Remittances and Income Inequality:
The Moderating Effect of Entrepreneurship, Rural Development and Infrastructure

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Abstract
Purpose: Income inequality issue becomes as vital agenda to deal with, especially for developing countries. In the presence of huge income inequality in most developing countries, solutions are certainly welcome. Theoretically, remittances have the potential to address the issue of income inequality, whereby bigger size of remittances may promote a sizeable decrease in income inequality. Indeed, the main objective of this study is to investigate the contribution of remittances in alleviating income inequality in developing countries. This study also analyzes the moderating effect of entrepreneurship, rural development and infrastructure on remittances-income inequality relationship in developing countries.
Design/methodology/approach: A dynamic panel estimator is applied to examine remittances-income inequality nexus, given the Generalized Method of Moment (GMM) method. This study utilizes the data from 2009 until 2017 and covers 47 developing countries.
Findings:
The findings of remittances reveal that they are unlikely helpful to reduce income inequality. Nonetheless, its desired role can be achieved if the recipients among the poor can allocate more for entrepreneurship activities as well as supported by better rural development and infrastructure. Due to that, this study believed that if government can design effective policy to guidance the recipients of remittances to fully maximize the usage not purely for daily one-off consumption, but also to include life-standard enhancing activities, mainly through entrepreneurship, rural development and infrastructure, income inequality can be lowered.
Research limitations/implications: In general, this study may serve as a stepping stone for further empirical work regarding the income inequality issue. This study believes that the insignificant effect of remittances on income inequality could be due to the fact that low level of remittances flows in developing countries and also poor utilization of the money among the poor. Alternatively, it is important to promote and enhance more remittances flows in developing countries.

Practical implications: As part of the strategies to uncover the true impact of remittances, this study also has highlighted the moderating role of entrepreneurship, rural development and infrastructure. This study finds that the presence of remittances will decrease income inequality by increasing entrepreneurship, rural development and infrastucture.

Originality: In this study, the potential solutions factor is proposed to address the issue of income inequality, known as remittances. More importantly, this study also suggests that remittances can be more effective in combating income inequality if the strategies are also combined with productive entrepreneurship activities and appropriate rural development and infrastructure in creating more economic opportunities.

Keywords: Remittances, income inequality, entrepreneurship, rural development and infrastructure, developing countries, dynamic panel data.

Introduction

The important of fair income distribution in assisting economic development is crucial in act as the primary drivers for economic growth (World Bank, 2013a; Ostry et al., 2014; Rose & Viju, 2014). Along with that, income equality has been treated as among major attributes of high economic development as it avoid dissatisfaction and conflict, crimes and unlawful activities, environmental destruction, harmful investment activities, support the progress in human development and promote sustainable growth (Thorbecke & Charumilind, 2002; Maddah, 2013, Ostry et al., 2014; Masron & Subramaniam, 2019). Therefore, the crucial role of income equality in economic development is something cannot be denied.

It is surprisingly that according to UNDP (2015), more than 75 percent of the population in developing countries which is majority of households are living today in societies where income is more unequally distributed as compared in the 1990s. At the same time as measured by Gini index, the developing countries such as Albania, Bostwana, Croatia, Iraq, Jamaica, Pakistan, Serbia, South Africa, Tajikistan, Togo and Zambia still live in increasing trend (Bastagli et al., 2012; WIID, 2019; World Bank, 2019a). In other words, many developing countries are suffering from highly unequal income distribution. More specific, alleviating income inequality issue is one of important agendas under this study and with that, this issue has become a main focus along with related area which would be emphasizing strategies to reduce income inequality. Hence, income inequality reduction is the central theme of this study and emerge as one of the main challenges faced by developing countries.

Due to that, this study believes that remittances is one of the crucial factors which can be considered as potential solution in addressing income inequality as it is very closed to the poor. Theoretically, remittances can serve as new fund to the poor and thus, can assist them to be out of poverty by engaging in various economic activities. Combined with the fact that remittances are currently the largest form of capital flows, surpassing foreign direct investment (FDI) and official development assistances (ODA) (Awdeh, 2018; Ngoma & Ismail, 2013). Nevertheless, the key challenges in the current practices of remittances is the sharp difference of remittances inflows among the developing countries, with most of the developing countries exhibited a low amount of remittances (World Bank, 2019a). Although small, this study asks '*what would be the impact of remittances inflow on income inequality in developing countries?*'.

The smallness of the size of remittances received by the developing countries may be by itself ineffective to bring down inequality. However, if the fund can be fully utilized for economic activities, either through business start-up or installation of be utilized for any economic activities such as through new business start-up partially, then it may help to bring the poor out of poverty in the long run as compared to if they fully utilized for one-off consumption such as

food and clothing. Then, this study interested to ask '*what would be the complementary role of entrepreneurship on the remittances-inequality nexus*?'. Remittances can also be utilized to get the mean to go for job (i.e., motorcycle and so on), then it is expected the poor will be able to earn more income. In other words, the surrounding of the rural areas must be properly developed by the authorities with equivalent infrastructure are also installed. Hence, limited remittances can be so effective in lowering inequality if complemented by the sufficient rural development and infrastructure. Thus, this study also asks '*is there any moderating effect of rural development and infrastructure on the effectiveness of remittances in bringing down income inequality in developing countries?*'.

Despite the fact that a wide strand of past studies has investigated the effects of remittances, there are limited studies that examine the effects of remittances on income inequality. In fact, Masron and Subramaniam (2018) have measured remittances by focusing on how the flow of remittances would lessen poverty which has become a central issue of discussion. In line with Masron and Subramaniam (2018), Huay and Bani (2018) has focused on the relationship between remittances and poverty through the human capital channel, mainly on education and schooling opportunities development. Meanwhile, Anyanwu (2011) has focused on a time series analysis of the impact of remittances on income inequality in African countries in light of the financial crisis. Therefore, a further empirical study is necessary.

The rest of the study is structured as follows. Section 2 is devoted to the background of the study. Section 3 gives a brief literature on the subject. After which the methodology is described in Section 4. Results discussed and concluding remarks given in Section 5 and 6, respectively. Section 7 is devoted to the theoretical implications, Section 8 is devoted to the practical and social implications. Finally, limitation and suggestions for future research is discussed in section 9.

Background of the Study
Income Inequality in Developing Countries
Figure 1 shows the Gini index in developing countries for 1995, 2006 and 2017. Generally, income inequality in the developing countries for 1995 lies between 23.3 to 59.6, for 2006 its lies between 26.6 to 60.1 and for 2017 its lies between 25.4 to 64.7, respectively. Interestingly, two additional information can be derived from the Figure 1. Firstly, there are few countries that are experiencing a decrease in Gini index. These are Belarus, Brazil, El Salvador, Kazakhstan, Kyrgyzstan, Mexico, Moldova, Panama, Paraguey, Peru, Sierra Leone, Thailand, Tunisia and Ukraine. Secondly, next to the lower Gini index countries, there are some others developing countries namely, Colombia and South Africa which have Gini index up to the 60.0. Out of these two countries, South Africa recorded Gini index of 64.7 in 2017, indicating the most unequal income distribution when the score is more than 50. It can be considered as very high inequality (Dobrea & Podgoreanu, 2014).
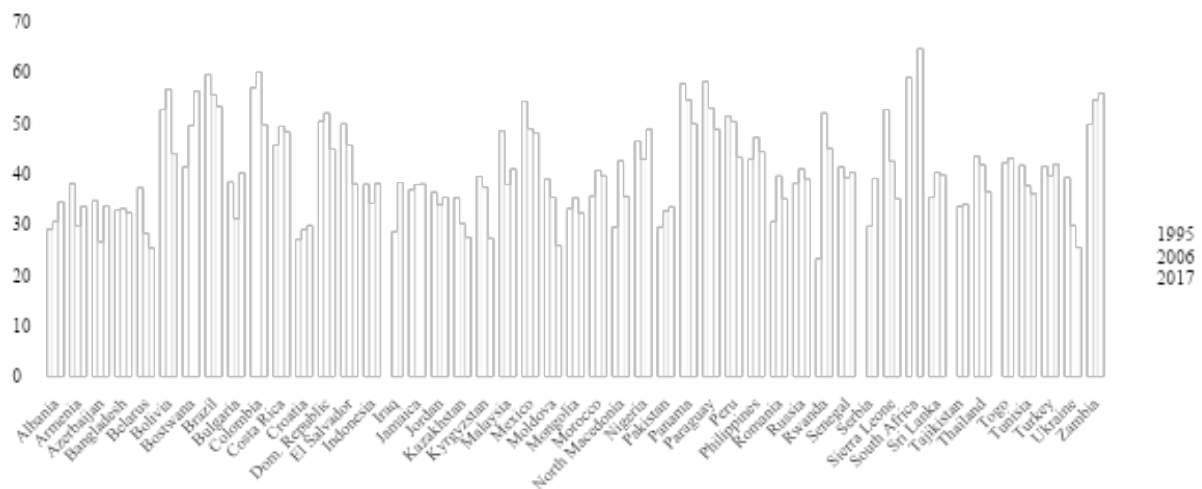
Figure 1: Gini Index in Developing Countries.
Sources: Bastagli et al. (2012), WIID (2019), and World Bank (2019a).
Note: WIID refer to World Income Inequality Database.

