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Financial Development and Income Inequality in Indonesia: A Sub-national Level Analysis

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Abstract

It is widely believed that financial inclusion aids inclusive growth and reducing inequality. This study constructs financial inclusion indicator and analyzes the link of financial inclusion and income inequality for 33 provinces in Indonesia. In extension to analyses at national level, estimation has been done by dividing provinces into three categories which are agriculture, manufacture, and mining economies. By using Fixed Effect Panel Model, we find financial inclusion appears to have insignificant effect to inequality at national level. While at sub-national level, adding other variables such as GRDP, years of schooling, and trade openness, we find financial inclusion appears to have negative and significant impact on income inequality in manufacture and mining-based provinces, not in agriculture-based. The results suggest that financial inclusion helps to lower income inequality when economic condition encourage people to utilize financial access for productive purposes. More effective financial inclusion programs in rural area are highly demanded.

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1. Introduction

After the 1997 to 1998 Asian financial crisis, the growth of Indonesia's economy has been relatively high. In the past 17 years, the nation's gross domestic product (GDP) rose on average by almost 5.4 percent annually, making it as a newly global darling. The relatively stable political and macroeconomic conditions make Indonesia able to attract foreign investors to enter domestic market.

However, the growing national economic growth has been accompanied by widening income gap between rich and poor. The gap, as measured by the Gini coefficient, shows an upward trend over the past 27 years, both in national and sub national basis.

On the other hand, financial markets in Indonesia also continue to grow in line with economic growth. While it is normal for a country to experience an up rise of unequal distribution of income at the start of their development stages, many countries such as Japan and South Korea shows economic growth is possible to achieve with only a small increase of inequality. Therefore, the challenge for the policymakers is therefore to the reach the optimal socioeconomic benefits associated with rapid economic expansion.

To promote economic growth and inclusive financial system for all, in 2012 the Government of Indonesia released the National Financial Inclusion Strategy (NFIS) by putting financial sector as an anchor for economic growth and poverty reduction. In 2015, NFIS was later revised to align with National Development Plan (NDP) 2015-2019. It aims to enhance the integration of pre-existing financial inclusion programs through 6 strategies; promoting financial education, public finance facility, mapping of financial information, supporting regulation, intermediary facility and customer protection. In 2016, the government published Presidential Decree No. 82 about NFIS to support financial inclusion development in Indonesia. The main purpose of this program is to provide access to financial services institutions for 75 percent of the adult population in Indonesia by the end of 2019. The program could be considered as a successful initiative. According to Global Financial Inclusion Index (Findex) 2017 released by World Bank in April 2018, Indonesia's financial inclusion has made the most progress in East Asia and the Pacific region. The report mentions that the share of adult population with a bank account in Indonesia now is 49 percent, considerably higher than 20 percent and 36 percent in 2011 and 2014 respectively. Some social programs like non-cash food subsidy has succesfully promoted lower class society to register a bank account.
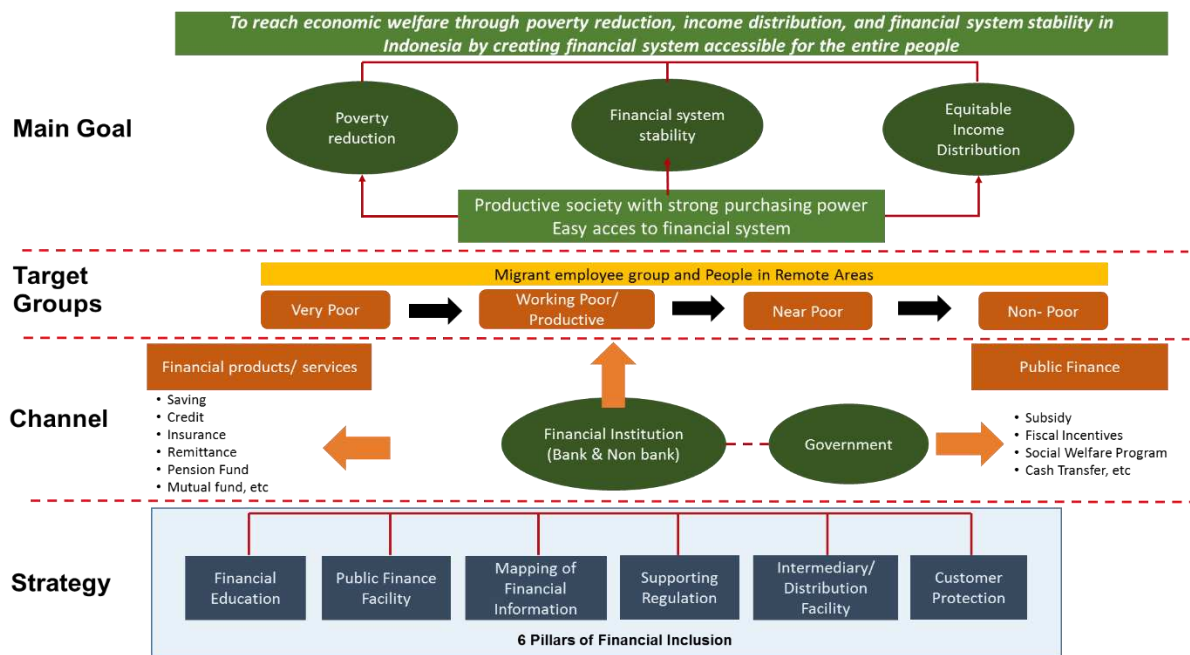
Figure 1. National Financial Inclusion Strategy

To ensure the effectiveness of the program, number of indicators are needed as a guideline to establish benchmarks for the development of the programs; to identification barriers of the programs; and to monitor the achievement of the programs, both in national and regional levels. Those indicators are grouped into three types of dimension. First is accessed, which is the ability to use formal financial services. Second dimension is usage, which is the actual usage of financial services and products. Last dimension is quality, which is providing financial services and products that can meet the needs of the people.

In 2016, the government also established National Council of Financial Inclusion (NCFI) to supervise the implementation of the programs. NCFI consist of President, Vice President, Coordinating Minister for Economic Affairs, Bank Indonesia, Financial Services Authorities (FSA) and several other ministries. To achieve its purpose, NCFI has 7 working groups in the financial education, community property right, intermediation facilities and financial distribution channels, financial services in the government sector, consumer protection, policy and regulation and infrastructure and financial information and technology.

