	instructive	24
Banyumas Regency	17.61	constructive	7	Wonosobo Regency	11.04	instructive	25
Semarang Regency	16.24	constructive	8	Grobogan Regency	10.72	instructive	26
Sukoharjo Regency	15.81	constructive	9	Temanggung Regency	10.68	instructive	27
Cilacap Regency	14.87	constructive	10	Demak Regency	10.05	instructive	28
Kudus Regency	13.88	constructive	11	Pemalang Regency	9.97	instructive	29
Pati Regency	13.7	constructive	12	Banjarnegara Regency	9.66	instructive	30
Pekalongan Regency	13.6	constructive	13	Brebes Regency	9.1	instructive	31
Purbalingga Regency	13.6	constructive	14	Kebumen Regency	9.03	instructive	32
Boyolali Regency	13.25	constructive	15	Wonogiri Regency	8.72	instructive	33
Rembang Regency	12.75	constructive	16	Blora Regency	8.34	instructive	34
Karanganyar Regency	12.46	constructive	17	Klaten Regency	7.2	instructive	35
Kendal Regency	12.4	constructive	18	Average	14.4		

It is known that the average of financial independence ratio in Central Java Province in 2010-2014 is 14.4%. Of 35 autonomous regions, there are 33 regencies/cities that are stated to have the very low financial capability with the instructive relationship pattern with the central government, while the two autonomous regions, Semarang City and Tegal City, are stated to have the unfavorable financial independence level, the low financial capability, with the consultative pattern of relationship with the central government.

Semarang and Tegal have the consultative pattern of relationship with the central government, which means that the governments of Semarang and Tegal are little more able to implement the regional autonomy and the intervention of the central government has begun to diminish. Meanwhile, the 33 regencies/cities have the instructive pattern of relationships, which means that the central government's role is still so large and even dominant that the regions are considered not able to fully implement the regional autonomy.

Semarang City government becomes the most independent region in Central Java Province because the government officials are able to carry out the development and assessment to increase the local revenue. This can be seen in the massive use of technology in various kinds of government activities and the active socialization to increase the local revenue. Semarang financial independence is also supported by the growth of GDP that is increasing every year. The main sectors contributing the GDP of Semarang are kinds of field processing industry, construction, and wholesale and retail trade, repair and maintenance of cars and motorcycles. GDP of Semarang supports the local financial independence because the average elasticity of local revenue to the GDP of Semarang in 2010 - 2014 is 4.13. It means that any increase in the GDP by 1% will increase the local revenue of 4.13%.

Klaten Regency becomes a region with the lowest level of financial independence because the transfer fund in the form of general allocation funds become the major source of local revenue. In 2014, the general allocation fund amounts Rp 1,142,586,588,000.00 while the total local revenue is Rp 1,866,506,500,772.00. This means that the local government finances the local activities using the funds from the central/provincial government and few activities are funded from the local revenues. With the general allocation fund of Klaten which amount is nearly half of the total revenues, it seems that the revenues are more allocated for the operational expenditure, especially personnel expenses. Capital expenditure is relatively small in proportion to the local expenditure.

Based on the result of independence and the regional autonomy, Central Java has not fully economically independent yet. This result is based on the previous research of Viphindrartin & Cahyo (2016) that East Java, which also implements the regional autonomy, has not fully independent. But the result of this research states that Central Java has constructive pattern between central government and local government, which could mean that the central government's role is less dominant than the local government independence itself. Meanwhile East Java has instructive pattern between central government and local government, which could mean that the central government's role is more dominant than the local government independence itself.

3. Regional mapping through typology of local financial independence

Regional mapping using the typology of financial independence is to classify the region based on the average ratio value of the local financial dependency and the average of local financial independence ratio. The results of the typology of financial independence can be seen in Figure 1.

Figure 1 shows the classification of autonomous regions based on the local financial independence. The vertical center line is the average rate of financial independence ratio of regencies/cities in Central Java Province in 2010-2014, while the horizontal center line is the average rate of financial dependence ratio of regencies/cities in Central Java Province in 2010-2014.

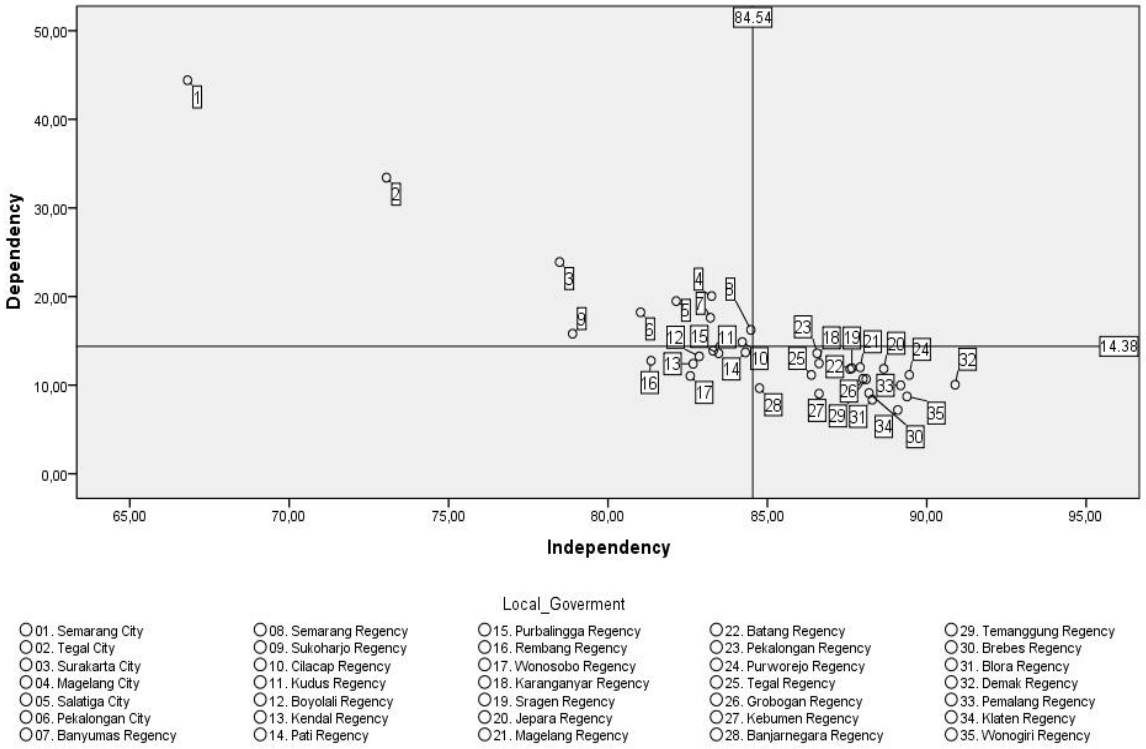
When the financial independence ratio is getting away from point 0, the region is getting more independent, and vice-versa. This is different from the dependence level, in which the farther the ratio of financial dependence from the point 0 is, the more the local government will tend to depend on the transfer fund from the central government or the provinces.