Remittances Growth in Developing Countries
By definition, an international migrant is known as a person who is living in a country other than his or her country of birth or from country to another country (United Nations, 2017; Ahmed et al., 2018). While they are working abroad, this foreign workers will transfer and send their earnings or their money back to their home countries, which is known as remittances (Adams, 2011). The enormous inflow of remittances has grown from US$56 million in 1995 to US$335 billion in 2010 for developing countries (Masron & Subramaniam, 2018). Globally, the number of international migrants has continued grow from 173 million in 2000, 191 million in 2005, 220 million in 2010 and 248 million in 2015 reaching 258 million in 2017 (United Nations, 2017).

The potential strength of remittances is that it has become a reality that touches nearly all corners of the globe in line with increase in interconnection globally (United Nations, 2017). Remittances emerged as an important instrument for economic growth and act as economic growth contributors particularly for developing countries as it provides a significant source of income for recipient families and leads to higher household income (Ahmed et al., 2018; Huay & Bani, 2018). Remittances is subject to encourage in order to give more priority to the low income people in improving the well-being of family members left behind and boost the economies of receiving countries. As an initiative, people or family in migrants home country can access more opportunities.

In this context, remittances can directly give a positive effect and contribute to poverty alleviation if it flows to the neediest group (Huay & Bani, 2018). Remittances made have significant implication on economic development when channeled into productive investment such as in human welfare, household expenditure, productive savings and consumption (Ratha, 2007; Ahmed et al., 2018; Awdeh, 2018; Masron & Subramaniam, 2018).
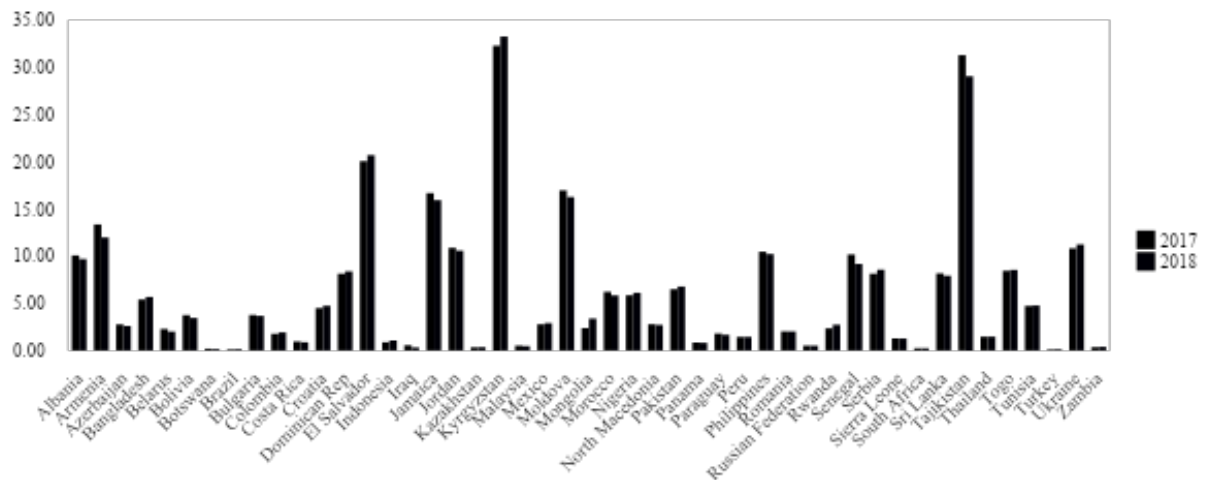
Figure 2: Remittances in Developing Countries for 2017 and 2018.
Source: World Bank (2019a).

As shown in Figure 2, it indicates that the amount of remittances flows of developing countries has been increasing rapidly and steadily over a long period of time, particularly in 2017 to 2018. Approximately, 20 developing countries have shown an increasing trend of remittances score from 2017 to 2018, namely, Bangladesh, Brazil, Colombia, Croatia, Dominican Rep, El Salvador, Indonesia, Kazakhstan, Kyrgyzstan, Mexico, Mongolia, Nigeria, Pakistan, Rwanda, Serbia, Turkey, Tunisia, Togo, Ukraine and Zambia. The figure also implies that Kyrgyzstan, emerged as country with the highest remittances score among others developing country with 32.27 percent in 2017 and 33.22 percent in 2018 respectively. The second larger amount of remittances score of developing countries in 2017 and 2018 was recorded by Tajikistan with 31.25 percent and 29.02 percent respectively.

Evidently, there are five countries which are showing an increase in remittances from 2017 to 2018. Those are Peru, Russia, Romania, South Africa and Thailand. However, out of all these five countries, Romania has the highest remittances score with 2.03 percent, implying that Romania is the best country in terms of constant movement of remittances in 2017 to 2018. Besides, it can be seen that the flow of remittances in developing countries was quite smaller but it shows a positive movement and this positive movement is very important to the developing countries in order to help them to come out of the poverty trap.

Literature Review
Income and Income Inequality
Theoretically, a main theoretical approach that assessing the determinants of income inequality is represented by inverted U-shaped Kuznets curve, mentioning the income and income inequality relationship (Shahbaz, 2010; Rose & Viju, 2014; Batabyal & Chowdhury, 2015). Inequality increases with rising per capita income and decreases only in the later stages of economic development, creating the presence of inverted U-shaped curve. In other words, under Kuznets (1955) assumptions, Kuznets conjectured that over the time, an increasing higher income of people has contributed to lower income inequality as an economy of a countries develops.
Empirically, studies by Alesina and Rodrik (1994), Shari (2000), Panizza (2002), Li and Zhou (2013) and Cingano (2014) confirmed that economic growth has laid to reduction of income

inequality. A blend of efforts and cooperation by government sector, private sector and the federal government such as via redistributive measures, were instrumental in producing economic growth with equal redistribution of income are among the vital reasons to reduction of income inequality (Shari, 2000; Panizza, 2002). Other than that, effective policy strategies, economic characteristics, export-oriented industrialization and foreign capital are also identified as vital factors that promoting equality of opportunities especially in raising household incomes and reducing unemployment percentages (Shari, 2000; Li & Zhou, 2013; Cingano, 2014). Consequently, the following hypothesis was developed:

H_1 = There is a positive effect of income on income inequality when income is at lower level, but gradually affect income inequality negatively once income reaches a higher level.

Trade and Income Inequality

Basically, trade is an economic concept involving the buying and selling of goods and services in the marketplace. Globally, trade gives consumers and countries the opportunity to be exposed to more goods and services. According to Meshi and Vivarelli (2009), developing countries have opened their enonomies internationally since the beginning of the 1980s.

As stressed by Munir and Bukhari (2020), trade is significantly contributes to income inequality reduction in the Asian emerging countries. This is due to trade has resulted in the distribution of knowledge as trade activity is involved with others developed and developing countries and therefore, effect on reduction of inequality in income. Meanwhile, the others studies such as by Jaumotte et al. (2013) and Lin and Fu (2016) suggest that the reduction in income inequality is contribute by trade factor in the developing countries between 1981 to 2003 and 1985 to 2012, respectively. This happened due to ores and agricultural exports engagement in trade activities, which usually employs low skilled workers and provide income generation to the poor. In the light of above findings, this paper believed that developing countries has huge potential of chance to reduce income inequality by involvement in trade. Consequently, the following hypothesis was developed:

H_2 = There is negative effects of trade on income inequality in developing countries.

Foreign Direct Investment (FDI) and Income Inequality

Gradually, FDI becomes an important source of country impressive for their economic growth, particularly to many emerging economies. Today's successful economies such as Argentina and Chile and some Asian countries like Indonesia, Malaysia and Thailand are the results of their dependency on FDI, alongside foreign portfolio investment (Masron & Naseem, 2017). Empirically, many past studies have presented an interesting finding in their study regarding the effect of FDI (Jaumotte et al., 2013; Asteriou et al., 2014; Herzer et al., 2014; among others). According to Asteriou et al. (2014) and Jaumotte et al. (2013), FDI will influence the relative demand for higher-skilled workers and imply substitute away low-skilled workers due to technology development, thus creating income inequality issues among higher-skilled and lower-skill workers. Meanwhile, Herzer et al. (2014) support that FDI has contributed to the wide income gaps in Latin America. Surprisingly, it seems that income inequality has become a transitional and normal phenomenon in Latin America. This situation happened mainly due to the involvement of policy dilemmas by Latin American governments. Many governments in the region promote FDI to benefit from technology spillovers and stimulate economic growth. However, at the same time, the high demand for skilled workers than the unskilled workers in Latin American also contributes to the income inequality issue. More realistically, since the FDI has figured high on the policy agenda of Latin American governments, the higher the chances for income inequality to occur as FDI favors primarily skilled workers. Consequently, the following hypothesis was developed:

H₃ = There is positive effects of FDI on income inequality in developing countries.

Education and Income Inequality
In line with the development of the modern world today, education also need to be taken into account. Theoretically, Schumpeter's creative destruction theory is relate to education, driven by innovation as new combinations of underlying principles. Schumpeter (1934) has clarified that innovation has its own special process and believed that innovation is the center of economic change. In other words, this theory portrays that development as a process of structural changes in bring out new combinations in the concept of innovation and collectively speed the economic growth (Porter & Stern, 1999; Sledzik, 2013).
Empirically, Duman (2008), who study in the Turkish country and Keller (2010), who study for developed and less developed of countries have emphasized that access to schooling is highly associated with income dispersal. As suggested by Shahbaz (2010), it is very important to allocate finance to improve education in order to reduce poverty and improve income distribution. This is because education convenience can give a chance, especially to the poorest people, to get better education opportunities in achieving desire to improve their living standard and reduce the income gap. Visibly, improvement in education access play a significant role in produced educated workers with intellectual development, create higher-income future income generation (Askari & Rehman, 2013; Kudasheva et al., 2015; Devkota & Upadhyay, 2016). Thus, education can promote development of country in a form of improvement future generation intellectual, thus enjoying low inequality (Askari & Rehman, 2013). Consequently, the following hypothesis was developed:
H₄ = There is negative effects of education on income inequality in developing countries.