In the view of many policymakers, there exists conventional wisdom about the role of financial inclusion: a more inclusive financial market support economic growth by providing financial aids for society – both wealthy and poor people – and thereby ensure

that capital is efficiently distributed. The logic goes as follow: easily accessible and more developed financial markets would pave the way for unbanked society to borrow and set up their businesses, increase income and climb the social ladder. This argument is arguably correct in many developing countries, where microcredits for the poor help a less developed society to supplement their income after obtaining a loan to build a business.

Despite abundant empirical findings of the beneficial role of financial inclusion in economic growth, the conclusion on the nexus of financial inclusion and income distribution, however, is still incipient. There have been somewhat conflicting predictions about the effect of financial inclusion on income distribution. At one end is the view that proposes an inverted-U relationship between finance and income inequality. While at the other end is the view that predicts a linear relationship.

Our study aims to go beyond the financial inclusion-growth nexus and empirically assess the link between financial inclusion and the distribution of income in a society. Following the methodology of Sarma (2008), we constructed financial inclusion indicator for each province in Indonesia. This study asks the following questions: 1) Does financial inclusion always reduce income inequality in a community? 2) Are there significant differences among regions in one monetary union based on their economic structure, or is the influence the same in all areas? 3) Is the impact of financial inclusion to income inequality within all provinces different based on income level? We analyze the link of financial inclusion and income inequality using standard proxies in the financial inclusion literature and the Gini coefficient of income distribution for all provinces in Indonesia.

This paper contributes to the existing literature by 1) developing a financial inclusion index which utilizes available provincial data, 2) focusing on sub-national level data, and 3) understanding the link between financial inclusion and income inequality across Indonesia. By creating our own measure of financial inclusion based on existing methodology, we can increase our sample for all provinces as well as utilize all available data for each province. By focusing all provinces, we cover diverse samples ranging from large growing provinces like those in Java islands to small provinces like those in eastern part of Indonesia, and consider the economic structure of each province like manufacturing based to natural resource based. Lastly, in addition to our own financial inclusion indicator, we tested the importance of trade openness in lowering income inequality across all provinces in Indonesia.

We extended the existing literature by using a more extensive database covering a longer time horizon and more provinces. We also further controlled for year effects and potential endogeneity problems. Finally, we conducted various robustness checks for our benchmark specification, including a sample split of the dataset into subsamples according to income levels and economic structure.

The result shows that in all subsamples and full sample financial inclusion appears to lower income inequality and the effect is strongest in mining-oriented provinces. Other variables which are Gross Regional Domestic Product (GRDP), years of schooling and trade-openness varies across subsample. In full sample and agriculture economies, GRDP has a negative impact to inequality whereas it is positive in mining sectors. Years of schooling is not significantly increase inequality in Indonesia. However, in agriculture provinces a longer year of schooling tend to widen inequality but in mining and manufacture economies it narrows inequality. Trade openness in all estimations appear to have a positive significant impact to inequality

This paper is organized as follows. Section 2 presents an overview of literature review and what we contribute to the literature. Section 3 provides the methodology for the construction of our financial inclusion indicator and data sources. Section 4 discusses some stylized facts and empirical results. Section 5 highlights the key findings. Lastly, section 6 summarizes and offers some policy recommendations.

2. Related literature

The term financial inclusion became a trend in post-crisis 2008, mainly based on the impact of the crisis on the bottom of the pyramid (low income and irregular income, living in remote areas, the disabled, workers with no legal identity documents and marginalized communities) which is generally unbanked with high numbers in developing countries.

At the G-20 Pittsbugh Summit 2009, the G20 members agreed on the need to improve the financial access for this group as highlighted at the 2010 Toronto Summit, with the release of 9 Principles for Innovative Financial Inclusion as guidelines for the development of inclusive finance. The principles are leadership, diversity, innovation, protection, empowerment, cooperation, knowledge, proportionality, and framework.

Despite extensive discussions on the issue, there is no standard definition of financial inclusion. However, several institutions have proposed some definitions of financial

inclusion which lead to a consensus. The World Bank mentions that *"financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way"*. Consultative Group to Assist the Poor (CGAP) describes that *"financial inclusion is state in which all working age adults have effective access to credit, savings, payments, and insurance from formal service providers. Effective access involves convenient and responsible service delivery, at a cost affordable to the customer and sustainable for the provider, with the result that financially excluded customers use formal financial services rather than existing informal options."* Meanwhile, Financial Action Task Force (FATF) states that "*financial inclusion involves providing access to an adequate range of safe, convenient and affordable financial services to disadvantaged and other vulnerable groups, including low income, rural and undocumented persons, who have been underserved or excluded from the formal financial sector."*

Existing literature on financial inclusion also has varying definitions of the concept. Amidžić, Massara, and Mialou (2014) and Sarma (2008) directly define financial inclusion. Amidžić, Massara, and Mialou (2014) stated that financial inclusion is an economic state where individuals and firms are not denied access to basic financial services. Another definition is proposed by Sarma (2008) – and we follow this definition – which views financial inclusion as a process that ensures the ease of access, availability, and usage of financial services of all members of society. Unlike the definition of Amidžić, Massara, and Mialou (2014), the advantage of Sarma's (2008) definition is that it builds the concept of financial inclusion based on several dimensions, including accessibility availability, and usage, which can be discussed separately.

Another issue about financial inclusion is that there is no standard method by which it can be measured. Consequently, existing studies propose varying measures of financial inclusion. Honohan (2007 and 2008), for instance, constructed a financial access indicator for 160 economies by comparing the fraction of adult population in a given economy with access to formal financial institutions. When available, he used household survey data on financial access to construct composite financial access indicator. For those without household survey on financial access, the indicator was derived using information on bank account numbers and GDP per capita. The dataset was constructed as a cross-section series using the most recent data as the reference year, which varies across economies. However,

Honohan's (2007 and 2008) measure provides only a snapshot of financial inclusion and therefore has limitation in capturing the dynamics over time and across economies.