Group I consists of the Banyumas Regency, Cilacap Regency, Semarang Regency, Sukoharjo Regency, Magelang City, Pekalongan City, Salatiga City, Semarang City, Surakarta City, and Tegal City. This region has the rate of independence ratio of more than 14.38% and the rate of dependence ratio of less than 84.54%.

There is no cities and regencies in Group II. However, based on the typology of financial independence, no governments of regencies/cities in Central Java Province fall into this category. This is because no regions have the rate of independence ratio of more than 14.38% and the financial dependence ratio of more than 85.54%.

Group III consist of seven regencies. This group is the dependent regions which local financial dependence level is below the average. Group III consists of Boyolali Regency, Kendal Regency, Kudus Regency, Pati Regency, Purbalingga Regency, Rembang Regency, and Wonosobo Regency. These regions have the independence rate of less than 14.38% while the rate of financial dependence ratio is less than 84.54%.

Figure 1. Typology of financial independence in Central Java Province



Group IV consist of 18 regencies. This group is the dependent regions but the financial dependence level on the central government or provinces is above the average. This group consists of Banjarnegara Regency, Batang Regency, Blora Regency, Brebes Regency, Demak Regency, Grobogan Regency, Jepara Regency, Karanganyar Regency, Kebumen Regency, Klaten Regency, Magelang Regency, Pekalongan Regency, Pemalang Regency, Purworejo Regency, Sragen Regency, Tegal Regency, Temanggung Regency, and Wonogiri Regency. These regions have the rate of financial independence ratio of less than 14.38% while the rate of financial dependence ratio is more than 84.54%.

Based on the results of typology of local financial independence shown in Figure 1, some characteristics of each group can be arranged. These characteristics are conducted by looking at the financial capability of the local governments. Group I, the growth of its local revenue tends to be stable between +/- 30% annually; the local taxes become a major source of income followed by other legitimate local revenues, the local levies, and the wealth management results that are separated. The result of management is still very low when compared to other sources of local revenues. The sources of local revenues have been obtained effectively even the realization of local taxes are very effective. Recently, the elasticity trend of the local revenues to the GDP tends to be stable.

Group III is shown by the orange color, which consists of seven local governments. The characteristics of group III are: the local revenue (PAD) growth tends to fluctuate between 20% - 56.65%, but is still lower than group I and II; other legitimate PAD becomes the main source of revenues, while taxes and levies give small contribution; the PAD reception is relatively effective, the trend of levies is less stable; PAD elasticity to the GDP is higher than group II.

Group IV is shown by the red color, which consists of 18 local governments. The characteristics of group IV are: the PAD growth trend is increasing in 2010 - 2014; other legitimate PAD becomes the main source of revenues, but other sources of revenues are also increasing; the government has been very effective in collecting the local revenue; PAD is also elastic to the GDP.

From these characteristics, some strategies can be drawn up to improve the local financial independence. Group I is maintaining the PAD growth to be always positive through the policy of intensification and extension; the levies need to be improved in quantity and level of effectiveness; giving more attention to public enterprises (BUMD); encouraging the local economic growth; and improving the local assets.

Group III is creating the conducive economic conditions to encourage the local economic growth and PAD; implementing the policy of intensification and extension of PAD; optimization and improvement of BUMD; supervision in the process of collecting levies; improving the performance of the government apparatus and the use of technology in the process of local financial management.

Group IV is creating the conducive economic conditions in order to increase the PAD and the economic growth; the policy of intensification and extension of taxes and levies; supervising the collection of local levies because of fluctuating and less effective; improving the performance of BUMD to be more effective and efficient; and improving the quality of human resources and technology.

We could say that the financial independence ratio that is far from point 0 indicates that a region becomes more independent, and vice versa. On the contrary, the dependence level with the regional financial dependence ratio that is far from point 0 indicates that the local government tends to depend on funding transfer from the central or local government.

Based on the calculation of indicators of the local government financial condition, it is known that in 35 districts/cities in Central Java Province the rate of each indicator tends to increase from 2010 to 2014. It means that in this period, the local governments are able to improve their regional ability to manage the finance and to improve the services to the people in the regions.

This research is in line with previous research conducted by Ritonga, Clark, & Wickremasinghe (2012), which examined the analysis of local government financial condition in Indonesia, which indicated that the local government financial condition is in good condition in terms of the rate of short-term solvency dimension, long-term solvency, and financial flexibility. Budget solvency demonstrates the ability of the local governments to cover all expenditures. It cannot be concluded for the service level solvency because there is no differentiation between good or bad conditions, but an increased ratio shows the service improvement to the community.

Conclusion

The aggregate financial condition of the government of regencies/cities in Central Java Province in 2010-2014 is in the improving state. The values of each indicator such as short-term solvency, long-term solvency, service level solvency, budget solvency and financial flexibility show the upward trend every year.

The financial independence of local government based on the financial dependence and independence ratio is that Semarang and Tegal Cities are stated to have high enough rate of financial dependency on the central or provincial government and the unfavourable financial independence level with consultative relationship pattern. The remaining of 33 regencies/cities in Central Java Province are stated to have the very high dependence level on the central government and have not been able to implement the local autonomy with the instructive relationship pattern with the central government.

Regional mapping through typology of financial independence of the autonomous regions are divided into four groups. Group I consists of ten local governments. In group II there is no autonomous regions included in the classification. Group III consists of seven local governments. Group IV consists of eighteen local governments.

The government needs to improve and maintain the local financial condition in good condition by increasing the current assets, especially the short-term investment, in order to avoid idle assets, particularly the transfer of cash; improving the long-term investment to gain more profits to increase the local revenues; adding the local fixed asset that can improve the level of service to the public; maintaining and improving coordination in the preparation of the local government's budget; and trying to achieve the accretion of local assets that are greater than the accretion of local government liabilities, which can be conducted by taking out a loan just for infrastructure development activities, not for the local operational activities. Therefore, the role of decision makers in budgeting and managing the local budget is very large in determining the financial condition of local government.

Semarang can be chosen as a pilot project for the improvement of local financial independence in Central Java Province. Other local governments may imitate, innovate, and study the policies made by the Government of Semarang that possibly match the potential of the region.

There are some strategies to increase the financial independence: making the policy of intensification and extension of PAD, creating the conditions and situation that are conducive to encourage the local economic growth, achieving the effectiveness and efficiency of enterprises, improving the quality of human resources and technology, and minimizing the elements of debt in the local finance.

