Investigating the relationship between different type of entrepreneurial activities and income inequality using country level data

A quantitative study

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A quantitative analysis to determine the relationship between the Total Entrepreneurial Activities (TEA) and income inequality, as well as to investigate how the necessity/opportunity dichotomy affecting the nature of the relationship.

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Relationship between different entrepreneurial activities and income inequality

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ABSTRACT

BACKGROUND: The extent to which entrepreneurship can affect income inequality have become a recent topic of debates among policymakers and economist. Some believe entrepreneurship is a source of enhanced income mobility, while others believe it contributes to widen the income gap among different social class. In this study, I stand the argument that entrepreneurship has a positive relationship with income inequality. Moreover, referring to necessity/opportunity dichotomy, I explore further how a certain type of entrepreneurship can contribute to the variation of income inequality.

OBJECTIVE: Using GEM survey collection data of 72 countries, I aim to establish a statistical model that explain how entrepreneurship increases the income inequality across different countries. A regression model is run with Total Entrepreneurial Activity (TEA) as the key explanatory variable and Gini index as the dependent variable to represent income inequality. Then, the level of analysis if further extended by comparing necessity vs. opportunity entrepreneurship in regression model to collect evidences on which type of entrepreneurship is seen to be the strongest predictor to inequality.

METHOD: I conduct a quantitative analysis based on secondary data from the 2004-2016 GEM Survey collection and World Bank consisting 72 countries (mixing of developed and developing countries). Using OLS linear regression approach, I explore the relative contribution of total entrepreneurial activities to inequality and necessity/opportunity entrepreneurship to inequality. I have also tested a nonlinear regression fitting in comparison, to identify which model can best explain the relationship.

RESULTS: Panel data study suggests that total entrepreneurial activities across different countries show positive and significant relationship with income inequality. In addition, statistical model suggests necessity entrepreneurship is a bigger contributor as compared to opportunity entrepreneurship. The nonlinear testing demonstrates better regression model as compared to linear model based on R^2 change value but the difference is not substantial. Finally, an interaction effect analysis is run by introducing GDP per capita and entrepreneurial framework conditions as control variables, the data suggested only entrepreneurial framework conditions shows significant interaction effect with total entrepreneurial activity (TEA).

CONCLUSION: The results of this thesis strengthen the argument, in which entrepreneurial activities can result in wider income inequality, as hypothesized earlier by Lewellyn (2018). Also the result highlighted necessity entrepreneurship as the biggest contributor to inequality, whereas opportunity entrepreneurship is the least. Thus, policy advice should be more targeted to encourage opportunity entrepreneurship, and focusing on innovative process instead of duplication. Such context will occur when these two factors are considered: i) access to public monetary institutions, ii) crafting public policy to create an adequate environment to facilitate the introduction of innovations for entrepreneurs.

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1. INTRODUCTION

Background of the study

The constant rising income gap raises question as why the income and wealth of people at the top of the economic pecking order have grown a lot faster than the income and wealth of those in the middle or at the bottom. In 2016, the share of total national income accounted by just nation's top 10% earners was 37% in Europe, 41% in China, 46% in Russia, 47% US-Canada and around 55% in sub-Saharan Africa, Brazil and India (Alvaredo et al., 2018). At most times, notion of income inequality is often associated with developing countries where poverty, corruption and political unrest are rife, leading to unfair distribution of resources to its people. However, the trend is changing, even a developed country has now experienced inequality phenomena. Keeley (2015) wrote an exclusive report on inequality trend among OECD countries and discovered United States, between 1975 and 2012 around 47% of total growth in pre-tax incomes went to the top 1%. The share was also high in a number of other (mostly) English-speaking countries: 37% in Canada and over 20% in Australia and the United Kingdom. But, in some countries the variations in inequality is particularly low like in Denmark, Norway, the Slovak Republic and Slovenia. Today, the rapid pace of technological progress and globalization is drawing concerns that it may cause income inequality to unravel even faster in many countries. If the problem persists, the prolonged effect of income gap between different class in a society will pose a risk factor that can lead to phenomena of group polarization and likewise worsen into social and economic crisis. The importance of entrepreneurship is therefore seen to be potential solution to combat inequality, as entrepreneurial activity contributes to the economy through job creation; it also offers a way for individuals to contribute to individual and social welfare, as well as to the global economy (Chowdury, Desai & Audretsch, 2018). In developing countries for instance, an

individual choose to be an entrepreneur due to lack of job opportunities, it is seen as the most expedient way for low-income individuals to support themselves. Such type of entrepreneurship is called necessity-driven and it is arguably more likely lead to high level wealth inequality, as they are seen to lack of resources and information required to take advantage of opportunities essential for such activity. Whereas opportunity entrepreneurship, value creative thinking and innovativeness, thus according to Schumpeterian vision, contributes to increase in economic growth (Lippman, Davis, & Aldrich, 2005). In spite of that, recent literatures in the past five years (Ragoubi & El-Harbi, 2018; Lewellyn, 2018; Atems & Shand, 2017; Halvarsson, Korpi, & Wennberg, 2018) have mentioned among several factors to be blamed in rising income inequality, entrepreneurship is one of them. There have been studies in a specific country where entrepreneurial activities is found to contribute to positive relationship with inequality. Unites Stated for example have experienced consistent rising in inequality over the last four decades, partly due to increasing entrepreneurship rate in the country (Atems & Shand, 2017). A considerable leap in income inequality between entrepreneurs and average-paid employment is also observed in recent years in Sweden (Halvarsson, Korpi, & Wennberg, 2018). The positive relationship between entrepreneurial activities and inequality continued to pose disturbing message for institutions and raise the question if policy should be made to encourage entrepreneurship, or dissuade from it. Whether there is a relationship between entrepreneurship and inequality observed in multiple countries, or whether this correlation is merely an empirical coincidence, it needs to be tested using the most recent survey collection to reflect today's economic situation. In addition, exploring further the nature of the relationship arises from different entrepreneurial activities between opportunity and necessity towards inequality would provide different dimension on how we see entrepreneurship effect plays a role in economic growth of a country.

Statement of the problem

Many authors (Ragoubi & El-Harbi, 2018; Lippmann, Davis, & Aldrich, 2005; Xavier-Oliveira, Laplume, & Pathak 2015) agreed that income inequality is a great contributor to increasing entrepreneurial activities. A possible explanation is that high income inequality suggests a greater population in lower level of economy ladder, and therefore necessity entrepreneurship become the preferred choice to make a living. At the same time, those segment in the upper level with accumulation of wealth will invest in entrepreneurial ventures, thus increasing the rate of entrepreneurial driven by market opportunities (Lippmann, Davis, and Aldrich, 2005). However, recent study by Lewellyn (2018) has revealed the reverse relationship. High-growth and/or necessity entrepreneurial activity, when occurring in a given context with particular institutional complementarities is not sufficient to prevent income inequality; rather in some cases, it is helping to drive the widening income gap between different societal actors (Lewellyn, 2018). However the assumption lack of statistical model to verify Lewellyn's hypothesis, and for this reason, a clear regression model is needed to illustrate the relationship confirming how entrepreneurial activities can contribute to inequality. The model stands to challenge that inequality is not the predictor, rather it could be result of total entrepreneurial activities.

Furthermore, a particular attention must be addressed to justify how the necessity/opportunity dichotomy can result in different economic rewards and its consequences to inequality. This type of analysis can be made possible using GEM surveys data which starting in 2001 has further extended collection on different type of entrepreneurial motivations, including necessity and opportunity entrepreneurship. Exploring this issue helps to determine policy measures aimed to effectively nurture the type of entrepreneurship that tackle inequality, not the opposite.