Corruption and Income Inequality
Globally, corruption represents as a crucial issue and has been examined in several studies. By definition, corruption refers to abuse of power used for personal gain purposes (Dincer & Gunalp, 2012; Avnimelech et al., 2014).
Given the potential empirical findings, Gyimah-Brempong (2002), Apergis et al. (2010), Dincer and Gunalp (2012), Huang (2013), Batabyal and Chowdhury (2015), Adams and Klobodu (2016) and Arif et al. (2019) claimed that corruption provide a bad impact to income inequality. Corruption has decreased the country's competitiveness, cause a decrease in economic growth, decrease the economic activities, decrease in government spending, reduce the government's resources, lead to a spreading of bribes, causing an a reduction of national income, while causing an increase in income inequality. Meanwhile, corruption has associated to creation of large informal sector in Latin America countries (Andres & Ramlogan-Dobson, 2011). The good news is that this informal sector provides a source of income and jobs opportunity mainly for people who are among the poorest in society dealing with financial or income constraints. However, it should be noted that benefit from allowing corruption to grow seems risky. Therefore, several important points are highlighted. First, most of the Latin American labor market is uncontrolled, with many workers, whether adults or children, facing exploitation and dangerous working conditions. Therefore, the informal sector is more exposed to these risky situations due to many poor workers participate in this sector due to poverty and living constraints. Second, low productivity and the absence of social protection that characterizes the informal sector by letting corruption continue to grow would contribute to negative effects and exacerbate the situation. Correspondingly, the control of corruption is needed in order to reduce income inequality (Adams & Klobodu, 2016). Consequently, the following hypothesis was developed:
H₅ = There is positive effects of corruption on income inequality in developing countries.

Inflation and Income Inequality

In general, inflation reduces the purchasing power of the currency, which leads to an increase in prices of goods and services. In other words, inflation contributes to increasing the cost of living of the people due to the depreciation of the currency. Ideally, inflation often characterized as highly instable macroeconomic conditions (Thalassinos et al., 2012; Crowe, 2004; Deyshappriya, 2017).

Empirically, Al-Marhubi (2000) has conducted a study based on cross-country data for Asia and Latin America, consisting of 53 countries has found that higher inflation has been associated to income inequality. While, the other study that investigated the effect of inflation on income inequality also experiance the positive significant effect (Dolmas et al., 2000; Li & Zou, 2002; Thalassinos et al., 2012; Khattak et al., 2014; Nantob, 2015). Among the reason cited is that inflation has exacerbated income distribution, reduced a country economic growth and contributed to unbalanced affects those within the bottom income group hierarchy (Li & Zou, 2002; Crowe, 2004; Khattak et al., 2014; Deyshappriya, 2017). Consequently, the following hypothesis was developed:

H_6 = There is positive effects of inflation on income inequality in developing countries.

Remittances and Income Inequality

Remittances offer attractive potential factors inherent to be a source of foreign funds for economic development at the macro-economic level (Kapur, 2004; Koechlin & Leon, 2007; Woodruff & Zenteno, 2007; Ngoma & Ismail, 2013; Awdeh, 2018; Huang & Bani, 2018; Masron & Subramaniam, 2018). According to Matuzeviciute and Butkus (2016), remittances were transferred worldwide through official channels with only US$68 billion in 1990 and have increased to US$528 billion in 2014, implying the growing flows of remittances. Supported by Clemens and McKenzie (2014) and Williams (2018), who claim that remittances have been increased rapidly, were just US$47 billion in 1980, followed by US$49 billion in 1990, US$102 billion in 2000, US$321 billion in 2010, and from there, remittances to developing countries keep increasing by reached US$431 billion in 2014. To be more specific, remittances have emerged as vital sources of external development finance, particularly for developing countries (Kapur, 2004). For many developing countries, remittances represent a significant share of the country's gross domestic product (GDP) with more than 20 percent (World Bank, 2014; Matuzeviciute & Butkus, 2016).

Containing 54 developing countries from 1981 to 2010, Huay and Bani (2018) has found a negative and significant effect of remittances inflows on poverty and a positive interaction between remittances and human capital. In other words, human capital impact, such as by focusing on the education sector and facilitating more schooling opportunities, has a larger impact in alleviating poverty. Along similar research lines, Masron and Subramaniam (2018) also test for the remittances effect using panel data from 44 developing countries from 2006 to 2014. According to Masron and Subramaniam (2018), poverty tends to be lower in countries with a higher flow of remittances. This is because remittances are related to a decline in poverty as remittances increase the household incomes and might be channeled to more productive activities of the poor. Given the potential consequences of remittances on income inequality, this study has developed the following testable hypothesis:

H_7 = There is negative effects of remittances on income inequality in developing countries.

*Remittances*Entrepreneurship (REM*ENT)*

Basically, the pioneering work on the role of entrepreneurship in promoting low income inequality can be traced back into past studies. According to Berkowitz and Jackson (2005), Lippmann et al. (2005), Kimhi (2010), Okah-Efogo and Timba (2015) and Halvarsson et al.

(2018), entrepreneurship is crucial as a main sources of increased social and economic mobility. This is mainly due to the opportunities that are offered by entrepreneurship mainly in providing job opportunities, which contributes to the reduction in unemployment and spread up the income distribution (Parker, 2009; Blanchflower, 2000; Acs, 2006; Acs et al., 2017; Hafer, 2013; Acs et al., 2018; Farinha et al., 2018).

Under these circumstances, this study argues that interaction between remittances and entrepreneurship *(REM*ENT)* do matter in explaining the effect in income inequality. Interestingly, remittances play a prominent role in introducing variation into developing countries populations and societies, where potential sources are used to finance a start-up new business such as entrepreneurship business (Shapiro & Mandelman, 2016). This means that the remittances received by the poor in home countries, could be used to start small-scale enterprises that engage in entrepreneurial activities. This highlights that remittances may play a vital role in reducing income inequality by channeling it into entrepreneurship activity. Hence, the testable hypothesis is stated as follows:

H_8 = There is a negative effect of remittances on income inequality in developing countries should more entrepreneurship prevails.

Remittances*Rural Development (REM*RUDEV)

Theoretically, rural offers a number of superiorities in stimulating and boosting economic growth. According to the Food and Agriculture Organization of the United Nations (2018), rural development is a key part of the overall structural transformation of a country's economy and country's society. Meanwhile, people in rural areas are more present with traditional sectors such as farming, fishing and agriculture sector as their sources of income, which very close to natural environment. Empirically, recent evidence by Wan and Zhou (2005) and Shahbaz et al. (2007) suggests that capital input emerged as the most significant determinant affecting income inequality. This is due to the agricultural sector, with a large number of peasants or agricultural workers in rural areas have faced difficulties in obtaining capital (Wan & Zhou, 2005; Shahbaz et al., 2007).

Different from the previous studies, this study has taken a step further by suggesting a way out for increasing the benefit effect of remittances on income inequality. By focusing on the positive role and the ability of rural development in generating more activities, which is translated into more employment opportunities and income advantages generation, the interaction term of *(REM*RUDEV)* is meant to capture this possibility. One of the main idea is that rural development will contribute to more income generation of the poor in the presence of remittances. This may happen if remittances received by the developing countries is utilize and channel into the productive activities, such as by channeling it into potential effective productive activities mainly in entrepreneurship and agriculture sector that mostly involve the poor, it can provide long-term capital input. Hence, the testable hypothesis is developed as follows:

H_9 = There is a negative effect of remittances on income inequality in developing countries, should rural development take place.

Remittances*Rural Infrastructure (REM*RUINF)

Meanwhile, this study also highlight that rural infrastructure is important in drive an income of the poor over the longer period. Indeed, this study believes that the relationship between remittances and rural infrastructure development *(REM*RUINF)* is important in leading to agro-industrial development in developing countries. In this regard, remittances can help in provide better rural infrastructure access. Whereby, this study believes that a better rural infrastructure such as clean water facilities access can help fertilize the plants and increase the

productive agro-industrial output. Therefore, this will have significant means of remittances in help provide better access to rural infrastructure access and subsequently to the rural economy as a whole. Hence, the testable hypothesis is developed as follows:

H_{10} = There is a negative effect of remittances on income inequality in developing countries, should rural infrastructure development take place.