References

Badrudin, R., & Siregar, B. (2015). The evaluation of the implementation of regional autonomy in Indonesia. *Economic Journal of Emerging Markets*, *7*(1), 1–11. https://doi.org/10.20885/ejem.vol7.iss1.art1

Cigu, E. (2014). An aproach of local financial autonomy and implication over sustainable development in the knowledge society. *Journal of Public Administration, Finance and Law*, *6*, 44–53.

Directorate General of Fiscal Balance. (2014). Regional Government Budget in 2010 to 2014. Retrieved July 23, 2017, from www.djpk.kemenkeu.go.id

Gousario, F., & Dharmastuti, C. F. (2015). Regional financial performance and human development index based on study in 20 counties/cities of level I region. *Journal The WINNERS*, *16*(2), 152–165.

Junadi, Maski, G., & Khusaini, M. (2013). The impact of fiscal decentralization on local economic development in East Java. *IOSR Journal Of Humanities And Social Science*, *13*(1), 1–7.

Lestari, E. P., & Kholis, M. (2016). The practices of regional autonomy in Central Java and its implication on economic competitiveness. *Journal of Economics, Business and Management*, *4*(5), 358–362. https://doi.org/10.18178/joebm.2016.4.5.417

Mamogale, M. (2014). Financial performance of local government in Limpopo Province, 2010-2012. *African Studies Quarterly*, *15*(1), 71–92. Retrieved from http://sites.clas.ufl.edu/africa-asq/files/Volume-15-Issue-1-Mamogale.pdf

Muti'ah. (2017). The effect of regional revenue, revenue sharing fund, general allocation fund and special allocation fund on regional economic growth (Empirical study in the 33 provinces in Indonesia year 2011-2014). *Research Journal of Finance and Accounting*, *8*(8), 102–112.

Nufus, K., Supratikta, H., & Muchtar, A. (2017). Analysis of financial performance of local government through South Tangerang calculation of realization regional budget. *European Journal of Business and Management*, *9*(3), 136–146.

Paul, J., Renyaan, A., Ubud, S., & Idrus, M. S. (2012). Effect of fiscal autonomy and economic growth on local financial performance (A study on local government of Papua Province). *Journal of Asian Scientific Research*, *1*(1), 16–21. https://doi.org/10.18488/journal.2/2015.5.7/2.7.340.348

Ratang, S. (2016). Analysis of financial performance of local government Keerom fiscal year 2009 – 2013. *Journal of Social and Development Sciences*, *7*(1), 31–39.

Ritonga, I. T., Clark, C., & Wickremasinghe, G. (2012). Assessing financial condition of local government in Indonesia : An exploration*Public and Municipal Finance*, *1*(2).

Simanjuntak, T. H., & Mukhlis, I. (2015). Empirical study about the interaction between equalization funds, regional financial and human development Index in Regional Economic. *International Journal of Economics and Finance*, *7*(1), 192–203. https://doi.org/10.5539/ijef.v7n1p192

Viphindrartin, S., & Cahyo, H. (2016). Analysis of economic performance as the independence indicators of government in East Java Province. *Review of Integrative Business and Economics Research*, *5*(32), 272–286.

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Efficiency and effectiveness of road infrastructure

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Abstract

This study was to analyse the efficiency and effectiveness of provincial road infrastructure performance Yogyakarta Province. The indicators of the efficiency measurement are congestion level, road maintenance, rehabilitation and improvement and the cost. Using the data envelopment analysis method, there was an only one out of fourteen road segment that is fully efficient. On average the efficiency level was quite low that is 34.9 percent due to equally treated system by local government regardless its utilization level. Whereas the effectiveness of road performance is measured by the satisfaction level using indicator of value for time and money, comfort and convenience, safety aspect, travel amenities and road signs. The satisfaction level of road user toward performance of the most efficient road segment is relatively high that is 73.73%.

Abstrak

Penelitian ini bertujuan untuk menganalisis efisiensi dan efektivitas kinerja prasarana jalan provinsi di Provinsi Daerah Istimewa Yogyakarta. Indikator pengukuran efisiensi adalah tingkat kemacetan, pemeliharaan jalan, rehabilitasi dan perbaikan, dan biaya. Dengan menggunakan metode Data Envelopment Analysis, hanya terdapat satu dari empat ruas jalan yang paling efisien. Rata-rata tingkat efisiensinya cukup rendah yaitu 34.9 persen disebabkan pemerintah memberikan perlakuan sama terhadap semua ruas jalan terlepas dari tingkat utilisasi ruas jalan. Sedangkan efektivitas kinerja jalan diukur dengan tingkat kepuasan menggunakan indikator nilai uang dan waktu, kenyamanan, keamanan, kemudahan dan fasilitas jalan. Tingkat kepuasan pengguna jalan terhadap kinerja ruas jalan yang paling efisien relatif tinggi yakni 73.73%.

Introduction

Infrastructure development is one of the measurements for local economic development. The efficiency and effectiveness infrastructure development by local government should be measured. It is important for local government to have several considerations to make decision about the input or output that should be chosen to gain improvement for economic welfare.

Over years, the services sector has been showing more steady growth rather than agriculture. The growth of services, finance, transport, communication and construction was steady, around 8% annually (Zain, 2010), which is larger than the overall GDP growth. Thus, it is not surprising if developing countries such Indonesia would likely to raise the productivity in service sector. Therefore, better infrastructure to support the growing of service sector is vital. With service sector contributing 54% of Indonesia GDP and absorbing 50% of workforce (Drake-Brockman, 2014), it is expected that the number of employment absorption would grow higher.

Service sector, therefore, would play an important role of Indonesian economy in the upcoming years. Nevertheless, it does not mean that service sector in Indonesia will bring Indonesia to the take-off stage of economic growth, from under-development to development. According to Rostow's stage-of-growth model of development, there are some stage should be faced and proceed by developing countries in the transition from underdevelopment to development. Higher share of saving and investment in GDP would not guarantee an economic growth as it is not the sole sufficed-condition. There should be sufficient condition such as well-integrated commodity and money markets, highly developed transport facili-

ties, a well-trained and educated workforce, the motivation to succeed, and lastly an efficient government bureaucracy (Todaro & Smith, 2006).

It goes the same to the service sector. Just by having numbers of manufacturing and industries work in service sector would be not enough to upgrade Indonesia economy. Sufficient conditions, such infrastructure development and skilled labours are highly important. In this condition, countless problems such uncertain regulatory framework and lack of infrastructure are likely to hamper the growth of service sector. Here, the government plays an important role as the provider of facilities needed for higher levels of output in service sector. Infrastructure development is an absolute qualification for higher economic growth enhancement and more equally income distribution (Calderón Luis, 2004), poverty reduction and living standard improvement (Ali & Pernia, 2003).