Amidžić, Massara, and Mialou (2014) proposed that financial inclusion indicator can be constructed by using variables pertaining to three dimensions of financial inclusion; outreach (geographic and demographic penetration), usage (deposit and lending), and quality (disclosure requirement, dispute resolution, and cost of usage). Each measure is normalized, statistically identified for each dimension, and then aggregated using statistical weights to be a composite indicator. However, a drawback from this approach is that it uses factor analysis method to determine which variables are to be included for each dimension. Therefore, it does not fully utilize all available data for each country.

Sarma (2008), on the other hand, follows a different approach to construct the indicator. He first computed a dimension index for each dimension of financial inclusion and then aggregated each index as the normalized inverse of Euclidean distance, where the distance is computed from a reference ideal point, and then normalized by the number of dimensions included in the aggregate index. The advantage of this approach is its ease of computation and it does not impose varying weights for each dimension. For this reason, this paper closely follows Sarma's (2008) approach.

Studies on income inequality have also been conducted intensively. As one of the most influential scholars in this field, Kuznets (1955) has succesfully explained income inequality phenomena in relation with income growth and economic development stages. Earlier studies also have found several factors that contribute significantly to income inequality. Among others, most studies found education to be an important factor that creates wider income gap between the poor and the rich (Chongvilaivan and Kim 2015; Contreras et al. 2009; De Silva and Sumarto 2013; Dos Santos and da Cruz Vieira 2013; Morduch and Sicular 2002; and Sapelli 2011). More recent study by the World Bank (2016) concludes that there are several main causes of income inequality in Indonesia: (i) unequal opportunity, (ii) unequal jobs, (iii) high wealth concentration, and (iv) low resiliency. Unequal access to education can give rise to inequality in the future since those who are less educated tend to engage in low-wage jobs, which are typically in the informal sector. Differences in wealth accumulation also matters in determining access to both education and health services, which in turn affect the potential earning of household members in the future. Some studies, on the other hand, find that access to finance matters in explaining income inequality (Wan and Zhou 2004; Bae, Han, and Son 2012).

Previous studies have also investigated the impact of financial inclusion on income inequality. Mookerjee and Kalipioni (2010) studied the impacts of financial services availability measured by the number of ban branches per 100.000 populations on income inequality. By using a sample of developed and undeveloped countries, they found that greater access to bank branchess strongly reduces income inequality accross countries. Brune et al. (2011) found that increased financial access through commitment saving account in rural Malawi improves the well-being of poor households as it provides access to their savings for agricultural input use. In an earlier version of his paper, Honohan (2007) tested the significance of his financial access indictor in reducing income equality. His results show that higher financial access significantly reduces income inequality as measured by the Gini coefficient. However, the link between the two variables depends on which specification is used, i.e., when the access variable is included on its own and/or includes financial depth measure, the results are significant, but the same does not hold when per capita income and dummy variables are included.

3. Data and Empirical Methodology

a. Calculating Financial Inclusion Indicator

Before testing the impact of financial inclusion to inequality, we first construct Financial Inclusion Indicator (FII). There are two reasons of constructing our own FII. Firstly, to our knowledge, there has been no study computing FII for all provinces in Indonesia. Secondly, we need to include all provinces in our sample to avoid biases estimates and to develop a consistent measure of financial inclusion for a large sample of provinces, which will be used to standardize the measure for Indonesia. We also limit the scope of the calculation of the FII using indicators in the banking industry. Based on financial system statistics published by Central Bank of Indonesia, the banking industry still dominates 77.3% of the Indonesian financial system. Moreover, the availability of data for the non-bank financial industry is currently limited.

In the earlier studies, several indicators have been used individually to measure the extent of financial inclusion. The most commonly used indicator is the number of bank credit accounts (per 1,000 adult persons), number of bank branches (per 1,000,000 people), amount of bank credit and amount of bank deposit. However, depends only on individual indicator might cause fallacy. It provides only partial information of the inclusiveness of

the financial system in an economy. Table 1 presents some indicators for a selected group of provinces.

As shown in Table 1, the number of bank credit accounts per 1,000 adults is highest in East Kalimantan. However, West Papua rank first for the number of bank branches per 1,000,000 adults. Another dimension is the inclusiveness of banking system, which can be estimated through the usage of the banking system in terms of volume of credit. East Kalimantan seems to have a low credit to GDP ratio in spite a high density of bank accounts and bank branches. On the other hand, in Bali the usage of banking system is high despite a moderate density of bank branches. Based on the example of Bali, East Kalimantan, West Papua, DI Yogyakarta, and North Sumatera, one single indicator is inadequate to capture the whole complexity of financial inclusion. Therefore, a more comprehensive measure of financial inclusion is required. Preferably in one single number which able to incorporate information on several aspects (dimensions) of financial inclusion. Such measure can be used to compare the levels of financial inclusion across provinces within countries at a specific time range.

Province	No. of bank credit accounts (per 1,000 adults)	No. of bank branches (per 1,000,000 adults)	Domestic credit (as % of GRDP)
North Sumatera	213.87	220.20	0.29
DI Yogyakarta	208.32	208.88	0.28
Bali	231.30	274.59	0.33
East Kalimantan	287.50	424.08	0.10
West Papua	197.47	475.40	0.15

Table 1: Indicators of Financial Inclusion for selected provinces (2017)

In constructing FII for Indonesia, we closely follow the methodology of Sarma (2008) that is multidimensional. Specifically, three measures namely the number of bank accounts (per 1,000 adult persons), number of bank branches (per million people), amount of bank credit to GDP ratio are included. The first measure pertains the dimension of banking penetration, the second refers to the availability of banking service and the third one attributes to the dimension of usage of banking system. From this point forward, we call it

dimension 1, dimension 2, dimension 3 respectively. We collect all data from Bank Monthly Report (Laporan Bulanan Bank Umum) in Bank Indonesia, regular data publication by Indonesia Bureau of Statistics and Financial Services Authority. We use data from year 2015 to 2017 to capture the dynamics over time. Data for all provinces are downloaded, except North Kalimantan due to data availability. One big advantage of this method is that we can produce large amount of observations, timely indicators and limited costs in data collection.