Methodology

This study employ the basic income and income inequality model as suggested by Kuznets (1995). Thus, following basic specification equation is expressed. Where, i represents the countries, t represents the time and $\mathcal{E}_{i,t}$ represents the error term.

$$IE_{i,t} = \alpha_0 + \alpha_1 INC_{i,t} + \alpha_2 INC^2{}_{i,t} + \varepsilon_{i,t} \tag{1}$$

As discussed in the literature section, several other factors have been identified as crucial in explaining income inequality, including trade *(TRA)*, foreign direct investment *(FDI)*, education *(EDU)*, corruption *(COR)* and inflation *(INF)*. Hence, an augmented model with all variables enter in natural logarithmic form as summarized in the equation (2) follows:

$$lnIE_{i,t} = \alpha_0 + \alpha_1 lnINC_{i,t} + \alpha_2 lnINC^2{}_{i,t} + \alpha_3 lnTRA_{i,t} + \alpha_4 lnFDI_{i,t} +$$
$$\alpha_5 lnEDU_{i,t} + \alpha_6 lnCOR_{i,t} + \alpha_7 lnINF_{i,t} + \varepsilon_{i,t} \tag{2}$$

Considering the main objective of the study, the model equation is extended by incorporating a measure of remittances *(REM)* as summarized in the following equation:

$$lnIE_{i,t} = \alpha_0 + \alpha_1 lnINC_{i,t} + \alpha_2 lnINC^2{}_{i,t} + \alpha_3 lnTRA_{i,t} + \alpha_4 lnFDI_{i,t} + \alpha_5 lnEDU_{i,t} +$$
$$\alpha_6 lnCOR_{i,t} + \alpha_7 lnINF_{i,t} + \alpha_8 lnREM_{i,t} + \varepsilon_{i,t} \tag{3}$$

Upward movement trend in remittances flows can become an important tool for economic development especially to recipient countries by channeling into productive investment and activities. Generally, remittances constitute a significant source of household income that improves their standard of living associated to the livelihoods of families and communities through investments in small business, health, real estate and education (United Nations, 2017; Masron & Subramaniam, 2018). In other word, if remittances can be fully utilized for entrepreneurship activities, there is a huge opportunity for the poor to be out of poverty. It means that, the poor will earn more long-term income generation opportunities rather than just used remittances received for one-off consumption. Hence, this study adds *lnREM*lnENT* in the next equation model in order to take into account the attention that should be paid to the interaction term between remittances and entrepreneurship. Hence, the next model for the present study is expressed as equation (4) follows:

$$lnIE_{i,t} = \alpha_0 + \alpha_1 lnINC_{i,t} + \alpha_2 lnINC^2{}_{i,t} + \alpha_3 lnTRA_{i,t} +$$
$$\alpha_4 lnFDI_{i,t+} \alpha_5 lnEDU_{i,t} + \alpha_6 lnCOR_{i,t} + \alpha_7 lnINF_{i,t} +$$
$$\alpha_8 lnREM_{i,t} + \alpha_9 lnENT_{i,t} + \alpha_{10} (lnREM_{i,t} * lnENT_{i,t}) + \varepsilon_{i,t} \tag{4}$$

Apart from that, this study believes that remittances received by developing countries can be so effective to help expand a significant benefit in lowering inequality by contributing to rural development in home countries. Due to that, the interaction term of *lnREM*lnRUDEV* was developed in the next model in this study. Hence, the next model is written as the following:

$$lnIE_{i,t} = \alpha_0 + \alpha_1 lnINC_{i,t} + \alpha_2 lnINC^2{}_{i,t} + \alpha_3 lnTRA_{i,t} +$$
$$\alpha_4 lnFDI_{i,t+} \alpha_5 lnEDU_{i,t} + \alpha_6 lnCOR_{i,t} + \alpha_7 lnINF_{i,t} +$$
$$\alpha_8 lnREM_{i,t} + \alpha_9 lnRUDEV_{i,t} + \alpha_{10} (lnREM_{i,t} * lnRUDEV_{i,t}) + \varepsilon_{i,t} \tag{5}$$

This study also believes that rural infrastructure *(RUINF)* is in crucial need to help the rural population to able to generate their income. As such, with the existence of sufficient and proper facilities mainly access to water, electricity and sanitation, it will be able to help improve agricultural production at lower cost. In relations to that, this study adds *lnREM*lnRUINF* in the next model:

$$lnIE_{i,t} = \alpha_0 + \alpha_1 lnINC_{i,t} + \alpha_2 lnINC^2_{i,t} + \alpha_3 lnTRA_{i,t} +$$
$$\alpha_4 lnFDI_{i,t+} \alpha_5 lnEDU_{i,t} + \alpha_6 lnCOR_{i,t} + \alpha_7 lnINF_{i,t} +$$
$$\alpha_8 lnREM_{i,t} + \alpha_9 lnRUINF_{i,t} + \alpha_{10}(lnREM_{i,t} * lnRUINF_{i,t}) + \varepsilon_{i,t} \quad (6)$$

Lastly, for equation (4), (5) and (6), the discussion of interaction term involves the calculation of threshold as well as marginal effects. The basic formula is given below, as in the case of equation (4):

$$\frac{\partial lnIE_{i,t}}{\partial lnREM_{i,t}} = \alpha_8 + \alpha_{10}lnENT_{i,t} \quad (7)$$

Estimation Methodology
This study start the empirical analysis by employing dynamic panel data regression model, namely, Generalized Method of Moment (GMM). GMM estimators technique was suggested by Holtz-Eakin et al. (1988), Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). Therefore, by using a GMM that contains the dependent variable and taking *X* to represent all explanatory variables, equation (8) can be written as:

$$IE_{i,t} = \alpha IE_{i,t-1} + \beta X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (8)$$

Where, IE stands for income inequality, *i* stands for countries, *t* stands for times, α and β stands for the parameters to be estimated, $X_{i,t}$ stands for vector of explanatory variables, $\mu_{i,t}$ stands for unobserved country-specific time-invariant (random effect) and $\varepsilon_{i,t}$ stands for independent and identically distributed. Basically, there are two variants of GMM estimators, namely, first-differenced GMM and system-GMM estimator. First-differenced GMM estimator has been found to have poor finite sample properties (bias and imprecision) when the lagged levels of the series are only weakly correlated with subsequent first differences, so that the instruments available for the first-differenced GMM equations are weak (Arellano & Bond, 1991; Blundell & Bond, 2000). In order to avoid downward bias in the computation of standard errors, system-GMM estimator is used as proposed by Arellano and Bover (1995). Therefore, this study recommends the system-GMM estimator as a consideration in subsequent empirical analysis. In the estimation, these moment conditions are applied to calculated the difference estimator, expressed as follows:

$$E\left[IE_{i,t-s}(\upsilon_{i,t} - \upsilon_{i,t-1})\right] = 0 \quad \text{for} \quad s \geq 2, \quad t = 3,...,T \quad (9)$$
$$E\left[X'_{i,t-s}(\upsilon_{i,t} - \upsilon_{i,t-1})\right] = 0 \quad \text{for} \quad s \geq 2, \quad t = 3,...,T \quad (10)$$

The consistency of the GMM estimator is depends on some specification tests or specification diagnostic: (i) the Sargan test of over-identifying restrictions (failure to reject the null hypothesis would imply that the instruments are valid and the model is correctly specified), (ii) the Hansen test of over-identifying restrictions (failure to reject the null hypothesis would imply that the instruments are valid and the model is correctly specified), and (iii) the serial correlation tests in the disturbances, which are first order serial correlation, AR(1) and second order serial correlation, AR(2). Based on the theory, the study should reject the null of the

absence of the first order serial correlation, AR(1) and not reject the absence of the second order serial correlation, AR(2) (Arellano & Bond, 1991; Law, 2018).

Computation of t-statistic for Marginal Effect
Brambor et al. (2006) point out that the attention should pay to compute the new standard error in order to evaluate the significant of marginal effect. Setting *IE* as Y and all explanatory variables as Z, representation of all equations can be expressed as:

$$Y = \alpha_0 + \alpha_1 X + \alpha_2 Z + \alpha_3 XZ \tag{11}$$

The marginal effect is, the Z which indicates that the change of y due to the changes of x is depends on Z variable. The new standard error needs to compute to evaluate the significant of the marginal effect. Therefore, the variance is obtained as next equation follows:

$$Variance = \sigma^2 \frac{dy}{dr} = \text{var}(\alpha_1) + 4X^2 \text{var}(\alpha_2) + 4X \text{cov}(\alpha_1\alpha_2) \tag{12}$$

Meanwhile, to evaluate the significant of the marginal effect, the mean, minimum and maximum values of these levels are used to compute the t-statistic.

$$t - stat = \frac{coefficient}{Standard\ Error} \tag{13}$$

By working out the turning point (threshold level), that would induce a total positive transparency effect solving for marginal effect.

Measurement and Data Sources
This study constructs a panel from a data set consisting of 47 developing countries from 2009 to 2017. In summary, Table 1 shows the list of each variables, proxies and data sources generated from a variety of sources.

Table 1: Variables, Proxies and Data Sources

Variables	Description	Proxies	Data Sources
IE	Income inequality	Gini index	Bastagli et al. (2012); WIID (2019); World Bank (2019a)
INC	Income	GDP per capita	World Bank (2019a)
TRA	Trade	Trade (% of GDP)	World Bank (2019a)
FDI	Foreign direct investment	Foreign direct investment (% of GDP)	UNCTAD (2019)
EDU	Education	Education expenditure (% of GNI)	World Bank (2019a)
COR	Corruption	COR = 5 – (Control of corruption + 2.5)	World Bank (2019b)
INF	Inflation	Inflation rates	World Bank (2019a)
REM	Remittances	Personal remittances, received (% of GDP)	World Bank (2019a)
ENT	Entrepreneurship	New Business Density (new registrations per 1,000 people ages 15-64)	World Bank (2018); World Bank (2019a)
RUDEV	Rural Development:		
	i. RP	i. Rural population (% of total population)	World Bank (2019a)
	ii. EIR	ii. Employment in agriculture (% of total employment)	
	iii. AO	iii. Agriculture, forestry, and fishing, value added (% of GDP)	
RUINF	Rural Infrastructure:		
	i. WT	i. People using at least basic drinking water services, rural (% of rural population)	World Bank (2019a)
	ii. ELC	iii. ii. Access to electricity, rural	

		iv.	(% of rural population)
ii.	ST	iii.	People using at least basic sanitation services, rural (% of rural population)

Findings and Discussion

This study begins the discussions by first looking at the descriptive analysis provided in Table 2. The summary of the statistics indicating that the maximum value of income for the developing countries during 2009 to 2017 is US$15331.9. Nevertheless, with some countries only earned US$390.1, this indicates a huge gap in income among the developing countries.