Based on Global Competitiveness Index (GCI), Indonesia has higher competitiveness level (4.52) compared to the last five years ago (Schwab, 2015). This index represents the macroeconomic environment, the state of a country's public institutions, and the level of technological readiness. The questionable thing is whether this index is fully explaining Indonesia currently or not. Since the crisis back then Indonesia government had lacked attention on the development of infrastructure across the provinces.

The development of infrastructure was not satisfying, but government did put its priority for the development of infrastructure, whether building a new infrastructure or refining the existed infrastructure. The unsatisfactory of infrastructure development in Indonesia generally caused combination of budget constraints and lack of state-owned companies that specifically address the issue of financing the infrastructure (Ministry of Finance Republic of Indonesia, 2015), and poor quality of physical infrastructure particularly transport infrastructure (Elias & Noone, 2011).

The poor condition of infrastructure is not only faced by national government but it is also happening in local government. Yogyakarta Province still has also a problem of infrastructure underdevelopment. Known as one of the best tourism city in Indonesia, it attracts a lot potential businesses and visitors from foreign. The saddening fact that is some important infrastructure in Yogyakarta Province is not well-built and doesn't perform its function fully such as poor river infrastructure and crowded Adi Sucipto International Airport. According to government rules on Integrated Design and Building (DB), infrastructure such as building, road, railways, bridges, airport, etc should be built quickly with high technological support to create a sustainability infrastructure. This rule is unlikely represents the actualization of the infrastructure development in this region.

In improving and developing economy especially the service sector in the region, the most essential infrastructure that must be considered is road networks. According to Karlaftis & Kepaptsoglou (2012) the social prosperity and economic development are directly related to mobility and accessibility of communities and are, therefore, highly dependent upon the existence of high quality road networks. Thus, the essence of road existence is too important as it is the dominant mode of transport.

Regarding the background of the importance of road infrastructure and the poor infrastructure condition in Yogyakarta, this research is likely to answer some questions like what are the indicators of roads performance measurement. Through this measurement the researcher expects to evaluate the efficiency and effectiveness of road infrastructure. Generally, performance analysis is used to measure the efficiency and effectiveness of inputs utilization to produce output in banking or industrial sector. Apparently, the scope of efficiency analysis has become wider. Not only it measures the performance of private sector but also it has been used to assess the performance of public sector in the level of city.

The Services Performance Technical Working Group established by Local Government Australia developed service performance indicators as principles to guide the performance measurement (Department of Planning and Community, 2013). The services framework would likely represent the performances of Local Government of Yogyakarta as this framework would measure the objectives of the services in terms of its effectiveness and efficiency. The effectiveness indicators measure the outcomes of a service and the efficiency indicators measure the goodness of the use of inputs in producing the outputs.

To measure the performances of the services, the effectiveness and efficiency of the services is measured by three dimensions that would result on service effectiveness indicators. Each dimension would indicate how well the services meet users' need. The effectiveness of the services is indicated by the appropriateness and quality of the services whereas the efficiency is indicated by cost (Department of Planning and Community, 2013). The first dimension, appropriateness, defines the ease of road users in accessing the services (access); how well the service meets all users desire (equity); whether users are being over or under serviced (service levels). In appropriateness, the service level definition of the dimension

is used instead of access and equity in measuring local road performance. The second dimension which is quality defines the indicators of output that measure the extent in which a service is delivered based on defined standards. Cost on the other hand defines the efficiency use of input in producing output. Lastly, all dimensions would give the measurement of how appropriate the outcomes meet the aims.

Service that would be measured to represent the Local Government performance is road. Road plays important role for mobilization, flow of goods and services distribution, flow of inputs or factor of production. As some area of Yogyakarta dominantly covered by plantation land, road is very essential to ease the distribution of input and output.

The appropriateness of local road effectiveness is measured by the service level offered by road agency. This indicator measures whether the serviced delivered to road users is over or under serviced. Under serviced refers to low maintenance over infeasible local road which affect the satisfaction of road users. Whereas over serviced refers to high level of services of road agency in maintaining improper local road condition (sensitive to roads that have the highest probability of damage level and act quickly in solving the possible damage). Therefore, the higher the number of road maintenance or renewal, the better the level of service offered by road agency.

The quality of local road networks is measured by the surface condition of road using The Pavement Condition Index (PCI) (Setyawan, Nainggolan, & Budiarto, 2015). PCI is a measure of the superficies of roads with the aims to identify the need of local road maintenance and rehabilitation conducted annually in order to evaluate the changes in road condition. This measurement gives numerical result of local road condition where 0 defines local road worst possible condition and 100 defines local road best condition. The conditions measured by PCI are the type of, extent and severity of pavement superficies distresses (typically cracks and rutting), and the smoothness and ride comfort of the road. With two basic road condition measurements from PCI, the result will be used as reference in making decision. There are five benefits of the used of PCI. The first benefit is the result of PCI could help road agency in identifying the needs of immediate maintenance, renewal, and rehabilitation. The second benefit is PCI helps road agency in monitoring the pavement condition overtime. PCI also used to develop a network preventive maintenance strategy. Beside its benefits on monitoring and maintenance strategy development, PCI is used to estimate budgets need for road maintenance. And lastly, PCI evaluates pavement materials and designs.

Cost on the other hand is used to measure the efficiency of local road performance. Cost is output indicators that measure how efficiently services use their resources (inputs) to produce outputs. The common indicators or measures used in cost efficiency are the average cost per unit (unit cost). Average cost per units originated from the calculation of total inputs/total outputs and total direct cost providing service/total number of units of service delivered.

Here, in terms of measuring road efficiency performance, the indicator used is cost of renewal and maintenance. The measures of this indicator are the ratio of local roads renewal expenditure spent over total kilometers of local roads renewed and also the ratio of maintenance expenditure of local roads over total roads maintained.

Efficiency has become a concern for any organization to foresee whether the cost that has sacrificed was not a waste. The measurement of efficiency is friendly applied in banking sector, but it does use to measure the performance of government as the concept of efficiency itself, which was mostly discussed in economics.

In assessing the level of efficiency, there is common method that mostly used such as regression analysis. But, this method is inadequate as it does not cover multiple output and input. The existence of Data Envelopment Analysis (DEA) has answered all the needs of efficiency measurement.

Data Envelop Analysis (DEA) is the most common method used to measure the efficiency performance. DEA is used by *Decision Making Unit* (DMU) to determine the efficiency of producers by measuring the level of input and output. The result of the measurement will give the efficiency frontier which defines the maximum combinations of outputs that can be produced for a given set of inputs. 'The Pareto-Koopmans' explains the definition of efficiency of a DMU. The Pareto-Koopmans describes that the 100 % rate of efficiency is given to a DMU if particular DMU has evidence that the inputs and outputs of another DMU can get improvement without hurting or destructing other inputs and outputs (Emrouznejad, Banker, Lopes, & de Alme, 2014).