Objective of the study

A particular challenge has been to explain quantitively how entrepreneurship, which in this case is represented by the variable of total entrepreneurial activities (TEA) from GEM database, may result in inequality in country level. Hence, I address the challenge to produce a statistical model result using survey collection data from GEM in 72 countries from year 2004 – 2016 to substantiate the claim that entrepreneurship contributes positively to inequality. I will also investigate how the difference in necessity and opportunity entrepreneurship (or so called necessity/opportunity dichotomy) may give rise to the variation of income inequality. Accordingly, I have built the following research questions as the response:

- Using GEM surveys data from 2004-2016, is there a significant evident to postulate the total entrepreneurial activities (TEA) contribute to increasing income inequality?
- To what extent does the necessity/opportunity dichotomy affect the nature of relationship between entrepreneurship and income inequality?

Apart from that, I will also test two control variables which are believed to affect the relationship between entrepreneurship and inequality:

- GDP per capita (in current $US).
- Entrepreneurial framework conditions

This thesis makes a contribution along several dimensions: First, it uses large panel data set across both developed and developing countries while existing papers largely address within-country experience for the specific country being studied. Second, it provides a new statistical model explaining how entrepreneurship drives inequality, as well as it tries to identify the separate effects of different motivation behind entrepreneurship: necessity and opportunity entrepreneurship. Whereas existing literatures thus far has focused primarily on relationship between entrepreneurial activities and economic growth but limited attention on

the motivation to why an individual decides to be an entrepreneur. The outcome of this thesis is expected to generate a message implying that not all kind of entrepreneurship will necessarily contribute in building a positive economic growth. As a consequence, the result may be useful to fine-tune innovation policies in a country, or to introduce a regulation to balance entrepreneurial activities in a sense that it will not carry a great amount of inherent economic risk for an individual or community.

2. LITERATURE REVIEW

In this section, I review the literatures on the concept of entrepreneurship, explanation of entrepreneurship as the possible factor that drives inequality and the implication of GDP per capita and entrepreneurial framework conditions with regards to entrepreneurial activities.

2.1 The concept of entrepreneurship

Hoselitz (1952) has long pointed out that the role of human resources is significant in the process of economic development, especially in underdeveloped areas. In contrary to what most scientists speculated in his era, he postulated that a new productive enterprise can be started with relatively little capital. Economic development, if it is to penetrate widely and deeply into the customary productive processes of a society, does not consist necessarily involve the most modern, large-scale equipment, but rather in the establishment of many decentralized plants, making use wherever possible of traditional manual skills and producing objects or services which are easily integrable into the native patterns of economic activities (Hoselitz, 1952). The customary productive process is what we see today as entrepreneurship in the form of small and medium-sized enterprises (SMEs). Although their sizes are small their presence are significant as they pave the road towards economic progress, and makes a huge contribution towards the quality and future hopes of a sector, economy or even a country. Most importantly, entrepreneurs keep the wheel of economic renewal spinning through innovation. Schumpeter (2002) defined entrepreneurship activity entails innovation in the introduction of a new product, organization or process, hence generating a destruction process. The innovator creates new industries and for this reason he causes relevant structural changes in the economy. Thus, entrepreneurs are considered to be the focal agents of change, perform entrepreneurial behaviour, and adapt their activities and strategies in response to threats and opportunities created by prevailing formal and informal institutions (Soriano &

Huarng, 2013). Empirical study by Van Praag & Versloot (2007) acknowledged two main economic benefits of entrepreneurship: employment generations and innovations. Entrepreneurial firms grow, proportionately, faster than other firms and thus create more jobs. The evidence suggests rather convincingly that there is a positive long-term effect of more entrepreneurial activity on labour demand, also by non-entrepreneurial firms. From aggregated study analysis at regional level, Fritsch (2008) argued entrepreneurial activity creates healthy competition as start-ups, or market entries lead to new business development, whereas incumbent firms might be forced to dissolve by the increased competition of the new firms. More indirectly, the new businesses and the removal of older, perhaps less efficient businesses, might lead to improved competitiveness and economic growth. The challenge remains on how to create climate to a healthy entrepreneurship? The one which makes possible objectively the exercise of independent individual enterprises, whilst, on the maturation and development of personalities whose dominant orientation is in the direction of productivity, working and creative integration (Nnadi, 2014). There exists three types of entrepreneurs based on Baumol (1990): productive, unproductive and destructive. The rules of the game (or the reward structure in the economy) that specify the relative payoffs to different entrepreneurial activities play a key role in determining whether entrepreneurship will be allocated in productive or unproductive directions. The evidence can be found in many extensive historical illustrations, for instance, persons of honorable status can access the money poured from booty, indemnities, provincial taxes, loans and miscellaneous extractions in quantities without precedent in Graeco-Roman history (Baumol, 1990). Still today, the same unproductive entrepreneurship can be found in rent-seeking entrepreneurship in variety of forms such as litigation and takeovers, as well as corporate lawsuit to prevent competition in the market. Meanwhile in Japan, Baumol (1990) explained such legal lawsuits happened fewer due to cultural aversion to litigiousness and the arrangements. The lesson

learned is that rule of the games must be changed in order to redirect the flow of entrepreneurial activity toward more productive entrepreneurs. For this reason, it is important to monitor the progress of entrepreneurial activity to make sure it contributes to economy's productivity growth and not the opposite. World Bank and GEM are among two organization which collected survey on entrepreneurship in different countries. According to Acs, Desai & Klapper (2008), both sources of data are reliable indicators for an empirical analysis in entrepreneurship study, depending on the objective of research, GEM data may represent the potential supply of entrepreneurs, whereas the World Bank data may represent the actual rate of entrepreneurship.

2.2 Entrepreneurship as the possible driver of income inequality

Schumpeter's approach of linking economic growth with entrepreneurship by means of creative destruction revolutionize the way how an individual innovations are sufficiently important to affect an entire economic structure, and therefore to some extent, researches in entrepreneurship literatures are mostly dominated with the topic on relationship between entrepreneurship and economic growth. Specifically to this date, researchers are interested to investigate the connection on how entrepreneurial activities could affect inequality, simply because inequality may reflect lack of economic opportunity, thereby limiting potential of economic growth. Data from Atems and Shand (2017) discovered strong positive relationship between the two and suggested that policies aimed at encouraging entrepreneurship will not only increase inequality, but may be detrimental to growth. Empirical result from 48 developing countries study by Dvouletý, Gordievskaya & Procházka (2018) showed negative influence of entrepreneurship on country's GDP and GNI in developing countries, but failed to prove any impact of entrepreneurship on HDI (Human Development Index). The authors argued that large number of replicative entrepreneurs (that do not significantly contribute to

the country's economic growth) can be found in developing countries, and thus the overall effect cannot be positive. On the other hand, Galindo & Picazo (2013) collected samples from 10 developed countries during the period 2001-2009. Among several hypothesis tested, the findings suggested all kind of activity that encourage innovation process would also encourage economic growth. At the same time, the result showed entrepreneurship has a positive effect on innovations. It is worth noting that both study by Dvouletý, Gordievskaya & Procházka (2018) and Galindo & Picazo (2013) produced two contradictory outcome resulted from two different kind of entrepreneurship: one is replicative entrepreneur, in which vast majority can be found today, starting a business with existing concept because the goal is mainly to 'make a living'. The second is called opportunity-driven entrepreneur, the one focuses on innovation process to make a creations that differ than others, hence creating a new market power for their products. Necessity entrepreneurship as observed by Lippmann, Davis, and Aldrich (2005) occur in high level of income inequality countries because such countries constitute larger proportions of low-levels of education and few connections to source of power, thus necessity entrepreneurship might be the most readily available option for earning a living. Unfortunately, the necessity entrepreneurship does not boost firms productivity and economies, instead they impose risk to widen inequality gap presumably because it increases the proportion of those in lower end of the spectrum through the reduction in incomes of those who leave paid employment to pursue entrepreneurial ventures (Lewellyn, 2018). This is relevant to what Hamilton (2000) has reported earlier that most entrepreneurs enter and persist in business despite the fact that they have both lower initial earnings and lower earnings growth than those engaged in paid employment, implying a median earnings differential of 35 percent for individuals in business for 10 years. On the other hand, opportunity entrepreneurship are mostly initiated by people who have access to financial capital to support their highly technological solution to a problem, and since their

attempts involved high reward/high risk ventures, they reap significant returns over their investments, thereby facilitate social mobility upwards.