Table 2: Descriptive Analysis

	Mean	Std. Dev.	Min	Max
IE:				
Gini Index	39.9	9.1	16.8	77.1
INC	5193.9	3540.7	390.1	15331.9
TRA	77.3	29.9	20.7	162.6
FDI	3.6	4.6	-37.2	43.9
EDU	4.1	1.7	0.9	9.5
COR	-0.5	0.5	-1.4	1.0
INF	5.3	5.6	-2.2	59.2
REM	6.2	7.7	0.1	43.8
ENT	2.1	2.8	0.2	18.4
RUDEV:				
RP	42.1	17.0	9.3	83.1
EIR	26.9	15.3	3.2	80.7
AO	11.0	9.4	2.0	60.3
RUINF:				
WT	81.2	16.9	36.9	100.0
ELC	80.1	30.0	0.2	100.0
ST	69.7	25.5	4.7	99.2

Note: Income refers to GDP per capita.

Moving to the correlation analysis provided in Table 3, there is no serious issue of multicollinearity exist in the sample as all correlation coefficients do not exceed 0.83. In other words, this study observes the correlation among the variables is low and thus, exerting less issue of multicollinearity.

Table 3: Correlation Analysis

	lnIE	lnINC	lnTRA	lnFDI	lnEDU	lnCOR	lnINF	lnENT	lnREM	lnRP	lnEIR	lnAO	lnWT	lnELC	lnST
lnIE	1.00														
lnINC	0.18	1.00													
lnTRA	-0.25	0.05	1.00												
lnFDI	-0.09	-0.07	0.21	1.00											
lnEDU	0.15	0.16	0.33	-0.02	1.00										
lnCOR	0.42	0.35	0.14	-0.03	0.39	1.00									
lnINF	-0.15	-0.07	0.02	0.10	-0.05	-0.19	1.00								
lnENT	0.18	0.29	0.21	0.03	0.32	0.39	-0.11	1.00							
lnREM	-0.37	-0.48	0.11	0.06	0.05	-0.31	-0.04	-0.20	1.00						
lnRP	-0.20	-0.60	-0.15	-0.01	-0.29	-0.23	0.03	-0.23	0.37	1.00					
lnEIR	-0.11	-0.67	-0.24	0.12	-0.34	-0.24	0.05	-0.23	0.19	0.77	1.00				
lnAO	-0.18	-0.62	-0.13	0.16	-0.24	-0.28	0.10	-0.26	0.20	0.57	0.74	1.00			
lnWT	-0.28	0.53	0.16	-0.20	0.05	0.12	-0.06	0.04	-0.01	-0.41	-0.65	-0.55	1.00		
lnELC	-0.34	0.48	0.19	-0.12	0.11	-0.07	-0.10	-0.04	0.17	-0.43	-0.63	-0.58	0.82	1.00	
lnST	-0.36	0.41	0.32	-0.06	0.13	0.14	-0.05	0.07	0.22	-0.23	-0.49	-0.48	0.73	0.83	1.00

Next, Table 4 discusses on the findings of the main objective in this study, which focuses on the contribution of remittances in alleviating income inequality in developing countries.

Table 4: Regression Results of the Basic Model [DV=IE]

	Model 1A:			
	Difference-GMM		System-GMM	
	1-step	2-step	1-step	2-step
lnIE(-1)	0.155	0.312	0.665	0.877
	[0.093]*	[0.000]***	[0.000]***	[0.000]***
lnINC	0.108	1.642	1.218	2.053
	[0.043]**	[0.048]**	[0.097]*	[0.070]*
lnINC^2	-0.025	-0.048	-0.001	-0.009
	[0.023]**	[0.083]*	[0.092] *	[0.019]**
lnTRA	-0.037	-0.091	-0.087	-0.079
	[0.047]**	[0.004]***	[0.024]**	[0.089]*
lnFDI	-0.003	-0.009	0.183	0.285
	[0.981]	[0.910]	[0.035]**	[0.000]***
lnEDU	0.025	0.068	0.185	0.006
	[0.001]***	[0.038]**	[0.162]	[0.293]
lnCOR	0.133	0.141	0.064	0.037
	[0.021]**	[0.001]***	[0.066]*	[0.081]*
lnINF	0.014	0.003	0.116	0.009
	[0.078]*	[0.006]***	[0.003]***	[0.036]**
lnREM	0.033	0.058	0.028	0.011
	[0.480]	[0.224]	[0.362]	[0.237]
	Model Criteria			
AR (1)	0.001***	0.039**	0.008*	0.079*
AR (2)	0.253	0.355	0.276	0.193
Hansen Test	0.596	0.318	0.347	0.399
Dif-Sar	0.944	0.998	0.725	0.914

Note: Asterisks *, **, and *** denote significant at 10%, 5%, and 1% levels, respectively. Figures in [ ] stand for p-value. The values of the AR, Hansen test & Dif-Sar refer to p-value.

Table 4 illustrates that the results has support the validity of the instruments and model specification of this study by the test of serial correlation and Hansen tests. As per Table 4, the result for the first-order of autocorrelation of this model signifiy the rejection of the null hypothesis. Meanwhile, the results of the second-order autocorrelation indicate that the model is fails to reject the null hypothesis. The Hansen test does not reject the null hypothesis of over-identification restriction and suggests that this model is valid. Dif-Sar test, on the other hand, suggests that system-GMM is superior to different-GMM. Since 2-step GMM theoretically tends to outperform 1-step, the subsequent discussion will focus on the results of 2-step system-GMM.

The results of remittances (REM) have highlighted that remittances does not have any significant impact on income inequality. Surprisingly, this result is inconsistent with previous studies which has indicated that remittances has a statistically significant negative impact (Huay & Bani, 2018). The possible explanation to these insignificant results is that it can be explained by taking into account the remittances flow in developing countries. Even though remittances ware clarified as a second-largest sources of external financial flows by Ngoma and Ismail (2013) and Awdeh (2018), but this study found that the remittances flows in developing countries is still at low level indicated by mean value of remittances as shown in the descriptive analysis with most of the developing countries recording a mean remittances of

6.2 only. This is supported by Beck et al. (2010), who claim that remittances flows in developing countries have decreased by 2.4 percent in 2016.

Other than that, these insignificant results also suggest that this may happen due to the remittances are not utilized in meaningful activities by the recipient country. The financial constraints faced by the poor in the recipient countries have increased one-off consumption mainly for the sake of survival concentrating mainly in getting food. This gives an idea that most recipients of remittances are more interested in spending and using their income only to meet their basic needs rather than using and channeling it into the other productive activities or investment. In other words, this study suspects that the contribution of remittances to income inequality is there, but it is too small or negligible to be used to generate more income particularly via the potential activities and investment. Due to that, the potential consequences of remittances as one of the potential solutions to deal with the income inequality issue especially to offer an important role to economic development opportunities cannot be achieved. As conclusion, by taking remittances impact on income inequality in developing countries during the period of study, H_7 is rejected.

Specially, the insignificant result of remittances has motivated this study to further investigate the means to turn remittances into a more meaningful factor to reduce income inequality. The first mean would be on entrepreneurship. In other word, this study believes that if remittances are sent into a community with high entrepreneurship (ENT) culture, then the positive role of remittances can be realized. Second, rural development (RUDEV) that can ensure less movement to the urban by giving more employment opportunity may also help remittances to be fully utilized for a productive activities. Third, remittances can bring more fruitful results if infrastructure in rural areas is improved. Infrastructure (RUINF) will offer more business opportunities for rural inputs that are previously left uneconomically.

Given the possibility of insignificant effect of remittances is due to low remittances flow and is related to the lack of awareness and involvement in expanding existing sources of income earned through remittances in developing countries, this study extends the analysis by suggesting that remittances could be statistically exerting to a positive role. Most importantly, this study believes that by channeling remittances into potential productive activities such as entrepreneurship, it can help the poor to be generating long term income and improves their well-being of families and communities in their own home countries. To reflect this, the next empirical model of interaction term of REM*ENT is carried out.

Table 5: Regression Results of the REM*ENT Model [DV=IE]

	Model 2A			
	Difference-GMM		System-GMM	
	1-step	2-step	1-step	2-step
lnIE(-1)	0.143	0.117	0.929	0.539
	[0.042]**	[0.067]*	[0.000]***	[0.003]***
lnINC	1.739	1.648	2.062	1.875
	[0.058]*	[0.029]**	[0.078]*	[0.092]*
lnINC^2	-2.033	-0.017	-0.002	-0.003
	[0.099]*	[0.018]**	[0.005]***	[0.019]**
lnTRA	-0.073	-0.057	-0.014	-0.136
	[0.043]**	[0.002]***	[0.032]**	[0.002]***
lnFDI	0.006	0.016	0.015	0.026
	[0.615]	[0.164]	[0.340]	[0.494]
lnEDU	0.050	0.053	0.010	0.017
	[0.018]**	[0.020]**	[0.068]*	[0.036]**
lnCOR	0.049	0.119	0.017	0.181
	[0.297]	[0.107]	[0.272]	[0.129]
lnINF	0.007	0.005	0.001	0.018

	[0.002]***	[0.019]**	[0.066]*	[0.055]*
lnREM	0.024	0.025	0.042	0.033
	[0.439]	[0.563]	[0.199]	[0.341]
lnENT	0.012	0.193	0.036	0.047
	[0.034]**	[0.059]*	[0.172]	[0.227]
lnREM*lnENT	-0.002	-0.003	-0.003	-0.008
	[0.010]***	[0.028]**	[0.084]*	[0.018]**

Table 5: Regression Results of the REM*ENT Model [DV=IE] (cont...)