DEA was used in assessing the performance of Class I freight railroads in North American (Malhotra, Malhotra, & Lermack, 2009). He applied DEA to evaluate the financial performance of railroads

industry comparatively to figure out which firm had efficient operation process among firms in railroads industry. The efficiency performance measurement in his study focused particularly on seven firms of North American Class I freight railroads, that was known as the seven largest railway platforms. In measuring the financial performance, they used several financial ratios such as average collection period, cash flow per share, current ratio, quick ratio, inventory turnover ratio, long term debt per share, return on equity, return on assets, interest rate coverage ratio. The results of the computation were there were 5 railroads firms that are financially performed efficiently for 100%, which are Burlington Northern Santa Fe, Canadian National, Canadian Pacific, CSX Corp, and lastly Union Pacific. The remained two companies had 27% and 87% of efficiency score for Kansas City Southern and Norfolk Southern respectively.

Aside from measuring the effectiveness of local roads from road agency view, the service performance from road user view should be measured also. The importance of road user feeling in experiencing the local road network is very helpful in creating maintenance, renewal, and rehabilitation strategy. The indicators used to measure the road service effectiveness are the road user satisfaction and safety. The technique of this survey is adopted from survey done in New Delhi, India (MDRA, 2007).

Research Method

Here, DEA is also used with the same intention. Local Government Yogyakarta efficiency performance in providing infrastructure (road) will be measured based on the indicators of the measurement. DEA on the other hand has its advantage for the purpose of performance assessment comparativeness. With standardized benchmarking, DEA is able to find the value of specified character of inputs in producing outputs, moreover on inputs-outputs that are hard to be valued.

The service performance efficiency measurement of infrastructure in Yogyakarta provided by Local Government Yogyakarta therefore would likely represent Local Government Yogyakarta performance. The framework of measuring the road performance is modified from Service Performance Technical Working Group established by Local Government Victoria (Department of Planning and Community, 2013).

The research location was conducted in 14 road networks in Bantul District, Yogyakarta Province. The data collected includes the length, rehabilitation, improvement, maintenance and cost of roads annually from 2011-2015. The provided data are used to foresee the efficiency performance of road networks using the input-oriented formula:

$$Efficiency = \frac{Output}{Input}$$

Efficiency is ratio of total outputs and inputs that presents how efficient DMU produces an output with several inputs. Output is total outputs that are produced by DMU, and Input is total inputs that are used to produce a set of output.

Besides computing the efficiency score that defines how DMU efficiently produce output with numbers of inputs, DEA will give solution and recommendation on how some inefficient DMUs could be efficient relative with an efficient DMU. By measuring the performance target of DMU it could help inefficient DMUs to perform efficiently (Ramanathan, 2003). One of the computations of performance target is input target, DMUs that are inefficient could find out what techniques and policy should be applied to perform an efficient productivity process with constant or same output. Input slack could also use to support the result of input target.

$$Input\ Target = Actual\ Input \times Relative\ Efficiency\ /\ 100$$

Input target is the number of input that could give inefficient DMU same ratio of output-input relative to efficient DMU. Actual Input is the actual amount of input used, and Relative Efficiency is the percentage of efficiency score.

$$Input\ Slack = Actual\ Input - Input\ target$$

$$Input\ Slack\ Percentage = \frac{Input\ Slack}{Actual\ Input} \times 100$$

Input Slack is the difference between actual input and input target. Input Slack Percentage will indicate how much inputs should be reduced to earn output the same with the most efficient DMU among others.

DEA is used to find the impact of the measures towards the performance of local roads in Yogyakarta. DEA would give numerical result of the ratio of the measures used to measure the indicator of each dimensions (*Appropriateness, Cost, Service Effectiveness*) of local road performance measurement.

In applying DEA, there are several types of model that can be used as the orientation of measurement. Input orientation is used in this research since it is easier for Local Government of Yogyakarta to control the input that aiming for efficiency instead of output. On this model, the inputs are available to be reduced and added. Input target is used to find out how many inputs should be utilized to get the targeted value of output by controlling the amount of input itself (Ramanathan, 2003).

MAXDEA software is used to measure the efficiency score of each DMU (road segments). As DEA have variant type of models, this research used CCR input oriented model since it is easier for road agency (Local Government of Yogyakarta) to control the inputs instead of output. The CCR Model (Charnes, Cooper, and Rhodes) assumes constant return to scale (CRS). The orientation of the model is input orientation which gives the number of inputs should be reduced to be efficient while holding constant output.

In order to measure the road efficiency, the data are collected secondarily. Secondary data is attained from Public Works Department. The data are used to construct the value of variables of measurement. Below are the lists of the variables and the data needed to support them.

1. Congestion level (CG) is the ratio data of numbers of daily traffic in all road segments and the length of each road segments.
2. Maintenance level (MT) is the ratio data of total kilometers roads maintained and the length of each road segments.
3. Rehabilitation Level (RL) is the ration data of total kilometer roads rehabilitated and the length of each road segments.
4. Road Improvement Level (RI) is the ratio data of total kilometer roads improved and the length of each road segments.
5. Ratio of Cost Spent (CS) is the ratio of data total expenditure of each road segments to the length of each road segments.

To measure the efficiency level, the variable of output is the level of congestion (CG) and the input variables are maintenance level (MN), rehabilitation level (RL), road improvement (RI) and ratio of cost spent (CS). Congestion Level is the output of the efficiency measurement. Congestion level earned from the ratio of numbers of daily traffic over total kilometers of local roads. At a certain number of congestion level (earn from daily traffic/total km of roads), higher maintenance, rehabilitation, and cost will lower the efficiency score. This is because when the physical condition of the road is getting better each km; the congestion level stays still which means the utilization of the road is not increased.

Maintenance level is the kilometers of road maintained by local government. High frequency of road maintenance would rather decrease the efficiency score instead of improve it. Each kilometers of local road maintained would likely reduce the efficiency with almost constant congestion level. High frequency of road rehabilitation, road improvement would also rather decrease the efficiency score instead of improve it. Ratio of cost represents how much one kilometer of road is cost when maintained, improved, or rehabbed. High expenditure for road will decrease efficiency score instead of improve it. Each rupiah of local road spent in Bantul would likely reduce the efficiency with almost constant congestion level.

In conducting the efficiency measurement of road performance, researcher used non-probability and typical case sampling technique. With the population of this research is all province roads supported by Local Government of Yogyakarta Province, the sample of this research are road networks in Bantul District. Bantul district was taken as the sample due to the highest daily traffic number it has. Bantul district has 14 road segments which located in southern part of the Special Region of Yogyakarta Province. Each road segment is measured to figure out the efficiency score that will describe whether the government treatment for each road segment is appropriate enough or not. The efficiency score of each road will depict if the road is utilized optimally with certain level of inputs.