2.3 Implication of GDP and entrepreneurial framework conditions

Economic development level of a country is seen to be a catalyst in generating productive entrepreneurship. Arguably because countries with better economic level have better alternatives on how to make a living and this would suggest that many entrepreneurs willingly make this career choice. This view is supported by authors (Hartog et al., 2010; Plehn-Dujowich, 2012) claiming GDP establish positive effect with entrepreneurship, in other word entrepreneurship and growth (GDP) have a dynamic relationship in which one generates the other. Therefore, it is very important to take into account the role of GDP per capita as a control variable since the dynamic of economic prosperity in a country influences an individual to become an entrepreneur as a career's choice.

There are yet other underlying causes that stimulate entrepreneurial activities, for example how government can provide entrepreneurial framework conditions that suit the condition to encourage people to be entrepreneurs. These can be in the form of providing access for financial resources such as grants and subsidies, and also crafting public policy to create an adequate environment, or 'social climate'. According to Galindo & Mendez-Picazo (2013), both play an important role in the process because financial institutions make it possible for entrepreneurships to obtain the necessary financial resources, while society must support their efforts to carry out their activity. Example to fit this situation is in Sweden, where government implemented high tax burden for welfare purpose, estimated an average worker pays 62-65% of their labour compensation in taxes. As a result, an individual has very little personal savings and thus, less likely to have the requisite equity to start a company, or willingly gives up tenured position for self-employment (Henrekson, 2005). This is part of

the explanation why there appears to be relatively little entrepreneurship in Sweden. Besides, high general tax rate will only favour the large incumbent firms in a way that it acts as barrier to entry for initially small firms with growth ambitions. Although Schumpeter is not sufficiently clear in designing the variables that affect such a "social climate." In general terms, they would include the democracy level and, especially, income distribution. Based on this assumption, it is then necessary to include the entrepreneurial framework conditions due to its direct impact on the number of entrepreneurial activities growth in a country.

2.4 Formulation of hypotheses

Although many past literatures confirmed the findings that high inequality resulting people to engage in entrepreneurial activities, it is however considered likely that the reverse relationship is observed in some countries. To validate this assumption, I refer to Lewellyn (2018) who has successfully established a configurational model explaining how entrepreneurial activities embedded in different institutions can result in inequality. However until today there is little known statistical model that prove this hypothesis. Particularly in developing countries where people involuntarily choose to be entrepreneur through informal sectors due to lack of job opportunities, or simply to survive in daily basis, entrepreneurial activities is seen to yield even greater inequality. In developed countries, even though better economic situation bring better career opportunities, people who become entrepreneurs by choice makes very little earning compared to average paid worker's wages, thus contributing to inequality in developed countries.

Hypothesis 1: Total entrepreneurial activities (TEA) has positive relationship with income inequality

With regards to entrepreneurial intentions, there are two types of entrepreneurs exist: one with necessity motive and the other one with opportunity motive. The GEM survey made a clear distinction between opportunity and necessity entrepreneurship by asking people whether they start and grow their business to take advantage of a unique business opportunity or was it the best option available (Reynolds et.al., 2001). Lippman and Aldrich (2005) discovered necessity entrepreneurship is linked to higher inequality. Unemployment push or the refugee effect is what triggered someone to be an entrepreneur in this context (Thurik et al., 2008), the probability for venture to generate a unique or added value to a product is therefore small and insignificant towards economic growth. Whereas opportunity entrepreneurship, fits the description to what Schumpeter refer as agents for 'creative destruction', that many scholars implicitly assumed to have a potential to reduce inequality.

Hypothesis 2a: Entrepreneurs with necessity motive increase inequality

Hypothesis 2b: Entrepreneurs with opportunity motive reduce inequality

At the same time, economic growth plays important part in innovation process. From Schumpeter's point of view (2002), entrepreneurs make decisions to innovate based on expectation to obtain a profit. This entails a circular process, because as innovations bring an improvement in the product, giving entrepreneur a better position in the market and makes profit. Higher profits would stimulate entrepreneur to introduce new innovations, increase the firm's activity, and thus having positive effects on economic growth and employment (Nissan, Galindo, & Mendez, 2011). Accordingly, economic growth, or in this case GDP per capita in a country to some extent is an external factor within the relationship between entrepreneurial activities and inequality.

Furthermore, Schumpeter (2002) also proposed two factors that influence decisions of people to be an entrepreneur: the financial access and social climate. The role of financial institutions is arguably important because it helps to finance entrepreneurs to develop their activity, including innovations, if savings are scarce in the economy. Whereas social climate refers to social support that entrepreneurs can gain from institutions, for instance how institutions facilitate entrepreneurs.

Hypothesis 3a: There is interaction effect between GDP per capita and entrepreneurial activities that affect the inequality
Hypothesis 3b: There is interaction effect between entrepreneurial framework conditions and entrepreneurial activities that affect the inequality

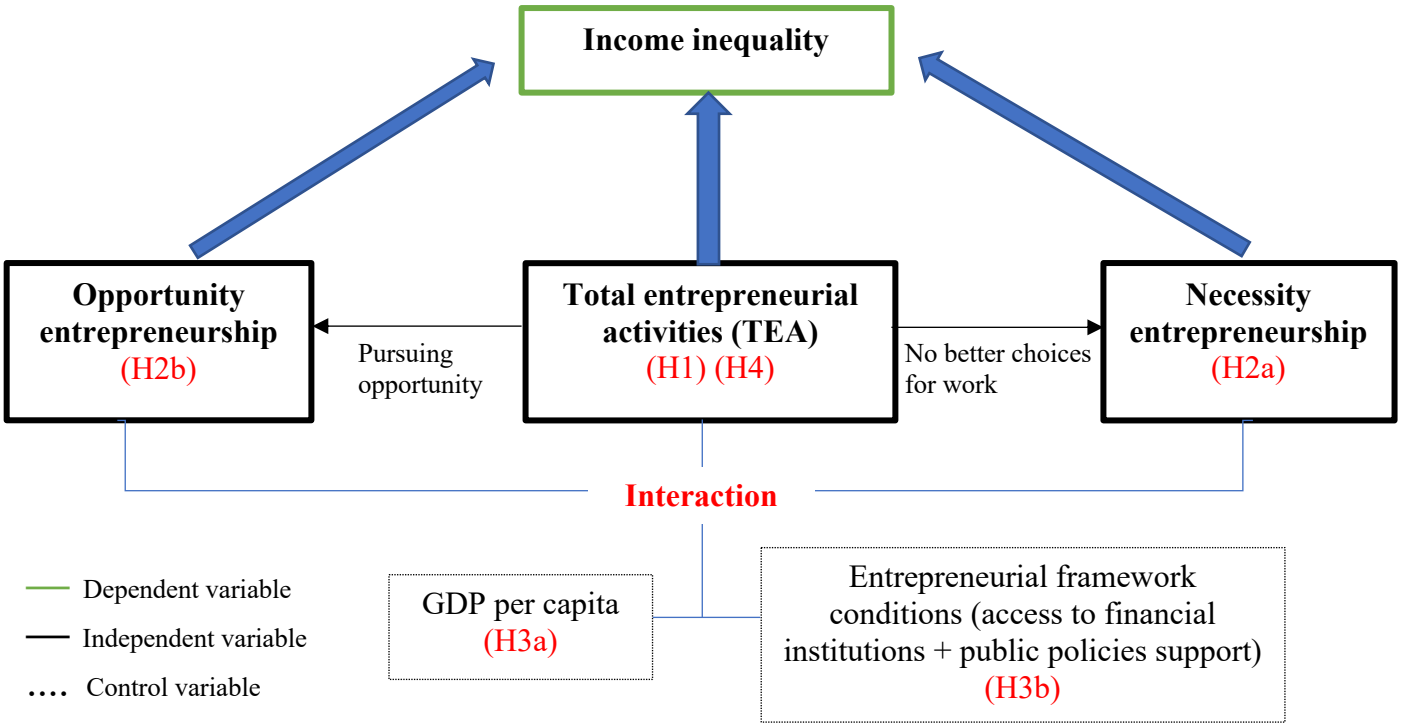
Kuznets stated the relationship between inequality and economic growth can be expressed in inverted U-shaped curve. Kuznets (1955) hypothesized that in early development of economy, investment opportunities only be available for those who already hold the wealth, however as the center of economy shifts, this migration results in increase of income increase per capita and effective decrease economic inequality. The shifting is associated with industrialization, such as democratization and the development of welfare state (Moffatt, 2019). An empirical analysis by Galor & Tsiddon (1996) shows consistency with Kuznets hypothesis, implying as the investment in human capital of the upper segments of society increases and income inequality widens, the accumulated knowledge trickle-down to the lower segments of society via a *technological progress* in production and thus investment in human capital becomes more beneficial to members of all segments of society. The technological progress in this context reflects the discovery of the new and improved methods of producing goods that diffuses in entrepreneurial economy environment. This