Model Criteria				
AR (1)	0.000***	0.045**	0.059*	0.079*
AR (2)	0.212	0.310	0.158	0.250
Hansen Test	0.084	0.275	0.316	0.373
Dif-Sar	0.736	0.794	0.863	0.845
Marginal Effect				
Mean	0.020	0.019	0.036	0.016
Min	0.024	0.025	0.042	0.033
Max	-0.013	-0.030	-0.013	-0.114
Threshold	12.000	8.333	14.00	4.125

Note: Asterisks *, **, and *** denote significant at 10%, 5%, and 1% levels, respectively. Figures in [ ] stand for p-value. The values of the AR, Hansen test & Dif-Sar refer to p-value.

The specification tests reported in Table 5 imply that the models are correctly specified. Firstly, the serial correlation test of AR(1) result soundly support the rejection of the null hypothesis of first-order autocorrelation while it fails to reject the null hypothesis of second-order autocorrelation AR(2). In terms of Hansen test, the result does not reject the null hypothesis of over-identification restriction, which confirm this study set of instruments are valid. Besides, p-value of the different-Sargan (Dif-Sar) in GMM approach is indicate greater than the significance level. Hence, from the result, it can be concluded that 2-step system-GMM estimator achieves greater efficiency than 2-step difference-GMM for the model extended model of remittances for the interaction term of REM*ENT.

Looking at the results in Table 5, the results hint that although remittances do not have significant effect on income inequality, their interaction with entrepreneurship do have significant impact. The negative coefficient of REM*ENT result indicates that entrepreneurship has a great potential to help promote income inequality eradication for the sample countries. As such, H_8 is accepted.

Due to that, this study observes that to examine the linkage between remittances and income inequality through entrepreneurship, it is important to confirm the presence of conditionality of entrepreneurship. In other words, this study wants to identify the minimum threshold value of entrepreneurship needed by developing countries especially during the period of study. Moving to the thresholds result in Table 5, this study finds evidence of a significant threshold value needed by developing countries is at 4.13 percent. This implies that if the entrepreneurship has to reach a minimum level of threshold value with 4.13 percent, income inequality tends to reduce. Hence, based on the result, for developing countries to get benefit and advantages from the development of remittances itself, they must achieve the threshold level of entrepreneurship.

Meanwhile, in terms of marginal effect that is reported in 2-step system-GMM in Table 5, it implies that remittances and income inequality are positive and significant at mean and minimum levels with 0.02 percentage points and 0.03 percentage points, respectively. On the other hand, at maximum level of entrepreneurship, the results indicate that negative results is obtained. In other words, each additional percentage point of remittances will benefit 0.11 percentage points of income inequality decrease when entrepreneurship is at the maximum

value. Having established the existence of a marginal effect, this result portrays that when a higher remittances occur, a lower income inequality achieved by the presence of entrepreneurship empowerment. To look deeper into these, the results in Table 5 clearly illustrates that the higher levels of remittances will contribute to lower income inequality in developing countries.

In other words, remittances will stimulate economic growth and promote community development as small-scale enterprises are formed through engagement in entrepreneurial activities. In fact, remittances also can ease credit constraints by providing working capital for the recipients and has useful purpose by providing a long-term potential income via economic benefits in home countries. This also results in job creation and enhancement of the development of the remittances receiving community. Due to that, remittances can contribute to inclusive and sustainable economic growth and development over a longer period and thus, contribute to lower income inequality level. In summary, this finding has hinted that the effect of remittances on income inequality reduction will occur as the involvement in entrepreneurship increases. Therefore, remittances have great potential to become as essential and growing sources of foreign funds for economic development of developing countries as the most stable source of external finance or capital towards household incomes particularly to the poor countries.

Next, this study extends the analysis by pointing out on the interaction between remittances and rural development in eradicating income inequality in developing countries. On the first perspective, this study believes that rural development (RUDEV) through the three indicators employed, namely rural population (RP), employability in rural area (EIR) and agricultural output (AO) will offer more economic opportunities to the poor in rural areas. This study believes that rural development (RUDEV) via the productive activities such as channeling remittances into potential productive activities mainly in agriculture sector will help the poor in the rural areas to generate more income and create long-term income formation and finally contribute to decreasing income inequality, in comparison to just utilizing remittances only for one-off consumption which cannot help the poor to generate long-term income.

To shed further light on this issue, this study has continued to investigate the contribution of the interaction term of REM*RUDEV in the next empirical model. Mainly, the interaction term of REM*RUDEV is carried out to investigate the moderating effect of rural development on remittances-income inequality relationship in developing countries. The results of GMM estimates of the dynamic equation are shown in Table 6.

Table 6: Regression Results of the REM*RUDEV Model [DV=IE]

	Model 3A: RUDEV = RP				Model 3B: RUDEV = EIR				Model 3C: RUDEV = AO			
	Difference-GMM		System-GMM		Difference-GMM		System-GMM		Difference-GMM		System-GMM	
	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step
lnIE(-1)	0.150	0.140	0.890	0.659	-0.164	-0.238	0.955	0.789	0.164	-0.211	0.929	0.419
	[0.031]**	[0.040]**	[0.000]***	[0.002]***	[0.046]**	[0.002]***	[0.000]***	[0.000]***	[0.034]**	[0.000]***	[0.020]**	[0.023]**
lnINC	0.096	0.264	0.039	0.176	0.237	0.418	0.517	0.593	0.647	0.317	0.537	0.238
	[0.116]	[0.158]	[0.065]*	[0.041]**	[0.072]*	[0.046]**	[0.058]*	[0.085]*	[0.037]**	[0.075]*	[0.086]*	[0.049]**
lnINC^2	-0.068	-0.015	-0.009	0.017	-0.088	-0.073	-0.004	-0.019	-0.049	-0.074	-0.158	-0.001
	[0.084]*	[0.098]*	[0.008]***	[0.016]**	[0.058]*	[0.058]*	[0.098]*	[0.076]*	[0.064]*	[0.059]*	[0.092]*	[0.066]*
lnTRA	-0.091	-0.053	-0.072	-0.172	-0.228	-0.228	-0.020	-0.021	-0.080	-0.015	-0.015	-0.038
	[0.009]***	[0.003]***	[0.059]*	[0.022]**	[0.000]***	[0.000]***	[0.066]*	[0.049]**	[0.042]**	[0.081]*	[0.013]**	[0.087]*
lnFDI	0.008	0.008	0.004	0.032	0.016	0.013	0.007	0.025	0.004	0.146	0.006	0.011
	[0.513]	[0.102]	[0.980]	[0.379]	[0.076]*	[0.023]**	[0.240]	[0.121]	[0.728]	[0.847]	[0.344]	[0.431]
lnEDU	0.071	0.145	0.157	0.023	0.099	0.067	0.060	0.092	0.048	0.059	0.014	0.078
	[0.074]*	[0.014]**	[0.021]**	[0.085]*	[0.154]	[0.197]	[0.020]**	[0.083]*	[0.067]*	[0.021]**	[0.011]**	[0.027]**
lnCOR	0.019	0.005	0.009	0.043	0.271	0.196	0.018	0.098	0.062	0.003	0.019	0.158
	[0.680]	[0.922]	[0.639]	[0.556]	[0.002]***	[0.230]	[0.620]	[0.702]	[0.208]	[0.960]	[0.236]	[0.174]
lnINF	0.002	0.004	0.015	0.007	0.014	0.013	0.003	0.007	0.009	0.011	0.003	0.073
	[0.803]	[0.259]	[0.569]	[0.064]*	[0.238]	[0.156]	[0.697]	[0.089]*	[0.072]*	[0.097]*	[0.029]**	[0.048]**
lnREM	1.263	1.159	0.675	1.114	0.337	0.256	0.135	0.280	0.063	0.2 27	0.211	0.135
	[0.024]**	[0.063]*	[0.322]	[0364]	[0.071]*	[0.068]*	[0.217]	[0.197]	[0.080]*	[0.001]***	[0.374]	[0.161]
lnRP	0.292	0.259	0.030	0.033	-	-	-	-	-	-	-	-
	[0.016]**	[0.021]**	[0.073]*	[0.075]*	-	-	-	-	-	-	-	-
lnREM*lnRP	-0.065	-0.040	-0.019	-0.032	-	-	-	-	-	-	-	-
	[0.041]**	[0.067]*	[0.033]**	[0.061]*	-	-	-	-	-	-	-	-
lnEIR	-	-	-	-	-0.355	-0.382	-0.022	-0.036	-	-	-	-
	-	-	-	-	[0.003]***	[0.000]***	[0.093]*	[0.099]*	-	-	-	-
lnREM*lnEIR	-	-	-	-	-0.091	-0.068	-0.010	-0.026	-	-	-	-
	-	-	-	-	[0.024]**	[0.031]**	[0.027]**	[0.092]*	-	-	-	-
lnAO	-	-	-	-	-	-	-	-	-0.013	-0.026	-0.014	-0.041
	-	-	-	-	-	-	-	-	[0.032]**	[0.024]**	[0.058]*	[0.064]*
lnREM*lnAO	-	-	-	-	-	-	-	-	-0.020	-0.063	-0.099	-0.056
	-	-	-	-	-	-	-	-	[0.021]**	[0.000]***	[0.039]**	[0.024]**

Table 6: Regression Results of the REM*RUDEV Model (cont...)