According to previous survey in New Delhi, the survey was aimed to all road users, but in this chance the researcher only applies the survey on single road users only. Here the researcher used the same purposive sampling technique due to some reasons. According to the data, the growing number of motorcycle in Yogyakarta showed that the number of road users dominated by motorcyclist, therefore researcher chose 30 motorcyclists as the respondents of the satisfaction survey. From 30 respondents chosen as the object of satisfaction survey, 20 of them were seller (owner of a store) and staff of a store such as convenience store, jewellery shop, and saloon. The respondents are generally commuters and for the rest of the respondents, they are originally lived around the road segment being surveyed as the owner of food stall.

Road service performance measures the satisfaction level of all road users. This measurement is used to find the answer directly from road users. The data are collected through survey questionnaire in order to identify users' satisfaction toward local roads. The questionnaire is constructed in Likert scale type of question. Each question represents whether the road users satisfy or not when they are using the road. There are five variables of satisfaction that will be covered in the questionnaire includes value for time and money, comfort and convenience, safety aspect, travel amenities and road signs.

Likert scale is used to analyse the level of satisfaction level of the road users. The indicators of satisfaction used are the value for time and money, comfort and convenience, safety aspects, travel amenities, and road signs (MDRA, 2007). With 5 aspects used as the variables of the satisfaction measurement, the data of survey are analysed using interval measurement basis. The results are composed into several categories to present the ranking or level of satisfaction. In conducting this research, the respondents are given questions that divided into 5 groups based on the aspects that are measured. The respondents are also given 4 responses for the questions: (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree.

Results and Discussion

Efficiency measurement

The efficiency measurement process is conducted during 2011 to 2015 collectively. The results show efficiency score, reference set, and times as a benchmark. Efficiency score presents the efficiency performance of each road segments. The scores earned by measuring variables of input and output. The reference set describes which road segments policy should be adopted by DMU to finally have 100% efficiency score. Times as benchmark defines the frequency of road segments become referee for DMU. Collective year 2011-2015 is used to overcome the limited data that available to avoid homogeneous result of efficiency score. Here, all input and output are sum up in range of five years; therefore, the data become more complete and satisfying.

Table 1: Efficiency score 2011-2015

DMU	Efficiency Score (%)	Times as a benchmark	Reference Set (λ)
Yogyakarta-Bakulan (parangtritis)	95.50%	0	dawung-makam imogiri (0.932142)
Yogyakarta-Barongan	65.90%	0	dawung-makam imogiri (0.631986)
Barongan-Bibal	16.70%	0	dawung-makam imogiri (0.149247)
Sedayu-Pandak	4.70%	0	dawung-makam imogiri (0.044508)
Bantul-Srandakan	73.10%	0	dawung-makam imogiri (0.682241)
Palbapang-Samas	15.90%	0	dawung-makam imogiri (0.159189)
Palbapang-Simpang Kweden	35.70%	0	dawung-makam imogiri (0.356758)
Bakulan-Barongan	51.70%	0	dawung-makam imogiri (0.515855)
Dawung-Makam Imogiri	**100.00%**	**13**	**dawung-makam imogiri (1.000000**
Sampakan-Singosaren	8.00%	0	dawung-makam imogiri (0.073071)
Imogiri-Dodogan	7.00%	0	dawung-makam imogiri (0.065229)
Patuk-Terong	4.10%	0	dawung-makam imogiri (0.038138)
Terong-Dlingo	6.90%	0	dawung-makam imogiri (0.065100)
Siluk-Kretek	2.70%	0	dawung-makam imogiri (0.021962)
Averaged Score	34.90%		

Based on the result in Table 1 above it is only one road showed efficient performance with 100% efficiency score (Dawung – Makam Imogiri road segment). On the other hand the rest of road networks are far from efficient with only one road that is close to be efficient which is Yogyakarta – Bakulan road segment with 95.5% efficiency score. The rest of road networks tend to be inefficient because of the number of input is too much. Each road networks has Dawung – Makam Imogiri as the reference, which means that other road networks should adopt the policy or technique used by Dawung – Makam Imogiri segment to be efficient.

Quite different with the partial year, the collective year shows some inefficient DMUs in the last five years. With average efficiency score is 34.9%, there are 2 DMUs that are efficient and 12 inefficient DMU. The four inefficient DMU has 0 times of reference which depicts the conditional inputs or outputs. However based on the result, the inefficient DMU can learn from its reference set to become efficient. For example Siluk-Kretek segment which has 2.07% efficiency score would be more efficient if it adopts the policies of techniques done by Dawung-Makam Imogiri segment. On the other hand, although there are 2 efficient DMU, these DMUs still take some DMUs as its benchmark. Yogyakarta-Bakulan segment despite of having almost efficient score it has reference set that indicates this DMU to learn from Dawung-Makam Imogiri segment.

As the orientation of this model is input orientation, it means that the number of inputs was reduced while output to reach efficiency was constant. The table below presents the proportional decrease of each input for the improvement of the inputs itself. Negative numbers mean decreasing input and vice versa for positive numbers.

Based on the efficiency score of collective years above, the result of the efficiency measurement of all road networks in Bantul district showed that only one road segment which is Dawung-Makam Imogiri that performed efficiently for 100% in 5 years. This result is unlikely satisfying; therefore, researcher classified the road networks in two categories to find a heterogeneity results. The road segments are classified into the most congested and less congested road networks. The division of these road segments was obtained by computing the average congested level of road networks. Road segments that have level of congestion above average are categorized as the most congested road classification whereas the congestion level of roads that is below average is categorized as less congested road classification.

There are 6 road segments included in the most congested road classification. Here, Dawung-Makam Imogiri is still the most efficient road segment even among the most congested road segments and 5 times become the referee for other road networks (Table 2). This implies that for other road networks such as Yogyakarta-Bakulan (Parangtritis), Yogyakarta-Barongan, Bantul-Srandakan, etc should adopt the policies and techniques used by Dawung-Makam Imogiri to equally perform 100% of efficiency.