After collecting three financial inclusion indicators mentioned above for 33 provinces, we then calculate the dimension index replicating the UNDP computation for Human Development Index (HDI) and specification of Sarma (2008). Specifically, each dimension index is derived as:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \tag{1}$$

where:

A_i = Actual value of dimension i

m_i = Minimum value of dimension i, given by the observed minimum for dimension i

M_i = Maximum value of dimension i, given by the empirical 94th quartile for dimension i

And $0 \leq d_i < 1$

The index of financial inclusion for province i is then measured by the normalized inverse of Euclidean distance of point d_i computed in Equation (1) from the ideal point I which is equal to 1. Specifically, the formula is given by:

$$IFI_x = 1 - \frac{\sqrt{(1 - d_1)^2 + (1 - d_2)^2 + \cdots + (1 - d_n)^2}}{\sqrt{n}} \tag{2}$$

where the second term of the numerator in Equation (2) is the Euclidean distance from an ideal point, normalizing it by the square root of the number of observations and subtracting it by 1, giving the inverse normalized distance. We normalized the indicator to make the

computed values lie between 0 and 1, where 1 corresponds to the highest financial inclusion index and 0 is the lowest, following Sarma (2008).

To investigate the impacts of financial inclusion on income inequality, we incorporate other related variables in the model. These variables are income inequality measured by Gini ratio, GRDP, years of schooling, and trade openness. The variables are similar to the one used by Park (2015). However, this paper adds trade openness variable due to its importance in Indonesian economic structure. International trade is believed to have a significant impact to income inequality in the nation.

Besides using full sample, we will also divide sample into three categories based on their source of economy, which are agricultural based economy, manufacture based economy, and mining based economy. The reason is to analyze whether economic structure matters to income inequality. Thus, there will be three estimations of fixed effect panel data.

b. Methodology

Due to large number of cross section and short time period, we use Fixed Effect Model Panel Data. The OLS Panel data is transformed to fixed effect model through decomposing the disturbance term into individual specific effect and the remainder disturbance left unexplained. Therefore, the equation is:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + v_i \qquad (3)$$

The variable μ_i, encapsulates all variables that effect y_{it} cross sectionally that do not vary over time. This model could be estimated using dummy variables, which would be termed the least squares dummy variable approach:

$$y_{it} = \beta x_{it} + \mu_i D_{1i} + \mu_2 D_{2i} + \mu_n D_{ni} + v_i \qquad (4)$$

where D_{1i} is a dummy variable that takes the value 1 for all observations on the first entity in the sample and zero otherwise, D_{2i} is a dummy variable that takes the value 1 for all observations on the second entity and zero otherwise, and so on. The intercept α is removed to avoid "dummy trap". In addition, to avoid the necessity to estimate too many dummy

variable parameters, a transformation is made to the data to simplify matters. The transformation is known as the within transformation. There exists a statistical method to choose between the most suitable panel data between common effect model, fixed effect model, and random effect model. However, observing the nature of the data and the preliminary hypothesis, we believe the fittest model is fixed effect (Brooks, 2014).

4. Empirical Results

a. Some Stylized Facts

Financial inclusion in Indonesia showed an improvement every year. Based on Global Financial Index by World Bank, Indonesia's financial inclusion increased from 36 percent in 2014 to 50 percent in 2017. The number explains that 50 percent of adult population in Indonesia already had a bank account. In the last 5 – 7 years, financial inclusion in Indonesia (or broader in the world) have been helped by the penetration of digitalization. More specifically, the development of cell phone. The producers of mobile phones are now competing to create the most advanced technology. The sales of mobile phone are now appeared in small stores in a remote area of Kalimantan. It helps people to engage with internet, including financial transaction. Nowadays, mobile phone usage is not limited to calling and texting only but also watching *Youtube*, interacting in *Facebook*, as well as shopping. Roughly, people can find anything in their cell phone. In Indonesia, number of smart phone users will grow from 55 million people in 2015 to 100 million in 2018. To catch up with the technology, bank introduces mobile banking. By days, the facilities get better too thus very convenient for its user. The technology has broadened financial sector in most part of urban area.

Although, in rural area of Indonesia people starts getting to know internet, sometimes the network is not well built. Therefore, the financial inclusion is heavily helped by the expansion of rural branch of Bank. Nevertheless, the operational cost of rural branch bank is not cheap such there are not many banks willing to open it. There are few familiar names that is seen in remote area such as Development Bank of Each Region (BPD) and Bank Rakyat Indonesia (BRI). Based on Indonesia Bureau of Statistics, there are at least 16 million poor people live in the rural area compare to 7 million in urban area. By expanding to rural area, the banks have opened financial access to poorest as well as farmers. The

bank has built a connection in such the rural population has a new way of financing their daily needs.

Unlike the ones who live in the city, people in the rural area are not exposed to many information. Before bank was brought in to the rural, loan shark is the only option to get financing for education nor their business. For a little money they applied a high interest rate such it hurts the business instead of developing. In that way, the presence of Bank will ease the circulation of money in the rural. It helps the poor to finance the education for their kid, to start a business. For farmers, the borrowing from a formal institution will broaden their ability to buy a better quality of seeds and a more advanced tool to boost productivity. The more they get financing for their business, the more prosperous the life of the poor. Hence, there will be less people living in a poverty line. In that way, the inequality gap will narrow.

Income inequality is a developing nation problem. In Indonesia, the level of income inequality (represent by Gini coefficient) has varied across the range of 0.37 – 0.42 for the last 10 years. Though, there is a tendency to decrease. Based on IMF report, other developing nations such as China and India both scores 0.53 and 0.51. The disparity became large in developing nation because the engine of growth centered in the city. Many companies and factories were built in the greater area of big city. By nature, good schools, public health, and public services will follow. Then it created massive urbanization, leaving the rural area in worse condition than before.

In recent years, Indonesia has tried to encounter the inequality problem by starting a program called "Developing Indonesia from the Rural". One of the program is village fund which transfers to more than 70,000 village in Indonesia using national budget. Indonesian government also focuses on building infrastructures to connect area within Indonesia through the development of highways, bridges, national sea highways, airport and port upgrading. The infrastructure projects aim to ease distribution of goods and services in every part of Indonesia. Thus, goods and services are available with affordable budget. In the end, the policy is meant to reduce income inequality gap. On the other hand, income inequality in Malaysia has made the country slumped in "middle income trap".