						Model Criteria						
AR(1)	0.001***	0.024**	0.048**	0.093*	0.067*	0.062*	0.065*	0.069*	0.001***	0.018**	0.059*	0.096*
AR(2)	0.207	0.360	0.145	0.233	0.616	0.392	0.161	0.169	0.183	0.542	0.157	0.265
Hansen Test	0.486	0.632	0.636	0.624	0.147	0.219	0.296	0.282	0.147	0.192	0.043	0.078
Dif-Sar	0.697	0.997	0.864	0.999	0.543	0.653	0.751	0.730	0.862	0.721	0.635	0.874
						Marginal Effect						
Mean	-1.471	-0.523	-0.124	-0.232	-2.110	-1.573	-0.134	-0.419	-0.157	-0.466	-0.877	-0.481
Min	0.662	0.789	0.499	0.818	0.046	0.038	0.103	0.197	0.023	0.102	0.014	0.024
Max	-4.137	-2.164	-0.903	-1.544	-7.010	-5.234	-0.672	-1.819	-1.143	-3.571	-5.757	-3.241
Threshold	19.431	28.975	35.526	34.813	3.703	3.765	13.500	10.769	3.150	3.603	2.131	2.411

Note: Asterisks *, **, and *** denote to the 10%, 5%, and 1% levels of significance, respectively. Figures in [ ] stand for p-value. The values of the AR, Hansen test & Dif-Sar refer to p-value. RP=Rural population, EIR=employment in rural, AO=agriculture output.

The results indicate that the autoregressive (AR) test for the serial correlation rejects the null of the first order auto-correlation (AR(1)), whilst it does not reject the null of second order auto-correlation (AR(2)). Hansen test fails to reject the over-identification restrictions, signifying that this study has valid instruments. The p-value of the different-Sargan (Dif-Sar) in GMM approach is greater than the significance level and it can be concluded that system-GMM achieves greater efficiency than difference-GMM for the model. Therefore, the results passed the diagnostics tests and motivates the reseacher to use the 2-step system-GMM estimator for further clarity.

As expected, the study highlights that the coefficient of REM*RUDEV result has negative and significant effect on income inequality in developing countries. On that basis, although the coefficient of remittances is insignificant, the coefficient of the REM*RUDEV emerged negative and statistically significant at 1 percent. Hence, the negative effect of the interaction terms of REM*RUDEV bring huge relief and hope about the relationship between remittances and income inequality. In conclusion, the results that provides in Table 6 supports this study's hypothesis regarding the interaction of REM*RUDEV and with that, H_9 is accepted.

When examining the effect of remittances on income inequality conditional upon the level of rural development, it is essential to compute the turning point. This is important in order to explain why there is a substantial difference in the minimum threshold values that need to be achieved by the developing countries. The result of threshold values reveal is quite different between each proxy for rural development variables. It shows that the threshold values of agriculture output are very small, which is only 2.41 percent. Conversely, the threshold values of rural population and employment in rural areas are quite high compared to the agriculture output with 34.81 percent and 10.77 percent, respectively. In summary, in order to ensure that income inequality can gain a negative effect from remittances, developing countries have to ensure at least a minimum level of threshold values of improvement in rural development. In a simple way, remittances are beneficial for income inequality reduction in developing countries if the remittances are accompanied by better rural development. This is an interesting finding as it provides evidence that remittances are not necessarily aggravate the problem of income inequality at all times as the empirical results indicate in the remittances basic model, but remittances can also offer benefits in the forms of reducing income inequality in developing countries.

With respect to marginal effects, the result on Table 6 indicates that 1 percent of increase in remittances level will decrease income inequality by 0.23 percent in rural population, 0.42 percent in employment in rural and 0.48 percent in agriculture output, evaluated as mean of rural development. Meanwhile, at the maximum level of rural development, a 1 percent increase in remittances will decrease the level of income inequality by about 1.54 percent in rural population, 1.82 in employment in rural and 3.24 percent in agriculture output. In other words, the results of marginal effect in this study reveals that a higher level of remittances tends to lower income inequality, which also depends on the level of rural development. This is because expansion of rural area is likely to reduce income inequality. Accordingly, several potential channels can be suggested on how rural development can contribute to lowering the level of income inequality of a developing country in the presence of remittances.

As highlighted by Wan and Zhou (2005) and Shahbaz et al. (2007), capital constraints has become a main issue that need to be faced by peasants in agriculture sector particularly in China and Pakistan. Therefore, one of the main ideas is that remittances can make significant contribution to finance the activities mainly in agriculture sector that can give benefit and advantages to a rural people through high employability and economic growth opportunities. In other words, when a sustainable rural development occur in the circulation of the economy, remittances can represent a significant benefit by removing capital constraints faced by the

farmers, improve and bring sustainability in the productivity of agriculture. Given these benefits, it can potentially increase a wide range of opportunities of sustainable livelihoods to income creation such as empowerment of food supply. This in turn may cause to lead and spur the income inequality reduction as rural population may engage in profitable agriculture activities.

However, a different picture emerges at the minimum level of rural development as the results indicates that the level of income inequality will increase by 0.82 percent for rural population, 0.20 percent for employment in rural and 0.02 percent for agriculture output, respectively. This result suggests that poor rural development condition or minimum level of rural development, mainly in terms of lack of employment opportunities and agriculture output has led the rural population mainly youth moving out to cities with intention to find a job.

Now, let's move to the interaction of REM*RUINF. To represent the rural infrastructure (RUINF) in this study, three types of rural facilities indicators are employed, namely people using at least basic drinking water services as a percentage of rural population (WT), access to electricity as a percentage of rural population (ELC) and people using at least basic sanitation services as a percentage of rural population (ST). The result as portrayed in Table 7 below.

Table 7: Regression Results of the REM*RUINF Model [DV=IE]

	Model 4A: RUINF = WT				Model 4B: RUINF = ELC				Model 4C: RUINF = ST			
	Difference-GMM		System-GMM		Difference-GMM		System-GMM		Difference-GMM		System-GMM	
	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step	1-step	2-step
lnIE(-1)	-0.309	-0.142	0.860	0.494	-0.180	-0.181	0.568	0.657	0.170	0.107	0.553	0.689
	[0.006]***	[0.004]***	[0.000]***	[0.020]**	[0.047]**	[0.003]***	[0.004]***	[0.000]***	[0.046]**	[0.060]*	[0.049]**	[0.019]**
lnINC	0.059	0.086	0.018	0.050	-0.053	-0.777	0.275	0.352	0.070	0.169	0.049	0.024
	[0.040]**	[0.073]*	[0.032]**	[0.019]**	[0.093]*	[0.048]**	[0.017]**	[0.039]**	[0.287]	[0.248]	[0.056]*	[0.039]**
lnINC^2	-0.079	-0.051	-0.026	-0.037	-0.617	-0.548	-0.005	-0.025	-0.073	-0.026	-0.160	-0.257
	[0.010]*	[0.042]**	[0.064]*	[0.009]***	[0.063]*	[0.001]***	[0.058]*	[0.042]**	[0.347]	[0.374]	[0.21]**	[0.073]*
lnTRA	-0.219	-0.072	-0.058	-0.093	-0.233	-0.139	-0.159	-0.150	-0.097	-0.058	-0.130	-0.088
	[0.126]	[0.159]	[0.115]	[0.007]***	[0.000]***	[0.000]***	[0.032]**	[0.030]**	[0.022]**	[0.019]**	[0.021]**	[0.023]**
lnFDI	0.004	0.013	0.006	0.006	0.024	0.013	0.007	0.053	0.007	0.002	0.014	0.019
	[0.840]	[0.246]	[0.679]	[0.708]	[0.318]	[0.484]	[0.430]	[0.106]	[0.610]	[0.704]	[0.304]	[0.642]
lnEDU	-0.124	-0.105	0.019	0.049	0.140	0.150	0.053	0.013	0.061	0.049	0.056	0.085
	[0.320]	[0.218]	[0.019]**	[0.006]***	[0.042]**	[0.011]**	[0.049]**	[0.069]*	[0.208]	[0.515]	[0.020]**	[0.057]*
lnCOR	0.243	0.278	0.019	0.167	0.197	0.257	0.056	0.092	0.105	0.190	0.102	0.189
	[0.009]***	[0.000]***	[0.019]**	[0.018]**	[0.005]***	[0.000]***	[0.038]**	[0.009]***	[0.068]*	[0.000]***	[0.048]**	[0.076]*
lnINF	0.008	0.008	0.006	0.003	0.012	0.017	0.029	0.004	0.024	0.024	0.019	0.020
	[0.007]***	[0.035]**	[0.087]*	[0.082]*	[0.268]	[0.100]	[0.065]*	[0.085]*	[0.023]**	[0.000]***	[0.024]**	[0.035]**
lnREM	1.929	2.533	1.239	2.613	0.098	0.107	0.049	0.012	0.043	0.991	0.140	1.005
	[0.043]**	[0.032]**	[0.162]	[0.181]	[0.057]*	[0.004]***	[0.396]	[0.159]	[0.091]*	[0.002]***	[0.581]	[0.485]
lnWT	0.025	0.651	0.127	0.340	-	-	-	-	-	-	-	-
	[0.059]*	[0.045]**	[0.045]**	[0.066]**	-	-	-	-	-	-	-	-
lnREM*lnWT	-0.049	-0.067	-0.033	-0.068	-	-	-	-	-	-	-	-
	[0.004]***	[0.062]*	[0.058]*	[0.096]*	-	-	-	-	-	-	-	-
lnELC	-	-	-	-	-0.026	-0.055	-0.009	-0.056	-	-	-	-
	-	-	-	-	[0.071]*	[0.004]***	[0.086]*	[0.083]*	-	-	-	-
lnREM*lnELC	-	-	-	-	-0.014	-0.029	-0.005	-0.002	-	-	-	-
	-	-	-	-	[0.047]**	[0.014]**	[0.038]**	[0.022]**	-	-	-	-
lnST	-	-	-	-	-	-	-	-	0.246	0.396	0.150	0.161
	-	-	-	-	-	-	-	-	[0.019]**	[0.003]***	[0.090]*	[0.094]*
lnREM*lnST	-	-	-	-	-	-	-	-	-0.003	-0.067	-0.012	-0.049
	-	-	-	-	-	-	-	-	[0.015]**	[0.005]***	[0.019]**	[0.079]*

Table 7: Regression Results of the REM*RUINF Model [DV=IE] (cont...)