Table 2. Efficiency score of most cogested road networks

DMU	Efficiency Score (%)	Reference Set	Time asBenchmark
Yogyakarta-Bakulan(parangtritis)	0.955016	dawung-makamdimogiri(0.932142)	0
Yogyakarta-barongan	0.658879	dawung-makamdimogiri(0.631986)	0
bantul-srandakan	0.731323	dawung-makamdimogiri(0.682241)	0
palbapang-simpangdkweden	0.356758	dawung-makamdimogiri(0.356758)	0
bakulan-barongan	0.516681	dawung-makamdimogiri(0.515855)	0
dawung-makamdimogiri	1	dawung-makamdimogiri(1.000000)	5

Table 3. Efficiency score of less congested road networks

DMU	Efficiency Score (%)	Reference Set	Time asBenchmark
bibal-barongan	1	bibal-barongan(1.000000)	1
pandak-sedayu	0.295125	samas-palbapang(0.279592)	0
samas-palbapang	1	samas-palbapang(1.000000)	6
singosaren-sampakan	0.496253	bibal-barongan(0.166266);dsamas-palbapang(0.303138)	0
dodogan-imogiri	0.442322	samas-palbapang(0.409762)	0
terong-patuk	0.256687	samas-palbapang(0.239575)	0
dlingo-terong	0.436211	samas-palbapang(0.408948)	0
kretek-siluk	0.168444	samas-palbapang(0.137964)	0

In less congested road classification, there are two road segments (Bibal-Barongan and Samas-Palbapang) that surprisingly performed efficiently for 100% (Table 3). On the previous measurement these roads did not show a good performance, but after classified into less congested road networks, these roads become the efficient among other less congested road segments. The efficient condition here refers to how efficient the inputs (maintenance, rehabilitation, road improvement, and cost) used to produce output whereas the output is the congestion level of road that represents the utilization level of the road itself.

The reason behind the perfect performance of Bibal-Barongan and Samas-Palbapang is due to both road segments are located in tourism area which make their utilization tend to be higher than other road segments in this classification. On the other hand, Kretek-Siluk as the most inefficient road networks should implement the policies used in Samas-Palbapang in order to perform equally. The probable reason of this inefficient condition on Kretek-Siluk is because this road was just improved into provincial road and required high amount of cost and maintenance. Therefore, with almost constant utilization level (level of congestion) huge treatment applied to Kretek-Siluk will cause unsatisfying result of performance measurement.

Input and target slack

Input target presents the number of input should be reduced or increased for inefficient DMU. From the result of efficiency estimation done above using MAXDEA, it turned out there are 13 DMU that are inefficient during 5 years. Here the input target and input slack manually calculated on collective year result to give recommendation for local government in achieving efficient road performance to improve the service sectors. Below are the results of input target on each input used.

Table 4. Maintenance Targeting & Slack

DMU	Input Target	Input Slack	Slack %
Yogyakarta-Bakulan (parangtritis)	**0.93**	**0.043922156**	**4.50%**
Yogyakarta-Barongan	0.63	0.327081633	34.10%
Barongan-Bibal	0.15	0.74375	83.30%
Sedayu-Pandak	0.04	0.902842105	95.30%
Bantul-Srandakan	0.68	0.250946309	26.90%
Palbapang-Samas	0.16	0.841	84.10%
Palbapang-Simpang Kweden	0.36	0.643	64.30%
Bakulan-Barongan	0.52	0.483	48.30%
Sampakan-Singosaren	0.07	0.8372	92.00%
Imogiri-Dodogan	0.06	0.861541667	93.00%
Patuk-Terong	0.04	0.895066667	95.90%
Terong-Dlingo	0.06	0.8728125	93.10%
Siluk-Kretek	0.02	0.796933333	97.30%

Table 5. Rehabilitation targeting & slack

DMU	Input Target	Input Slack	Slack %
Yogyakarta-Bakulan (parangtritis)	**0.114**	**0.005**	**5%**
Yogyakarta-Barongan	0	0	0%
Barongan-Bibal	0.055	0.276	83%
Sedayu-Pandak	0	0	0%
Bantul-Srandakan	0.123	0.045	27%
Palbapang-Samas	0	0	0%
Palbapang-Simpang Kweden	0	0	0%
Bakulan-Barongan	0	0	0%
Sampakan-Singosaren	0.009	0.102	92%
Imogiri-Dodogan	0.009	0.114	93%
Patuk-Terong	0.014	0.32	96%
Terong-Dlingo	0.022	0.291	93%
Siluk-Kretek	0	0	0%

After manually computed, the 13 inefficient DMUs gave variance results over maintenance as one of the road performance measurement inputs (Table 4). Yogyakarta-Bakulan (Parangtritis) which almost perfectly efficient need to operate 0.93 km of maintenance with output 15.728 congestion level to be efficient. On the other side, percentage of input slack explains that Yogyakarta-Bakulan should reduce maintenance input by 4.5%.

Still discussing Yogyakarta-Bakulan (Parangtritis), the second input which is rehabilitation should also be changed to be efficient in delivering the function of roads. For Yogyakarta-Bakulan to be efficient should do rehabilitation by 0.114 km of road or reducing the conduction of rehabilitation in this road by 5% (Table 5).

Since road improvement is done one in a time and not regularly, therefore without doing any road improvement or do 0 km of road improvement, it will help Yogyakarta-Bakulan to be efficient such as Dawung-Makam Imogiri (Table 6). The slack percentage for Yogyakarta-Bakulan rehabilitation is 0%, it means the rehabilitation should be reduce by 0% or in other words does not need any treatment.

Table 6. Road improvement targeting & slack

DMU	Input to Target	Input to Slack	Slack to %
Yogyakarta-Bakulan (parangtritis)	**0**	**0**	**0%**
Yogyakarta-Barongan	0.134	0.07	34%
Barongan-Bibal	0.034	0.17	83%
Sedayu-Pandak	0.006	0.125	95%
Bantul-Srandakan	0	0	0%
Palbapang-Samas	0	0	0%
Palbapang-Simpang to Kweden	0	0	0%
Bakulan-Barongan	0	0	0%
Sampakan-Singosaren	0.009	0.107	92%
Imogiri-Dodogan	0	0	0%
Patuk-Terong	0	0	0%
Terong-Dlingo	0	0	0%
Siluk-Kretek	0.012	0.44	97%

Table 7. Cost Targeting & Slack

DMU	Input to Target	Input to Slack	Slack to %
Yogyakarta-Bakulan (parangtritis)	**42.617**	**2.008**	**5%**
Yogyakarta-Barongan	80.138	41.467	34%
Barongan-Bibal	31.831	158.773	83%
Sedayu-Pandak	7.089	143.741	95%
Bantul-Srandakan	69.948	25.74	27%
Palbapang-Samas	2.586	13.679	84%
Palbapang-Simpang to Kweden	5.807	10.459	64%
Bakulan-Barongan	8.396	7.843	48%
Sampakan-Singosaren	16.43	188.943	92%
Imogiri-Dodogan	7.816	103.848	93%
Patuk-Terong	4.616	107.978	96%
Terong-Dlingo	7.999	107.932	93%
Siluk-Kretek	**13.94**	**502.347**	**97%**

In this research, cost is the only input that influences the performance score clearly. The inefficiency of these DMU resulted from the strange expenditure on particular road like Siluk-Kretek. Siluk-Kretek has only 370 unit of vehicle per kilometer or 3891 unit of vehicles in one day, but Siluk-Kretek spent for about 5.421 million rupiah compared to Yogyakarta-Bakulan. Yogyakarta-Bakulan spent around 372 million rupiah on average in 5 years but has 131.330 vehicles used this road. Therefore Yogyakarta-

Bakulan needs to spend 42.617 million rupiah per kilometer and later consider having equal efficiency with Dawung-Makam Imogiri (100%). The slack percentage of cost on the other hand tells that to be as efficient as Dawung-Makam Imogiri, Yogyakarta-Bakulan should decrease the cost spent by 5% (Table 7).