view is also backed by Audretsch & Thurik (2001) stated that entrepreneurship model has shifted from a regime what was once a 'managed' economy dictated by large-scale production and unskilled labour as source of competitive advantages to the 'entrepreneurial' economy, which value entrepreneurship capital, or the capacity to engage in and generate entrepreneurial activity. This type of decentralized and fluid environment promotes the diffusion of intangible technological capabilities, generating a high propensity for economic agents to start new firms, which eventually will benefit economic development as a whole. Accordingly, this demonstrates a possible interplay between entrepreneurship and inequality that may follow the trend of Kuznets curve over the course of economic development.

Hypothesis 4: There is a curvilinear relationship observed between entrepreneurial activities and inequality, following Kuznets curve theory on economic development.

2.5 Model of study

Figure 2.1 – Model for the study based on own interpretation.



3. METHODOLOGY

3.1 General review of methodological approach

This study will be based on pooled panel data research design of multiple variables gathered in a specific period of time. All data are secondary data collected by two different organizations. In my case, I am using Gini index as the measure of inequality from World Bank database and Total Entrepreneurial Activity (TEA) from GEM database taken from the year period 2004 – 2016 as my variable of interest. Using regression analysis from SPSS software, I determine to ascertain a pattern on how the entrepreneurial activity has influenced income inequality over period of time. In addition, I have also conducted cross-sectional analysis on impact of different entrepreneurial activities, as well as control variables with regards to income inequality. This thesis will be divided into three main parts of analysis:

i) OLS linear regression line analysis

ii) Cross-sectional analysis to identify interaction effects

iii) Fitting of nonlinear regression model

All of the analysis are quantitative analysis run in SPSS statistic software version 25. Set of preliminary analysis are conducted beforehand to meet the requirements of statistical algorithm in order for the results to be valid for scientific interpretation. In addition, null hypothesis and research proposal have been developed prior to running each analysis, this way objectiveness is well maintained and reduces the risk of biased results.

Although this type analysis can provide information of how the variable of interest is changing overtime, bear in mind there are limitations applies to the results, one of them is the time sensitive study. This pooled panel data analysis result applies in very restricted circumstances of a country (e.g. economical & political stability, policy change, population number etc.) during the year period when the data was collected (in this case 2004 – 2016),

thus the interpretation result may not be suitable or relevant to be used far outside those years. In most cases, repeated panel data study such as this one should be used to confirm and contextualize the results of more targeted longitudinal studies.

3.2 Data and preliminary analysis

There are total 72 countries in this study and the samples cover annual data taken from 2004 – 2016. For panel data analysis, all the input from GEM and Gini index from World Bank must first be transformed to long format. For plotting and interpretation purpose, these countries are grouped into two categories: developed countries (33) and developing countries (39). I followed the World Bank Group (2017) classification of countries (Appendix A). I referred developed countries as high-income countries (HIC) and developing countries as middle- and low income countries (MLIC).

3.2.1 Variables and data description

Dependent variable

In this study, Gini index is used as the dependent variable, or the outcome in which we are interested to measure. Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution (World Bank, 2019). It is derived from Lorenz curve which measures the percentage of total income earned by cumulative percentage of population (De Maio, 2007). The coefficient has long been used to represent income inequality of a country in most economic studies, 100 represents complete inequality and 0 represents complete equality.

Key explanatory variables

The key explanatory variable, or simply an independent variable is predictor that is used to explain variability in dependent variable result. There are three key explanatory variables used:

i. Total Early-Stage Entrepreneurial Activity (TEA). By definition TEA measures the percentage of 18-64 years old population who are either a nascent entrepreneur or owner-manager of a new business (GEM, 2019).

ii. Opportunity entrepreneurship. Collected by GEM since 2001, the opportunity entrepreneurship represents opportunity-driven early-stage entrepreneur. Respondents in this category indicates themselves as individual who is starting and growing his business to take advantage of a unique market opportunity.

iii. Necessity entrepreneurship. Collected by GEM since 2001, the necessity entrepreneurship represents necessity-driven early-stage entrepreneur. Respondents in this category indicates themselves as individual who is starting and growing his business because it was the best option available.

Control variables

Control variables are used to test if there are additional factors that may influence the relationship between independent and dependent variables, and we assume control variables are always constant. There are two control variables used in this study:

i. GDP per capita of a country.

   The GDP is used as control variable to consider the effect that different level of economic development in a country can result in different entrepreneurial intent of an individual to start a venture.

ii. Entrepreneurial framework conditions. This variable reflects how well the support at national context available when individual start businesses. It is computed from the sum of two different variables originally collected by GEM National Expert Survey by means of questionnaires in different countries:

   a. Financing for entrepreneurs – GEM has collected this data to measure the availability of financial resources, equity and debt, for small and medium enterprises (SMEs) (including grants and subsidies). I use this variable in the analysis to represent monetary institution as what Schumpeter has described as the first factor to facilitate entrepreneurial activity.

   b. Governmental support and policies – GEM has collected this data as an to measure the extent to which public policies support entrepreneurship where entrepreneurship is considered as a relevant economic issue. GEM refers this as an indicator of government policy and it is composed of 2 components: a) Entrepreneurship as a relevant economic issue and b) Taxes or regulations are either size-neutral or encourage new and SMEs. I used this variable in the analysis to represent adequate environment, or 'social climate' as what Schumpeter has described as the second factor to stimulate entrepreneurships.

   Thus, entrepreneurial framework conditions = financing for entrepreneurs + governmental support and policies

3.2.2 Recomputation to generate dummy variables

One of the prerequisite to run univariate analysis to determine any interaction effects is to divide independent variables/ predictors into groups. The idea is to use general linear model univariate procedure is to test the null hypotheses about the effects of other variables by

looking at the *means* of various groupings of a single dependent variable. Therefore, I have made dummy variables that take the value of 1,2,3.

Table 3.1– Dummy variables to sub-divide variables in different values.