	Model Criteria											
AR(1)	0.000***	0.095*	0.049**	0.005***	0.092*	0.008***	0.003***	0.059*	0.000***	0.017**	0.006***	0.079*
AR(2)	0.247	0.449	0.152	0.256	0.262	0.372	0.051	0.174	0.241	0.472	0.376	0.241
Hansen Test	0.308	0.698	0.629	0.813	0.241	0.013	0.296	0.381	0.450	0.428	0.443	0.514
Dif-Sar	0.771	0.993	0.998	0.901	0.845	0.683	0.551	0.637	0.991	0.816	0.922	0.748
	Marginal Effect											
Mean	-2.048	-2.905	-1.440	-2.906	-1.023	-2.215	-0.351	-0.148	-0.166	-3.680	-0.697	-2.411
Min	0.120	0.060	0.021	0.103	0.095	0.101	0.048	0.012	0.029	0.676	0.084	0.774
Max	-2.971	-4.167	-2.061	-4.187	-1.302	-2.793	-0.451	-0.188	-0.255	-5.654	-1.050	-3.855
Threshold	39.367	37.806	37.545	38.426	7.000	3.690	9.800	6.000	14.333	14.791	11.667	20.510

Note: Asterisks *, **, and *** denote to the 10%, 5%, and 1% levels of significance, respectively. Figures in [ ] stand for p-value. The values of the AR, Hansen test & Dif-Sar refer to p-value. WT = People using at least basic drinking water services, rural (% of rural population), ELC = access to electricity, rural (% of rural population), ST = people using at least basic sanitation services, rural (% of rural population).

Based on the 2-step system-GMM, the results show that the serial correlation test of AR(1) rejects the null hypothesis of no first-order autocorrelation, while the serial correlation test of AR(2) fails to reject the null hypothesis of no second-order autocorrelation. Besides, Hansen test fails to reject the null hypothesis of no over-identification of restriction in all regressions implying that the instruments are valid. Finally, the value of different-Sargan (Dif-Sar) statistics in the GMM approach used to address the better estimators among GMM, mainly on the validity of additional moment condition in the level equations. Failure to reject the null hypothesis of the validity of the level moment condition supports the superiority of system GMM estimator. Hence, this study adopts the 2-step system GMM as the main estimator in the explanation.

Given the result in Table 7, it has proved that rural infrastructure can help in improving and providing better access of facilities for many households in the home countries especially to the poor. In other words, this result implies that the effect of remittances on income inequality reduction will occur, should rural infrastructure increase as remittances become a vital income sources. In relation to that, the negative effect of REM*RUINF bring huge relief and hope about the effect between remittances and income inequality. Therefore, H_{10} is accepted.

In respect to thresholds result, the results in Table 7 have demonstrated that the positive role of remittances can be absorbed if the rural infrastructure particularly in basic facilities has reached a minimum level of thresholds value of 6.00 percent in electricity facilities. Meanwhile, the threshold values of water and sanitation indicate higher values compared to the electricity. Above all, this results leads to the finding that in order to generate benefit from the development of remittances flow, developing countries must achieve the minimum threshold value of rural infrastructure, specifically at least 38.43 percent for water, 6.00 percent for electricity and 20.51 percent for sanitation. In summary, the results highlight that in order to ensure that income inequality can gain a negative impact from remittances, developing countries have to ensure they reached at least a certain turning point of minimum level of development in rural infrastructure. This is important as rural infrastructure is very close to the poor and has a great importance in benefiting and encouraging entrepreneurs by helping them to operate their business. Hence, development of rural infrastructure act as a vital component in encouraging rural economic growth, leading to a reduction in the income inequality.

Furthermore, the marginal effect of mean value of rural implies that 1 percent increase in remittances will contribute to decrease in income inequality by 2.91 percent for water, 0.15 percent for electricity and 2.41 percent for sanitation. This same negative sign also reaches the maximum value which implies that a 1 percent increase in remittances will decrease the level of income inequality by 4.19 percent in water, 0.19 percent in electricity and 3.86 percent in sanitation. Specifically, this brings clarification that higher level of remittances flow will contribute towards lowering income inequality, in the presence of rural infrastructure development. This is because, rural infrastructure such as water facilities act as a crucial factor for agricultural production of crops to remain fertile. Water facilities also affect or determines plant growth and output of agriculture product. Its availability, or scarcity, can determine the success or the failure of the agriculture sector. Due to that, sufficient water is important to help raise the agriculture output. In this case, access to rural facilities can help an entrepreneur mainly in agricultural communities in enhancing higher productivity. Therefore, through development of rural infrastructure, it will create inclusive and sustainable economic growth and foster social inclusion via more job opportunities to offer, thus lowering the income inequality.

Nevertheless, as can be seen at minimum level of rural infrastructure, the results imply a positive effect. It means that, when provision of rural infrastructure is low, income inequality

will increase. In sum, this study has found that the marginal effect of remittances on income inequality is negative when rural infrastructure mainly water, electricity and sanitation facilities, is at highest level. But, it is important to remember that if development of rural infrastructure is at lower level, it will cause an opposite effect. These results have added to the belief that remittances are a powerful tool, which has the potential to increase income as proven in Table 7.

Conclusion

Contrary to the initial hypothesis, the result reveals that remittances have insignificant effect on income inequality in developing countries. However, this study believes that this could be due to the fact that low level of remittances flows in developing countries and also poor utilization of the money among the poor. Alternatively, it is important to promote and enhance more remittances flows in developing countries. By doing so, it can offer and encourage more space to the poor, relatively will improve the income of poor families in their home country especially in low income developing countries as remittances increase the household incomes and subsequently, decrease income inequality. This study also finds that the presence of remittances will decrease income inequality by increasing entrepreneurship, rural development and infrastructure.

Theoretical Implications

Generally, it is accepted that remittances have been considered the crucial engine for income inequality alleviation. Even though the past studies investigating the effect of remittances on income inequality have emerged frequently in Sub-Saharan African countries, its contribution remains unclear in the rest of the world. In this context, this study could offer a new insight by presenting latest evidence on the link between remittances and income inequality especially in developing countries, as remittances might change due to the current globalization and economic conditions. Meanwhile, by presenting evidence that remittances become as potential vital sources of income give greatest impact on value-added contribution to the poor family economy, mainly by participating in productive investment such as entrepreneurship as well as supported by better rural development and infrastructure, poor people can make more funds available and produce higher aggregate savings. Thus, this study support and consistent with the theoretical approach of inverted U-shaped Kuznets curve (Kuznets, 1955; Shahbaz, 2010; Rose & Viju, 2014; Batabyal & Chowdhury, 2015).

Practical and Social Implications

As part of the strategies to uncover the true impact of remittances, this study also has highlighted the moderating role of entrepreneurship, rural development and infrastructure. Given the negative sign, this study believes that if government can formulate policy to guide the recipients of remittances to fully maximize not purely for daily one-off consumption, but also to generate long-term income mainly by enhancing entrepreneurship activities, rural development and infrastructure, income inequality is able to decrease. In this regard, government can provide supporting policies such as training and financial incentives by targeting the poor, alongside with direct improvement of the well-being of the poor in the home countries. An implementation of progressive effective approaches like focusing and facilitating on improving small-scale investment for small business and rural development is very important and it will be an eye-opener and may provide greater opportunities especially to the poor to involve in various income generating activities. As a result, it is important to promote sufficiently large scale of entrepreneurship, rural development and infrastructure, so that it can push towards better usage of remittances especially in generating long time income to the poor. Therefore,

this study serves to remind that remittances act as a powerful income inequality reduction tool, where it has the potential to increase both income and economic growth.

Limitations and Suggestions for Future Research

This study has encountered some potential limitations. This study emphasizes on the agriculture sector offers huge benefits to the poor in rural areas particularly by improving the income of poor families. However, the expansion and the growth of the agricultural sector will be generally exposed to some issues. For instance, some developing countries may face limitation in availability or insufficient land endowment. Some areas in Africa for example may be situated in deserts. Taking into account this issue, this study assumes that there are still other potential sectors that can contribute to rural economic development.

In terms of value-adding, there are a few of non-agriculture sector that have potential and need to be clarified and further investigated in future research. First, this study can be further extended by having a mining sector that potentially having an effect on economic development, employment and income of the poor. Second, future studies may expand this study by focusing and exploring on the role of culture and recreation sector as a potential sector which likely can play a vital role in promoting the highest contribution to the economy and well-being of the poor in rural areas. In doing so, it hopes that the future research can enrich the more potential sector that can provide more income to the poor.

Acknowledgement

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