Satisfaction level

Based on the survey of road user's satisfaction level, 73.3% of respondent feel satisfied enough (agree) and 26.7% feel not satisfied (disagree) toward the condition of the road. Below is the percentage of satisfaction level on each aspect:

Table. Percentage Result of Satisfaction Measurement

Satisfaction Aspects	Description			
	Very Unsatisfied (Strongly Disagree)	Not Satisfied (Disagree)	Satisfied Enough (Agree)	Very Satisfied (Strongly Agree)
Value for Money & Time	-	40%	60%	-
Comfort & Convenience	-	60%	40%	-
Travel Amenities	-	20%	70%	10%
Safety Aspects	-	10%	90%	-
Road Signs	-	33.30%	66.70%	-
Overall Satisfaction	-	26.70%	73.30%	-

After conducting the survey in Dawung-Makam Imogiri as it is the most efficient road segment, it turned out that road user in Dawung-Makam Imogiri feel satisfied enough with the physical condition of the road measured by 5 aspects of satisfaction. Users who use this road only for commute do not consider the road damage is very disturbing. It was informed that the road damage did not increase the spending of users related with vehicles complementary such as gasoline, vehicle service spending, tire maintenance, etc. Instead, the users felt 60% satisfied with the value of time and money. The satisfaction level of this aspect (value for time and money) is 20% higher for the commute people than local people who have live for a long time.

The local people tend to feel dissatisfied with the physical condition of the road. Proven by overall satisfaction level of the origin people is 26.70%. The original people mostly felt dissatisfied with the safety level in Dawung-Makam Imogiri. After directly questioned, they confess that there are a lot of crimes happened in Makam Imogiri Avenue. Most of them are robbery, even though Makam Imogiri Avenue is very crowded.

Despite the low satisfaction level showed by origin road users of Makam Imogiri on average, they felt very satisfied on particular aspect which is comfort & convenience. Comfort & convenience describes how convenience the users of road utilizing the road segment itself and how easy road users could access the road networks. Based on direct interview that origin road users do feel better improvement done on Dawung-Makam Imogiri since the accessing from Makam Imogiri Avenue to capital region is easier and not time consuming.

There will be an increasing demand from road users over more amenities and better road properties such as distance signs and warning signs when there is an improvement on road condition. Improvement on road condition will increase the value for time and money and increase comfort and safety levels, therefore road users would expect better facilities (MDRA, 2007).

Conclusions

The efficiency result shows that there is only one road segment among 14 that is efficient during 2011-2015. This road segment is Dawung-Makam Imogiri. This result depicts that the local government did not perform an efficient performance in providing the road infrastructure. The rest of the result described the inefficient performance with only 1 out of 13 road segments which is Yogyakarta-Bakulan that close enough to be as efficient as Dawung-Makam Imogiri. By having references (benchmark) on DEA measurement of road performance, the local government could figure out what policy or technique should be applied on inefficient DMUs. All DMUs have Dawung-Makam Imogiri as the referee. Therefore, the gov-

ernment could adopt the techniques used in it to perform a good road condition for road users. Despite applying the techniques and policy of Dawung-Makam Imogiri, local government is also helped by the numerical result of input-oriented model used in the measurement process. This input-oriented model could support the government on controlling the number of inputs used in order to be efficient.

Road users' point of view is also used to measure the effectiveness of road performance. Measuring the satisfaction level of road users could help local government to improve its road services such as road safety, travel amenities, road signs, comfort and convenience, etc. The result of road users' satisfaction survey in Dawung-Makam Imogiri show that the road user is satisfied enough toward the road condition.

Since the results of this research are quiet unsatisfying due to many road networks performed inefficiently, therefore the local government has to reconsider the inputs used in producing the function of the road based on the input target and slack computation. The results of the computation would help the government in increasing the efficiency performance of road networks and improve the road users' satisfaction level. Many road networks would be better if given less treatment instead of equally treated.

Reference

Ali, I., & Pernia, E. M. (2003). *Infrastructure and poverty peduction — what is the connection?* (ERD Policy Brief Series No. 13). Manila.

Calderón Luis, C. S. (2004). *The effects of infrastructure development on growth and income distribution*. *Policy Research Working Papers*. The World Bank. https://doi.org/doi:10.1596/1813-9450-3400

Department of Planning and Community. (2013). *Draft local government performance reporting framework & indicators* (Department of Planning and Community Working Paper No. May). Victoria.

Drake-Brockman, J. (2014). Indonesian services sector finds its voice. *International Trade Forum*, *2014*(1), 32–33. https://doi.org/10.18356/be6d5c55-en

Elias, S., & Noone, C. (2011). *The growth and development of the Indonesian economy economic developments* (Reserve Bank of Australia Bulletin No. December Quarter). Sydney.

Emrouznejad, A., Banker, R., Lopes, A. L. M., & de Alme, M. R. (2014). Data envelopment analysis in the public sector. *Socio-Economic Planning Sciences*, *48*(1), 2–3.

Karlaftis, M., & Kepaptsoglou, K. (2012). *Performance measurement in the road sector: A cross-country review of experience* (International Transport Forum Discussion Papers No. 10). Paris: Organisation for Economic Cooperation and Development (OECD).

Malhotra, R., Malhotra, D. K., & Lermack, H. (2009). Using data envelopment analysis to analyze the performance of North American class I freight railroads. In K. D. Lawrence & G. Kleinman (Eds.), *Applications of Management Science* (13th ed., pp. 113–131). Emerald Group Publishing Limited. https://doi.org/10.1108/S0276-8976(2009)0000013009

MDRA. (2007). *Road user satisfaction survey in the state of Himachal Pradesh*. New Delhi.

Ministry of Finance Republic of Indonesia. (2015). Underdeveloped infrastructure, Indonesia's economy can't grow 7 percent.

Ramanathan, R. (2003). *An introduction to data envelopment analysis: A tool for performance measurement*. New Delhi: Sage Publication India Pvt. Ltd.

Schwab, K. (2015). *The global competitiveness report 2015-2016*. Geneva.

Setyawan, A., Nainggolan, J., & Budiarto, A. (2015). Predicting the remaining service life of road using pavement condition index. *Procedia Engineering*, *125*, 417–423. https://doi.org/10.1016/J.PROENG.2015.11.108

Todaro, M. P., & Smith, S. C. (2006). *Economic development* (9th ed.). Pearson.

Zain, W. (2010, April). Services sector: An alternative route to high growth? *The Jakarta Post*.