Based on Malaysia Household Income Survey 2014, Gini coefficient for Malaysia reached 0.43, the same as Indonesia. However, in the same period, Malaysia's GDP per capita is already 2,3 times higher than Indonesia. Yet, Malaysia still faced inequality

problem. Malaysia is caused by the inability of the poor population to have a high education. Nevertheless, Malaysia has moved toward a high technology industry, where many companies need a minimum education of bachelor's degree or diploma. Malaysia economic transformation is faster than Indonesia. Few decades ago, Malaysia relied on oil as their source of economy. However, it shifted to manufacture, gradually. The nation then became the center of factories for mainly electronics producer, as well as their call centers. Although, the economy started to move towards manufactures, it was still a labor intensive – low education manufacture. In recent years, due to raising minimum wage and competition from China and other cheap labor countries had made it expensive for the manufacturers to open factories in Malaysia. Although the transformation is beneficial for some part of population but for the poor it became harder to catch up. In addition, taxation system in Malaysia is still in favor of the rich. Tax for the highest income bracket is 25 percent, compare to 35 percent in developed countries. In order to reduce the inequality, Malaysian government plan to build roads, extend electricity coverage, mobile clinics, and build houses for household with income lower than RM2,500 in poor region such as Sabah and Sarawak.

Table 2 presents our computed financial inclusion indicator. Several observations are noted. Unsurprisingly, DKI Jakarta has the highest financial inclusion. Given its status as the capital city of Indonesia as well as the center of financial industries, DKI Jakarta has by far the most improved financial system. Interestingly, however, provinces that have significant contribution to Indonesian economies such as West Java, Central Java, and East Java are not included in top one-third of the ranking table. One explanation is that more than half of Indonesian population currently live in Java. It made a significant impact on FII calculation because the number of adults population and density in Java provinces is very high. In addition, Java's landscape is different from provinces in eastern part of Indonesia where a province consists of several islands. Although there might be only some small number of people live in one island, the regional development bank or other state-owned banks might try to open a bank branch to provide financial services in the island. Moreover, mobility rate is higher in Java. Supported by more developed infrastructures, is easier for people who live in Central Java to mobile to reach a bank than some groups living on an island in Maluku province. This leads to lower bank services to population ratio in Java.

Province	FII	Rank
DKI Jakarta	0.99	1
North Sulawesi	0.84	2
Bali	0.81	3
South Sulawesi	0.69	4
North Sumatera	0.65	5
DI Yogyakarta	0.61	6
Maluku	0.61	7
Central Kalimantan	0.61	8
West Sumatera	0.57	9
Banten	0.57	10
Bengkulu	0.57	11
North Maluku	0.56	12
Central Sulawesi	0.54	13
West Java	0.52	14
West Papua	0.51	15
South Kalimantan	0.51	16
Gorontalo	0.48	17
East Java	0.47	18
East Kalimantan	0.47	19
Jambi	0.46	20
Central Java	0.46	21
Aceh	0.46	22
Papua	0.43	23
South East Sulawesi	0.42	24
West Nusa Tenggara	0.39	25
West Sulawesi	0.30	26
Riau Islands	0.29	27
South Sumatera	0.28	28
Riau	0.26	29
West Kalimantan	0.26	30
Bangka Belitung Islands	0.25	31
East Nusa Tenggara	0.24	32
Lampung	0.15	33

Table 2. Financial Inclusion Index of all provinces

After calculating the FII for all provinces, we test which factors significantly increase or decrease financial inclusion in Indonesia. Through the plot from figure 2 to 5 we examine the relation between few macro economy indicators and financial inclusion. Figure 5 illustrate the relation between financial inclusion and inequality indeed positive, implying region with higher access to financial service has a bigger inequality problem. This simple finding is contradictory to our preliminary hypothesis, which the relation is supposed to be negative. We also plot other indicators which may influence financial inclusion such as

GRDP (figure 4), poverty (figure 2), and years of schooling (figure 3). GRDP and years of schooling shows a positive tendency towards financial inclusion. It indicates that region with the bigger the economy and the longer average students went to school has a higher financial penetration. On the other hand, region with lower poverty rate tends to have better access to financial system.
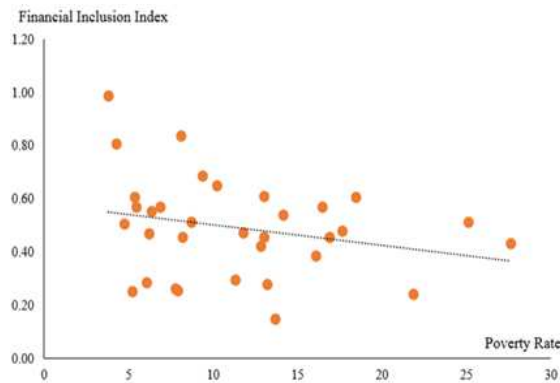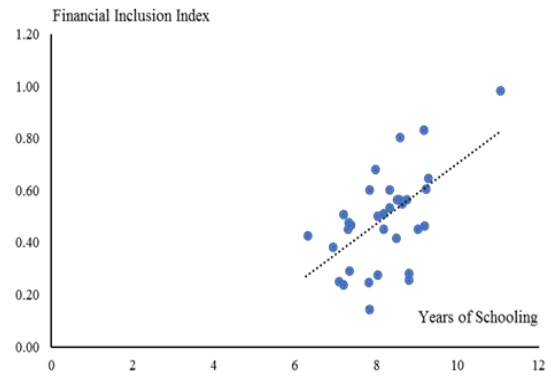

Figure 2 Financial Inclusion Index and Poverty

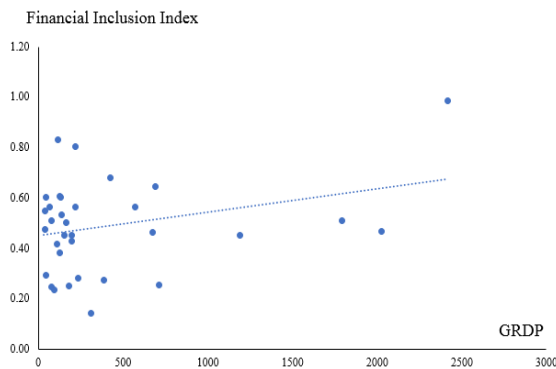

Figure 3 Financial Inclusion and Years of Schooling

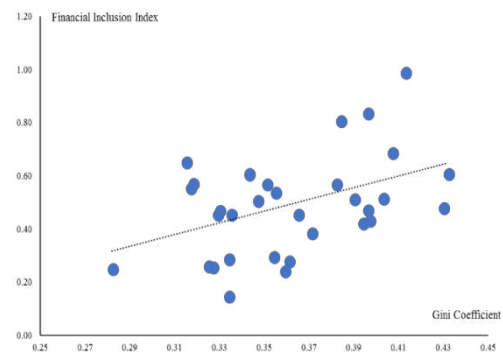Figure 4 Financial Inclusion Index and GRDP

Figure 5 Financial Inclusion and Inequlity

b. Empirical Results

In order to answer the first research question in this paper, we ran the regression model to test whether financial inclusion helps to reduce income inequality in Indonesia. Various specifications are used to test the robustness of the results and address multicollinearity among the regressors. Specifications (1) solely test the relationship of financial inclusion and income inequality. While specifications (2) include economic growth variable, specifications (3) add the role of education. Finally, specifications (4) include all regressors.