Original variable	Dummy variable	Definition	Value
TEA	TEA_Cat	A variable to explain different group categories for entrepreneurial activities (TEA)	Cat 1 = Low level (0-9.99) Cat 2 = Moderate level (10-19.99) Cat 3 = High level (>20)
TEA_Nec	TEA_Nec_Cat	A variable to explain different group categories for necessity entrepreneurship	Cat 1 = Low level (0-1.99) Cat 2 = Moderate level (1.99-5.99) Cat 3 = High level (>6)
TEA_Opp	TEA_Opp_Cat	A variable to explain different group categories for opportunity entrepreneurship	Cat 1 = Low level (0-9.99) Cat 2 = Moderate level (10-19.99) Cat 3 = High level (>20)
GDP	GDP_Cat	A variable to explain different group categories for GDP (in current $US) in different countries	Cat 1 = Low level ($0-19,999) Cat 2 = Moderate level ($20,000-39,999) Cat 3 = High level (>$40,000)
Entrepreneurial framework conditions	Entrepreneurial Framework conditions_Cat	A variable to explain different group categories for entrepreneurial framework conditions in different countries	Cat 1 = Low level (0-3.99) Cat 2 = Moderate level (4-5.99) Cat 3 = High level (>6)

3.2.3 Descriptive statistics

I presented the descriptive statistics below in Table 3.2. There are total 72 countries data in total, however some countries appear to have missing variable values due to absence of data. Based on the descriptive statistic, the mean for Gini index is 35.73 and mean for TEA is 10.29. The opportunity entrepreneurship is seen to have higher mean compared to necessity entrepreneurship.

Table 3.2 – Definition and descriptive statistics of the variables

Variables	*Definition*	*N*	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Gini Index	Gini index of income inequality	674	23.70	60.50	35.73	7.81
Total early-stage entrepreneurial activity (TEA)	Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business	531	1.48	40.27	10.29	6.66
Necessity entrepreneurship	Percentage of 18-64 population - Those who are pushed to entrepreneurship out of necessity or those who sought only to maintain their income.	426	.15	14.90	2.67	2.47
Opportunity entrepreneurship	Percentage of 18-64 population - Those who are pulled to entrepreneurship by opportunity and because they desire independence or to increase their income	426	1.11	31.62	7.37	4.79
GDP (in current US$)	Gross domestic per capita in current US$	947	135.76	119225.38	20212.35	22827.47
Entrepreneurial framework conditions	The availability of financial resources—equity and debt—for small and medium enterprises (SMEs) and the extent to which public policies support entrepreneurship.	482	3.18	7.62	5.12	.82

3.2.4 Correlations

To assess the relationship between each variables, I have conducted correlation analysis. Correlation coefficient is useful to reveal the strength between paired variables. It differs from regression because it cannot be used to predict form of linear relationship between variables. However, understanding correlation help to gauge how the inequality behaves relative to external factors. Correlation coefficient ranges from -1 (perfect negative correlation) to +1 (perfect positive correlation). Based on the Table 3.3, the variables TEA, opportunity & necessity entrepreneurship reveal strong positive correlation with Gini index, which translates all the three variables move in the same direction as inequality. Conversely, GDP and entrepreneurial framework condition show negative correlation with Gini index.

Table 3.3 – Pearson correlation matrix

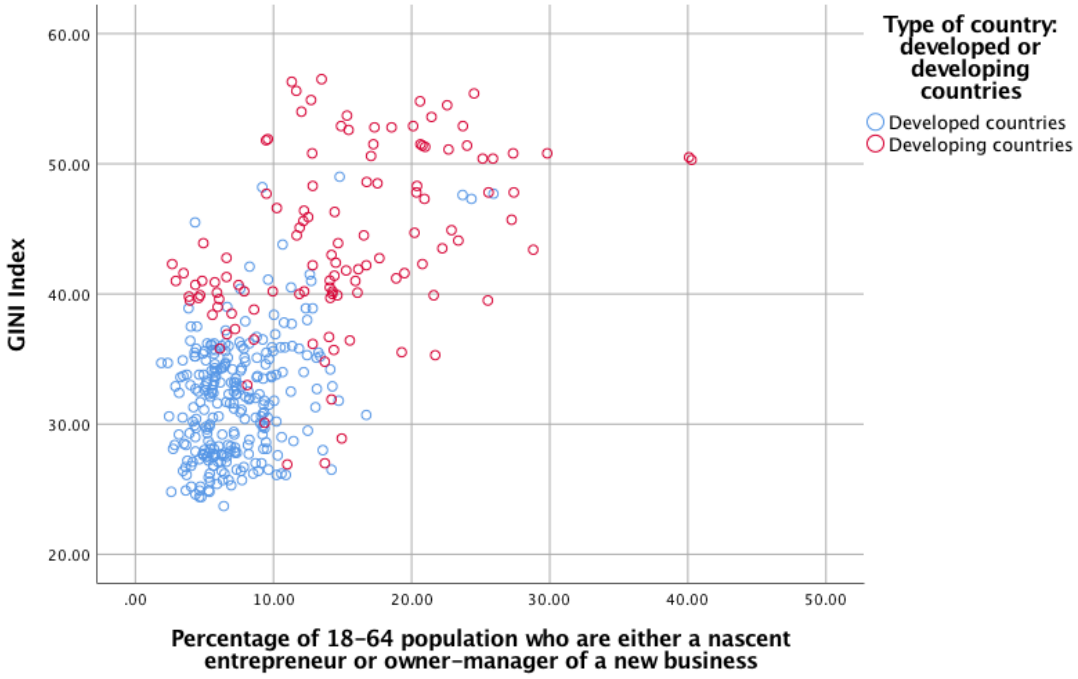
	Gini index	Total entrepreneurial activity (TEA)	Necessity motive entrepreneur	Opportunity motive entrepreneur	GDP (in current US$)	Entrepreneurial framework conditions
Gini index	1	.651**	.702**	.544**	-.442**	-.364**
Total entrepreneurial activity (TEA)	.651**	1	.866**	.961**	-.436**	-.251**
Necessity motive entrepreneur	.702**	.866**	1	.745**	-.605**	-.413**
Opportunity motive entrepreneur	.544**	.961**	.745**	1	-.367**	-.185**
GDP (in current US$)	-.442**	-.436**	-.605**	-.367**	1	.417**
Entrepreneurial framework conditions	-.364**	-.251**	-.413**	-.185**	.417**	1

**. Correlation is significant at the 0.01 level (2-tailed).

3.2.5 Scatter plot

Scatter plot is useful to give indication if there is a relationship between two variables before further analysis on the regression is conducted. Here, there is a tendency to form a positive relationship trend between TEA and inequality which implies that inequality increases as entrepreneurial activity increases. However, further analysis on ANOVA model is still required for more precise best fit line prediction rather than relying on scatterplot alone.

Figure.3.1 – Scatterplot TEA vs. Inequality



3.3 Empirical analysis

3.3.1 OLS Linear regression line

The Ordinary Least Squares regression line is the simplest form to estimate α and β in a regression equation. This type of regression help to investigate bivariate and multivariate relationship, where we can hypothesize one variable depends on another variable or a combination of other variable (Cottrell, 2003). The components of OLS linear regression are as below:

- X as explanatory variable and Y as dependent variable
- Constant, or intercept term: alpha
- Regression coefficient, slope: beta
- Error term, residuals: epsilon

A simple linear equation is when a single predictor variable X is used to model the response variable Y, thus the equation can be expressed as,

$$y = \alpha + \beta * x + \varepsilon$$

It is possible to add two or more predictors to model one response, this is called multiple linear regression models. A multiple linear regression model with *k* predictor variable X_1, X_2, ..., X_k and a response Y, can be written as,

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_k x_k + \varepsilon_i$$

In this case, I am using OLS linear regression method to investigate analysis between different entrepreneurial activities and income inequality. Then, I continued by using multiple linear equation to explore further any structural relationship that may exist among my independent variables and additional control variables.