Table 3 shows the result using full sample of 33 provinces in Indonesia. FII has a positive significant impact to income inequality, in which the opposite from our expectation. A better financial access is supposed to help narrowing inequality. However, as more variables are added the sign change into negative signing yet not significant It indicates that considering other indicators, FII able to lower inequality though it remains insignificant with a relatively low coefficient value. This implies that the success of financial inclusion depends on financial education received by communities. Moreover, financial inclusion cannot be done in one year or two. It is a country's long-term investment and Indonesia just started to realize the importance of financial inclusion in recent years. Other indicators such as GRDP, years of schooling and trade openness are added to the estimation to provide a more robust model. It shows that across specification, a higher GRDP will lower inequality. In the case of Indonesia, a higher GRDP apparently able to lift people's quality of life through a more balance wealth distribution, thus it able to narrow inequality. Another indicator is years of schooling. The longer a person attend school, the more chance of higher income later. However, the estimation result finds that a longer year of schooling only increase inequality. At this moment, through an expansion of technology some groups of people able to reach education up to doctorate level more than it used to. However, some remains struggle to touch university level. In 2015 Statistics Indonesia (BPS) stated that there are 121 public universities compare to 3,104 private universities in Indonesia. Nevertheless, private universities do not receive government funding like the public universities do so the tuition fee is higher. Also, good universities concentrated in urban area. By the distribution of public and private universities and the location, it demonstrates an inequality within Indonesian education system. Later, it creates income inequality. Last variable to be added into the model is trade openness. The export-led growth hypothesis emphasizes that export is main engine of growth both in developing or industrialized countries. However, Cobb-Douglass Function explains that labor is one of production variables. Therefore, trade openness is supposed to have a significant impact to output (production) and labor (Smith, 2001). Later there will be more people who can afford to live better and tightening inequality gap. The estimation output shows the reverse. A higher exposure to export will widening inequality. Those labor-intensive industries heavily employ low skill workers so while they are expanding the needs of high skill worker stay the same. Rather than helping to reduce, the situation has enlarged the inequality in Indonesia.

Variabel	(1)	(2)	(3)	(4)
c	-1.005891*	0.817626*	0.589856*	0.926245*
log(fii)	0.01497*	-0.006894	-0.007301	-0.004451
log(grdp)		-0.151308*	-0.153385*	-0.171574*
log(edu)			0.124734*	0.044391
log(to)				0.022237*
R^2	0.978407	0.983479	0.987656	0.981659
N	99	99	99	99

Table 3 Regression Results on Income Inequality, Full Sampel Indonesia (33 Provinces)

With regards to the second research question, we divide Indonesian provinces into three categories, which are agriculture, manufacture, and mining based economy. Out of 34 provinces currently, this paper excludes North Kalimantan. In addition, DKI Jakarta and Bali's largest sector of the economy do not fall in those 3 categories; thus these two provinces are excluded in sectoral estimation as well. List of provinces based on their dominant sectors are written in the table below.

Agriculture-BasedProvinces	Manufacture-Based Provinces	Mining-Based Provinces
DI Aceh	West Java	Riau
North Sumatera	Banten	South Sumatera
West Sumatera	Central Java	South Kalimantan
Jambi	East Java	East Kalimantan
Bengkulu	DI Yoyakarta	Papua
Lampung	West Papua	
West Nusa Tenggara	Riau Islands	
East Nusa Tenggara	Bangka Belitung Islands	
West Kalimantan		
Central Kalimantan		
West Sulawesi		
South Sulawesi		
South East Sulawesi		
Central Sulawesi		
Gorontalo		
North Sulawesi		
Maluku		
North Maluku		

Table 4 List of province based on the dominant sector of the economy

The estimation result for agricultural-based economy is shown in table 5. This sub-sample shows that a greater financial inclusion will cause the inequality to widen though in specification 4 the impact turns to negative, yet insignificant. Majority of Indonesian farmers (to the extent of workers in palm oil, rubber, etc.) live in the village or rural area.

The pressure to have knowledge of financial system is much less than in the city because the financial service is not provided as developed as in the urban area. Up to this point, the inclusion of Indonesian financial service in the agricultural dominated economy only benefit the high income (in this case corporation) because it does not well receive by the workers/labors. On the other hand, GRDP shows a significant impact to inequality. An increase in the size of the economy will tighten inequality through a progressive taxation. As for the years of schooling, it shows a positive and significant impact to enlarge income inequality. The fact that there still exists a paradigm about no need for farmers to attain a good and longer school years. The students whose parents are farmers are not encouraged to experience high education because they will continue the legacy of being farmer, which does not require a high education. In fact, because there are too many of the students has a vision to become "normal" farmers, the one who achieve a higher education will well distinct from other. The one with high education then able to get into big plantation companies in which pay better. Later, it will create a bigger inequality. As for trade openness, it has an insignificant impact to inequality.

Variabel	(1)	(2)	(3)	(4)
c	-1.008024*	-0.228459	-0.316175	0.276674
log(fii)	0.042682*	0.019543**	0.015041	-0.005993
log(grdp)		-0.068542*	-0.229443*	-0.279336*
log(edu)			0.941887*	0.91603*
log(to)				0.014213
R^2	0.987047	0.986889	0.986942	0.967434
N	54	54	54	54

Table 5 Regression Results on Income Inequality, Agriculture based Provinces

Table 6 shows the estimation result for manufacture dominated provinces. At first it shows a positive significant impact of financial inclusion to inequality. However, after adding more regressor the result demonstrates the opposite. The more regressors in the model, the higher impact of financial inclusion able to reduce inequality. The factories or offices which manufacture's workers work usually located in the sub-urban area. In that way, everyone has the same access to financial service and actually able to experience the service itself. Manufacture sector is also considered to be better developed than agriculture sector. Also, it uses more advanced technology, so the workers are more familiar to computers and machine. Mostly, the workers' earning is received through bank. As a result, workers are used to technology and by living close to the cities they receive more

information about financial services. So, a further development of financial service will help the low-middle income workers to live better off by having access to financing their education, houses, etc. Meanwhile the middle-high income workers will have better funding for their second home or cars. Although both low-middle and middle-high income receive benefit through financial inclusion, but the former is by far more affected. Similar to finding of full sample Indonesia, the bigger size of GRDP is also helping to distribute wealth more equal since the result shows a negative sign. Although, in the specification 4 the sign turns into positive, but it is not significant. Adding years of schooling into the models, it has been found that the longer years of schooling has a negative impact to inequality. In other words, the longer a person stay in school the more he will have power to increase his income and create a more equal society. Manufacture company tends to be big (at least the one who employ lots of labors). Since the size of their operation is large, they are monitored by the government closely. In Indonesia, association for labors (manufacture) has power to deliver their wills. Companies are careful enough to put workers based on their level of education and experience. There will be a specific description to job entitle. For instance, a person with vocational degree will not be places as worker, rather he would be a supervisor. Education in manufacture sector then determine the level of earning. The more workers with good education background the society will be less unequal. Like the earlier estimation, we also add trade openness to measure the impact of export to inequality. In manufacture-oriented economy, a bigger exposure to export will cause an economy to more unequal. Exporter companies are usually the biggest of all. The smaller ones are probably struggling to enter the export market due to its economies of scale.

Variabel	(1)	(2)	(3)	(4)
c	-0.92043*	3.858468*	3.865548*	3.137375*
log(fii)	0.092265*	-0.072088*	-0.07345*	-0.104865*
log(grdp)		-0.382991*	-0.267543**	0.005839
log(edu)			-0.71685	-2.157726**
log(to)				0.06926**
R^2	0.977593	0.997763	0.996061	0.988684
N	24	24	24	24

Table 6 Regression Results on Income Inequality Manufacture based Provinces

Table 7 demonstrates the estimation result of mining dominated provinces. In the mining economies, financial inclusion will able to reduce inequality. A big coverage of financial sector will help the low-income bracket to access financing. Also, income in mining sector is comparably higher than in agriculture and manufacture. Although workers might be considered low income in mining but could be medium income in another sector. Mostly, most of mining site located in remote area thus the high wage is considered a compensation. Due to the nature of mining sector, it does not employ workers as others though the contribution to regional economy is large. Regardless their location, it is easier to spread financial service to the ones working in mining sector because there are less of them. In addition, working in the remote area made them needs a mechanism in which able to send money to their families back home. Thus, there is a need of financial services especially banking. Another variable we add to the model is GRDP. In the case of mining-oriented economy, the result is different than earlier estimation. A higher GRDP leads to a higher income inequality. A bigger production in which cause mining sector to increase, highly depends on their machine and technology. It does not reduce inequality because to some extent, a production boom will cause to adding more machines and not human capitals. Also, there exist a production bonus in mining companies. As the companies receiving more revenue through sales, bonus will be given but the schemes are most likely to be progressive thus creating inequality. Education in this model is represented by the years of schooling. Technology used in mining sector is also advanced and complicated therefore they need skill. By attending school longer, they workers will be more skilled and enlarge their chance to get higher earnings. By observing the coefficient of the regression, we conclude that years of school in mining provinces has bigger impact to reduce inequality

than in manufacture-oriented economies. Trade openness also has a bigger impact to widen inequality than in manufacture nor agriculture.

Variabel	(1)	(2)	(3)	(4)
c	-1.061513*	0.145433	-0.853554	-0.135256
log(fii)	-0.019588*	-0.009277	-0.000208	-0.031434**
log(pdrb)		-0.094285	0.821925*	0.766175*
log(edu)			-5.147866*	-5.388363*
log(to)				0.139294*
R^2	0.885684	0.893158	0.940198	0.975320
N	15	15	15	15

Table 7 Regression Results on Income Inequality Mining based Provinces

In order to answer the third question, We also run 2 regressions using the same model. However, this time we divided the sample based on their quantile income level (GRDP Percapita). There are 4 categories which are high income, upper middle income, lower middle income, and low income. The list is as follow:

High Income	Upper Middle Income	Lower Middle Income	Low Income
DKI Jakarta	Bali	Aceh	Bengkulu
Jambi	Banten	Jawa Barat	DI Yogyakarta
Jawa Timur	Kalimantan Tengah	Jawa Tengah	Gorontalo
Kalimantan Timur	Sulawesi Selatan	Kalimantan Barat	Maluku
Kepulauan Bangka Belitung	Sulawesi Tenggara	Kalimantan Selatan	Maluku Utara
Kepulauan Riau	Sulawesi Utara	Lampung	Nusa Tenggara Barat
Papua	Sumatera Selatan	Sulawesi Tengah	Nusa Tenggara Timur
Papua Barat	Sumatera Utara	Sumatera Barat	Sulawesi Barat

Table 8. Indonesia Province Rank Based on GRDP Percapita

Firstly, we ran a regression with FII as a single independent variable. We found that financial inclusion gives a significant impact to income inequality. In most areas, a higher access to financial system lead to a higher inequality. It gives an early indication that easier financing is more beneficial to the well being than the poorer. It might be the case that credit is distributed more to a medium-big local firms than to small medium enterprises, local farmers, and others low-wage workers. Nevertheless, in low income areas the impact

is different. Higher financial inclusion is able to give the poorer one to get financing. Thus, they can use the loan as a working capital and lift their welfare.

Variabel	High Income	Upper Middle Income	Lower Middle Income	Low Income
c	-0.985206*	-0.96755*	-0.975789	-1.062671*
log(fii)	0.04099*	0.052286*	0.082913*	-0.073195*
R^2	0.991041	0.964717	0.996320	0.987780
N	27	24	24	24

Table 9. Regression Result on Income Inequality and Financial Inclusion Index

Secondly, we also add other regressors into equation which are GRDP, years of schooling, and trade opennes. The estimation result shows that the impact of financial inclusion is positive yet not significant in high income provinces. In this area, a significant factor to reduce income inequality is a greater economy. A larger economy is able to create a bigger job opportunity, thus able to give the unemployed jobs.