3.3.2 Univariate analysis to identify interaction effects

The cross-sectional data analysis to identify interaction effect is performed by using univariate method. From there, the interaction effect estimates are obtained by cross-checking main effects of different variables. The mathematical model behind multiple linear regression model and univariate regression model are closely related, they both use several explanatory variables to measure one response (dependent variable). It differs with multivariate analysis which use more than one dependent variable to establish a model. The benefit to use univariate analysis method than a the conventional linear regression function in SPSS is the flexibility of choosing a parameter estimates and type of output from SPSS software. Ideally, to estimate interaction effect it is recommended to use univariate option because it produces interaction profile plots that are are useful for comparing marginal means and makes it easier to visualize any interaction effect.

3.3.3 Non-linear regression model fitting

Nonlinear regression is an iterative procedure. The whole point of nonlinear regression is to fit a model to the data, to find parameter values that minimize the sum of the squared distances to the points from the curve (Motulsky & Christopoulos, 2004). There are two ways

to test nonlinear relationship of between two variables, one is through incremental predictive capacity by including nonlinear term in regression equation, and the second alternative is to run curve fit estimation. I chose the first method, which is by introducing nonlinear term, in this case I square all the independent variables in order to get R^2 change value. The R^2 change value will provide information whether the nonlinear model is a better regression model than linear model or the opposite. In a quadratic nonlinear function, the relationship between X and Y variable can be expressed as follows,

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + \varepsilon$$

Where,

y	= predicted Y value
β_0	= constant or the intercept
β_1, β_2	= variable X regression coefficient
x	= independent variable
ε	= residual

3.3.4 Empirical analysis overview

As can be seen in table 3.4, most of my analyses are aimed to only model one dependent variable, which is income inequality. Various methods are run one after the other to signify the findings on the relationship between TEA and inequality.

Table 3.4 – Regression analysis overview

Hypothesis	Analysis method	Dependent variable	Independent variables	Control variables
H1a, H2a, H2b	OLS multiple linear regression, bivariate correlation	Gini index	TEA, necessity entrepreneurship, opportunity entrepreneurship	GDP per capita, entrepreneurial framework conditions
H3a, H3b	Cross-sectional data analysis using univariate factor ANOVA	Gini index	TEA, necessity entrepreneurship, opportunity entrepreneurship GDP per capita, entrepreneurial framework conditions	
H4	Nonlinear regression method	Gini index	TEA, necessity entrepreneurship, opportunity entrepreneurship	GDP per capita, entrepreneurial framework conditions

4. STATISTICAL RESULTS

4.1 OLS linear regression model with assumption testing

Table 4.1a– Bivariate OLS to examine any multicollinearity effect between different variables.

	Gini index	Total entrepreneurial activity (TEA)	Necessity motive entrepreneur	Opportunity motive entrepreneur	GDP (in current US$)	Entrepreneurial framework conditions
Gini index	1	.651**	.702**	.544**	-.442**	-.364**
Total entrepreneurial activity (TEA)	.651**	1	.866**	.961**	-.436**	-.251**
Necessity motive entrepreneur	.702**	.866**	1	.745**	-.605**	-.413**
Opportunity motive entrepreneur	.544**	.961**	.745**	1	-.367**	-.185**
GDP (in current US$)	-.442**	-.436**	-.605**	-.367**	1	.417**
Entrepreneurial framework conditions	-.364**	-.251**	-.413**	-.185**	.417**	1

**Correlation is significant at the 0.01 level

Table 4.1b – Multiple linear regression to assess relationship between TEA, control variables and income inequality

R	.745[a]**	
R^2	.554	
Adjusted R^2	.550	
Standardized Coefficients Beta	TEA	.532**
	GDP per capita	-.281**
	Entrepreneurial framework conditions	-.083*
Collinearity statistics VIF	TEA	1.283
	GDP per capita	1.492
	Entrepreneurial framework conditions	1.283

a. Dependent variable: Gini index.

Predictors : (Constant), TEA, GDP per capita & Entrepreneurial framework conditions
**Correlation is significant at the 0.01 level
*Correlation is significant at the 0.05 level

Table 4.1c – Multiple linear regression to assess relationship between necessity entrepreneurship, control variables and income inequality.

R	.754[a]**	
R^2	.569	
Adjusted R^2	.564	
Standardized Coefficients Beta	Necessity entrepreneurship	.612**
	GDP per capita	-.3.189**
	Entrepreneurial framework conditions	-.852
Collinearity statistics VIF	Necessity entrepreneurship	1.744
	GDP per capita	1.855
	Entrepreneurial framework conditions	1.407

a. Dependent variable: Gini index.

Predictors : (Constant), Necessity entrepreneurship, GDP per capita & Entrepreneurial framework conditions
**Correlation is significant at the 0.01 level

Table 4.1d – Multiple linear regression to assess relationship between opportunity entrepreneurship, control variables and income inequality

R	.724[a]**	
R^2	.523	
Adjusted R^2	.518	
Standardized Coefficients Beta	Opportunity entrepreneurship	.449**
	GDP per capita	-.357**
	Entrepreneurial framework conditions	-.126**
Collinearity statistics VIF	Opportunity entrepreneurship	1.137
	GDP per capita	1.455
	Entrepreneurial framework conditions	1.341

a. Dependent variable: Gini index.

Predictors : (Constant), Opportunity entrepreneurship, GDP per capita & Entrepreneurial framework conditions.
**Correlation is significant at the 0.01 level

4.1.1 Linear regression model on relationship between entrepreneurship and income inequality

From Table 4.1a, there is strong correlation, all greater than .70 among different type of entrepreneurial activities, hence it indicates multicollinearity effect, however such effect is not found in the control variables. This explains why it is important to treat each explanatory variable separately and therefore in the next analysis I have run three different regression (Table 4.1b, Table 4.1c and Table 4.1d) models for each entrepreneurial activities. Apart from that, correlation between Total Entrepreneurial Activity (TEA) and income inequality displays strong correlation .651 and statistically significant with $p < .001$. Necessity-based entrepreneur and opportunity-based entrepreneurs scored .702 and .544 respectively and both are statistically significant. All correlations represent positive association meaning that as the independent variables increases (TEA, TEA with necessity motive and TEA with opportunity motive), so does the inequality.

The most important assumption when running linear regression is that both dependent and independent variables are treated as linear and are normally distributed. The comparison of each linear regression (Table 4.1b, 4.1c and 4.1d) between three different entrepreneurial activities suggested all type of entrepreneurship show positive and significant relationship with inequality. A value of $R^2 > .30$ is considered a good fit. In this case, total entrepreneurial activities explains 55.4% of outcome variance in the inequality. However when considering the motivation on nature of entrepreneurship, the R^2 shows necessity entrepreneurship responsible in most case with 56.9% outcome in inequality, as compared to opportunity entrepreneurship 52.3%. As for the standardized coefficients beta, contribution from all three entrepreneurship variables seen to be the highest predictor compared to GDP and entrepreneurial framework conditions. This response has already been anticipated since GDP and entrepreneurial framework conditions only perform as control variable and not as key explanatory variable. Note also beta values for necessity entrepreneurship again makes a

significant contribution to change in inequality (.612) relative to TEA (.532) and opportunity entrepreneurship (.449).

For the other two controlled variables: GDP and framework conditions, they both show negative correlation and are statistically significant implying that they make contribution to the inequality distribution in the opposite manner. The presence of control variables hamper the effect of inequality in the regression model. Such assumption is also evident looking at their negative beta values. All beta values for control variables are significant, except the coefficient for framework condition in necessity entrepreneurship, and thus it does not make unique contribution to inequality. What is interesting is, in terms of general trend, GDP beta weights more in all three entrepreneurship, thus indicating that economic level of a country plays more dominant role to contribute to inequality than the entrepreneurial framework conditions.