In upper middle income provinces, a wider financial inclusion is significantly caused a higher income disparity whereas in lower middle income provinces, the effect remains insignificant. In low income provinces, a wider financial access for the communities along with bigger economy will result a lower income inequality.

Regarding the effect of financial inclusion to reduce income inequality we need to acknowledge that banks are Indonesia's financial system biggest player. Howeverm bank is a highly regulated financial corporation. Therefore, they are selective in terms of approving loan. All measurement such as the financial history of their lenders, income, and collateral are all taken into accoiunt. Most of the time a wealthier one has a better income as well as more collateral. The problem arises in high income area is that bank has options to choose between giving loans to the wealty or poor. Considering the risk for the poor has a higher credit risk than the wealthier one, logically more loans are provided for the wealthy one. However for the low income are, the pool of lenders is dominated by the less wealthy. Meaning, most of them might have a high credit risk, giving banks less option. It supports the argument that in low income area, higher financial inclusion leads to income inequality reduction.

Variabel	High Income	Upper Middle Income	Lower Middle Income	Low Income
c	6.227211*	-0.97964	1.450356	1.842811*
log(fii)	1.05E-05	0.04744*	0.01068	-0.142511*
log(pdrb)	-0.589045*	0.047406	0.112056	-0.298052*
log(edu)	-0.02957	-0.32478	-1.86751	0.083351
log(to)	0.036375*	0.051693*	-0.00051	0.030736*
R^2	0.988934	0.979925	0.979960	0.986824
N	27	24	24	24

Table 10. Regression Result on Income Inequality, Based on Income Level

5. Conclusion and Policy Implications

It is widely believed that financial inclusion aids inclusive growth and reducing inequality. More specifically, it expands poor people's access to financial services, increasing their economic opportunities and improving their lives. Recognizing the positive impact of financial inclusion on inclusive growth as well as poverty reduction, Indonesian government in 2012 released the National Financial Inclusion Strategy (NFIS).

This paper contributes in constructing Financial Inclusion Index for each province in Indonesia for time period of 2015-2017. We find that provinces which shows a high financial inclusion is the one with urban area such as DKI Jakarta, North Sulawesi (Manado), Bali (Denpasar), and South Sulawesi (Makassar). Some big economies namely West Java and East Java does not appear at high rank due to massive number of adult population. In addition, geograpical landscape play an important role in terms of spreading financial service.

Though we find robust evidence that provinces with high financial inclusion have lower inequality, answer to the question whether financial inclusion really helps to reduce income inequality depends on other supporting factors. Our study suggests that financial inclusion alone is hardly having an impact on reducing income inequality. Rather, the spread of financial inclusion in Indonesia will have a chance to lower inequality if other supporting development such as education, infrastructure, and government project are in place.

Furthermore, the validity of the results seems to depend on the main economic sector of each province. The estimation using full samples of 33 provinces provide information that the power of financial inclusion in Indonesia has not show a strong impact to reduce inequality. Out of 4 independent variables, GRDP is acknowledged to be the variabel which

could decrease inequality. Trade openness seemed to have opposite effect, in which a bigger export leads to higher inequality. Surprisingly, years of schooling does not have significant effect to reduce Indonesian inequality.

The result is slightly different in agriculture based economies subsample. Though financial inclusion remains insignifiant in the last spesification but in spesification 1 to 3 the effect is positive. Most Indonesian farmers live in rural area which became a constrain for financial services. On the other hand, longer years of schooling tend to increase inequality, which the opposite from our prelimenary hypothesis.

As for manufacture-based economies, financial inclusion has a strong impact to reduce inequality. Manufacture sector usually concentrated in sub urban area which make it easier for the expansion of financial inclusion. Also, most of the players in this sector is big coorporation that apply a more modern system of wage payment. The number of labors is massive in such make it impossible to pay them manually, thus banking system is applied. GRDP no longer significant. On the other hand, the impact of years of schooling to inequality is different from the two earlier estimations. In manufacture-based provinces, a longer year of schooling has power to reduce income inequality because each job demands a specific educational background unlike in the agriculture sector. Another variable, trade openness has a positive impact to increase inequality.

Other economies, which is mining based economies has a negative impact of financial inclusion to income inequlity. The number of workers in this sector is relatively small, thus it is easier to spread financial service. Differently, a higher GRDP in these provinces cause inequality to widen because the industry itself is capital intensive. As for years of schooling and trade openness the effect is similar to estimation result of manufacture bassed provinces.

The results suggest that financial inclusion only helps to lower income inequality when overall economic conditions empower people to use access to finance for productive purposes such as expanding a business or investing in education. Such a relationship is much more reliable in both manufacture and mining-based provinces which have relatively higher income where better regulatory conditions provide an enabling environment for a range of development outcomes.

More focused programs implemented by NCFI in low-income regions could make financial inclusion to be more effective to help reducing income inequality in Indonesia. Firstly, NCFI needs to continuously educate and promote women as well as young generation to engage with financial system, especially the one in lower income area. Secondly, to expand financial inclusion in agriculture economies, NCFI along with local

government and local banks have to build attractive products or lending schemes that support trading transaction of farmers.

ANNEX

This paper has made some adjustment to the FII. It is not 100% replicating computation done by earlier Sarma (2008) in terms of the indicators. As for the banking penetration (dimension 1), this paper uses the same indicators which are a number of bank accounts. More precisely, a number of credit bank account/1,000 adults. The dimension 2, availability of banking services is rather a bit different because the only measure being used is a number of bank branches/1,000 population. A number of ATM/1,000 population is not used because, in the case of Indonesia, bank branches have more influence in the rural area. In some parts of Indonesia, there is some area which electricity is not available for 24 hours. In this circumstances, ATM is not convenient, so bank branch is preferable. Another thing is that some people who live in the rural area are not used to the banking system. The year 2017 could be the first time they get accessed to the financial sector. Therefore, the help from customer service is needed and by doing a face to face interaction the customer's trust grow. ATM does not have this ammenities because it is a machine. The third dimension is usage which is proxied by credit/GRDP.

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