The VIF test (Variance Inflation Factor) is conducted to test the multicollinearity presence among the independent variables. This is important because similarity between the independent variables will result in a very strong correlation and consequently will carry partial effect of independent variable on dependent variable in regression model. If the VIF value lies between 1-10, there is no multicollinearity. In this case, there is no apparent multicollinearity between different variables with the regression model, since we have split analysis into three different entrepreneurships, as what was suggested earlier in the bivariate correlation *preliminary analysis 3.2.4.*

4.2 Cross-section analysis to estimate interaction effects between variables

I followed the univariate factorial ANOVA method using TEA, economic development (as represented by GDP per capita) and entrepreneurial framework conditions as my independent variables to identify any interaction effect.

Table 4.2– Summary for univariate analysis for variance

	Sig.	Partial Eta Squared
TEA*GDP	.087	.012
TEA* Entrepreneurial framework conditions	.016	.042
Necessity TEA* GDP	.340	.009
Necessity TEA * Entrepreneurial framework conditions	.574	.005
Opportunity TEA * GDP	.190	.007
Opportunity TEA * Entrepreneurial framework conditions	.857	.001
GDP * Entrepreneurial framework conditions	.365	.01

a. Dependent variable: Gini index

Figure.4.1a – Group means distribution of interaction effect between TEA and GDP variables using dummy variables from *3.2.3 preliminary analysis*. The empty box represent group of means that are missing.

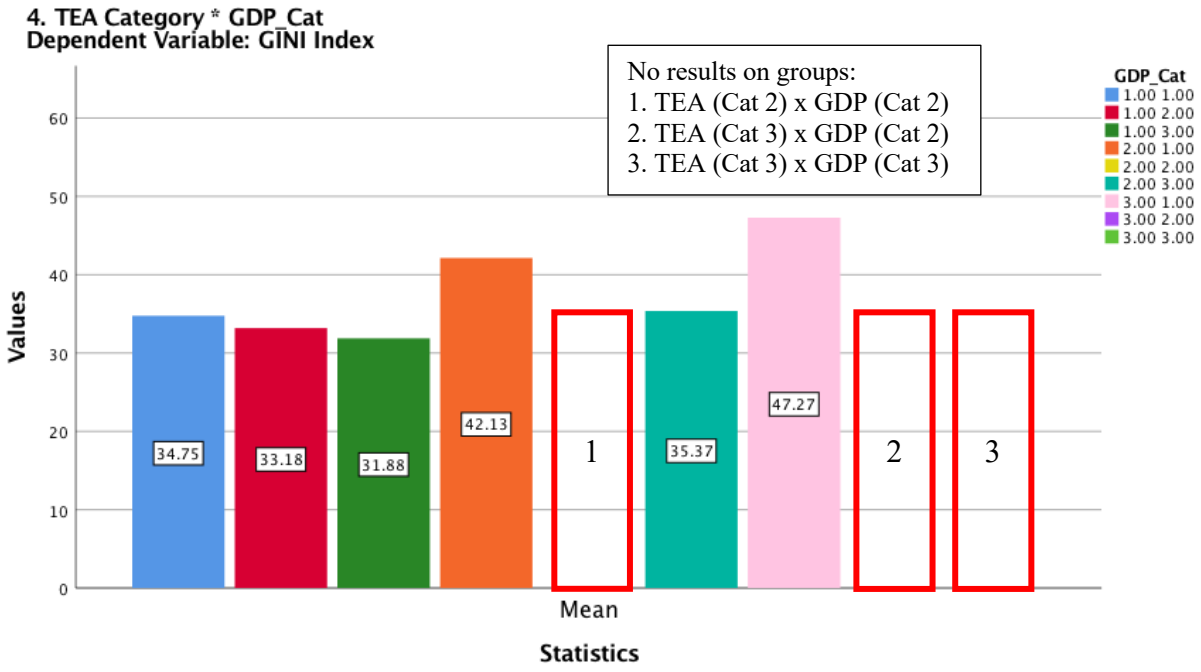
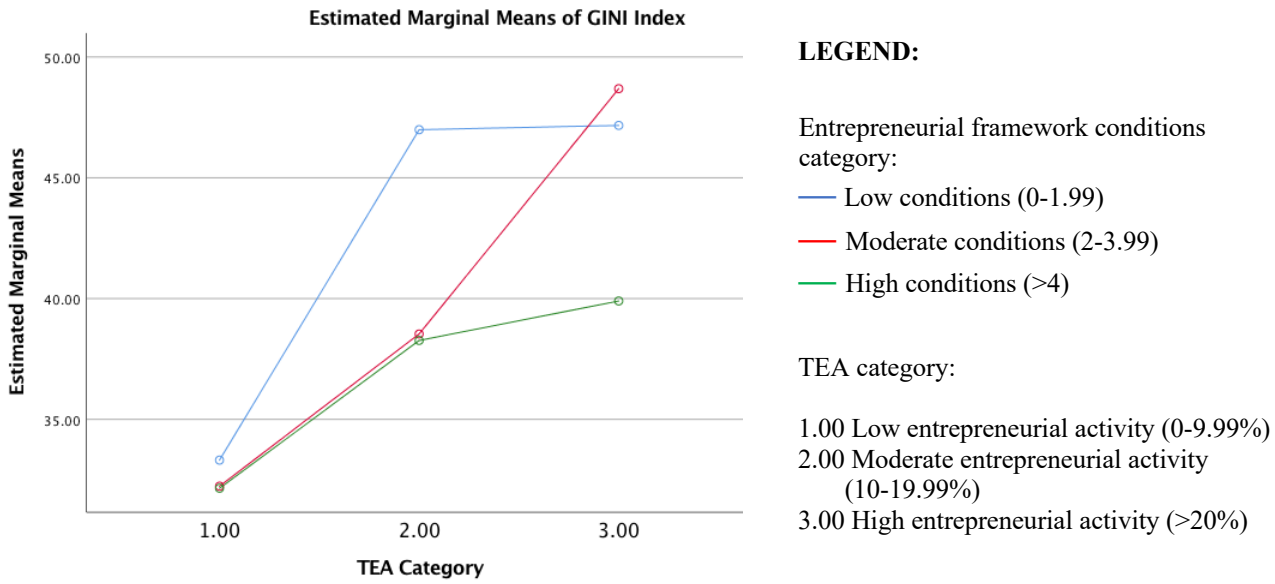


Figure.4.1b – Interaction profile plot between TEA & entrepreneurial framework conditions to explain inequality trend



4.2.1 Interaction effects results

At Table 4.2, notice there is only one interaction observed that is statistically significant which is interaction between TEA and entrepreneurial framework conditions. Partial Eta Squared .042 which explains 4.2% of variance in inequality. At high entrepreneurship %, the countries that receive low to moderate support of framework conditions from its institutions seems to make higher inequality, as oppose to countries with high entrepreneurial framework conditions. Interaction effect between TEA and GDP was anticipated, however statistical results shows no significant evidence that they both are associated, the p-value .087 is only close to significant. More detailed results on interaction effect can be seen in Appendix C.

4.3 Non-linear regression model for different entrepreneurial activities VS. inequality

Table 4.3a – Comparison of regression analysis between TEA vs. inequality

	R	*R Square*	*Adjusted R square*	*R Square Change*	*Standardized Coefficient Beta*
Linear model	.745[a]	.555**	.551	.555	.537**
Nonlinear model	.746[b]	.557**	.551	.002	-.167**

a. Predictors: (Constant), TEA, Entrepreneurial Framework Conditions & GDP per capita
b. Predictors: (Constant), TEA*TEA, Entrepreneurial Framework Conditions & GDP per capita
c. **Correlation is significant at the 0.01 level

Table 4.3b – Comparison of regression analysis between TEA with Necessity-motive vs. inequality

	R	*R Square*	*Adjusted R square*	*R Square Change*	*Standardized Coefficient Beta*
Linear model	.751[a]	.563**	.558	.563	.573**
Nonlinear model	.756[b]	.572*	.564	.008	-.302*

a. Predictors: (Constant), TEA Necessity-motive, Entrepreneurial Framework Conditions & GDP per capita
b. Predictors: (Constant), TEA Necessity-motive* TEA Necessity-motive, Entrepreneurial Framework Conditions & GDP per capita
c. **Correlation is significant at the 0.01 level
*Correlation is significant at the 0.05 level

Table 4.3c – Comparison of regression analysis between TEA with Opportunity-motive vs. inequality

	R	*R Square*	*Adjusted R square*	*R Square Change*	*Standardized Coefficient Beta*
Linear model	.735[a]	.540**	.534	.540	.460**
Nonlinear model	.744[b]	.554**	.546	.014	-.370**

a. Predictors: (Constant), TEA Necessity-motive, Entrepreneurial Framework Conditions & GDP per capita
b. Predictors: (Constant), TEA Necessity-motive* TEA Necessity-motive, Entrepreneurial Framework Conditions & GDP per capita
c. **Correlation is significant at the 0.01 level

4.3.1 Non-linear regression model results

Table 4.3a, 4.3b and 4.3c show statistical summary result from non-linear regression model for different type of entrepreneurial activities. In Table 4.3a, it can be observed that based on R square in linear model, 55.5% of variance in inequality can be attributed by TEA in and this is statistically significant. This figure jumped into 55.7% when TEA_squared is introduced and it is statistically significant. Hence, about 0.20% of variability in dependent variable is being accounted for by the addition of the nonlinear effect, which is considered low. Table 4.3b demonstrates that 56.3% of variance in inequality can be attributed by necessity entrepreneurship and this is statistically significant. This figure increased to 57.2% when nonlinear effect is introduced, and it is statistically significant. Lastly on table 4.3c, it explains that 54.0% of variance in inequality can be attributed by TEA with opportunity motive and this is statistically significant. This figure increased to 55.4% in when nonlinear effect is introduced and it is statistically significant. Also, all the beta values in nonlinear model show negative value. Although R^2 change only increase slightly when nonlinear effect is accounted in all the three different type of entrepreneurs, the results are significant, and thus it is safe to say that the non-linear model is the better predictor as compared to the linear model.

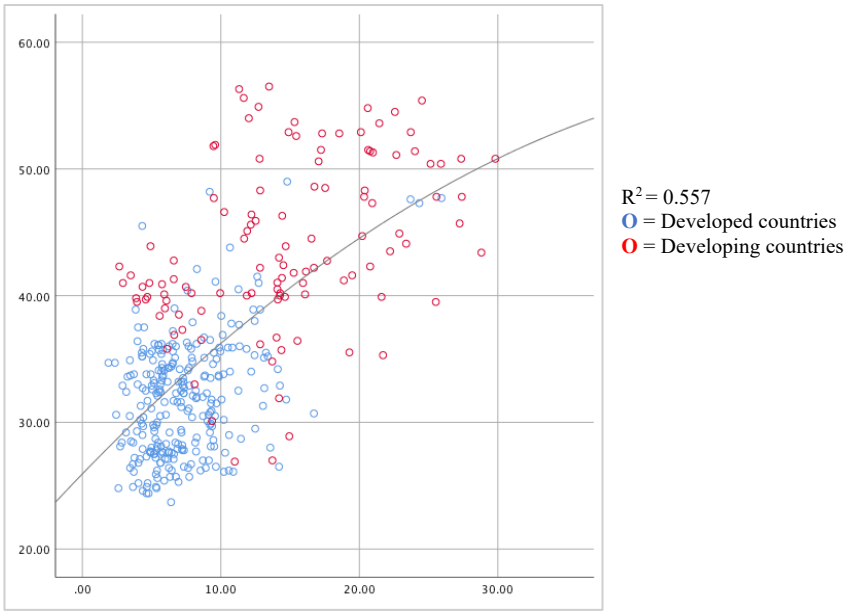


Figure.4.2a– Scatterplot of TEA vs. Gini index. Source: computation from SPSS.

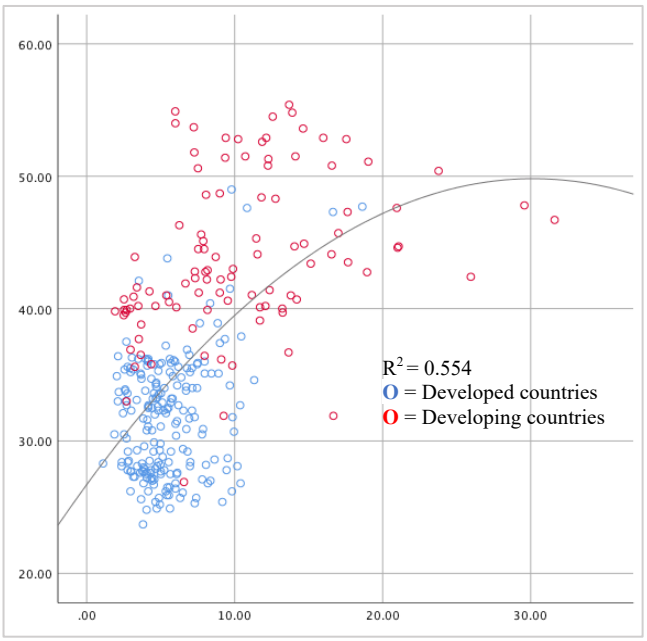


Figure.4.2b – Scatterplot of TEA with opportunity motive vs. Gini index. Source: computation from SPSS.

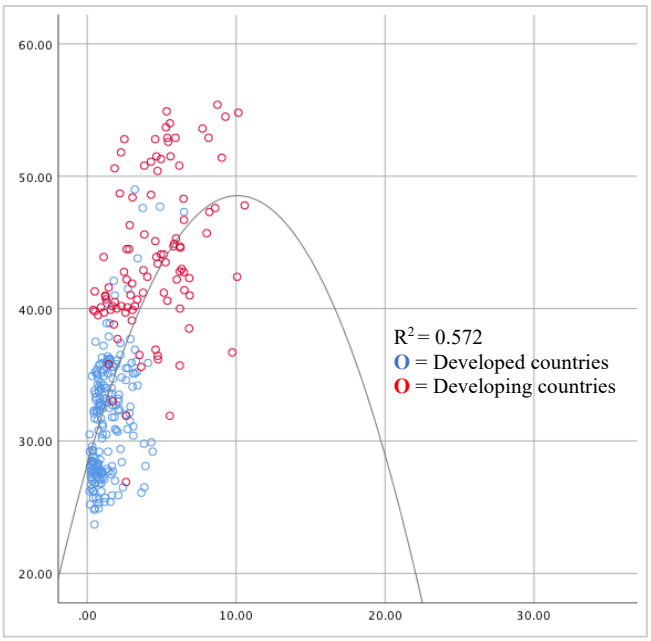


Figure.4.2c – Scatterplot of TEA with necessity motive vs. Gini index. Source: computation from SPSS.

5. DISCUSSION

In this master thesis, I aimed to answer the following research question:

- *Using GEM surveys data from 2004-2016, is there a significant evident to postulate the total entrepreneurial activities (TEA) contribute to increasing income inequality?*
- *To what extent the differences in entrepreneurial motivation affecting the nature of relationship between entrepreneurship and income inequality?*

In respond to that, I have formulated a hypothesis table (Table 5.1) to summarize my empirical findings, along with its interpretations on the subsequent paragraph.

Table 5.1– List of hypothesis testing

	Hypothesis:	**Status:**
H1	Total entrepreneurial activities (TEA) has positive relationship with income inequality	Accepted
H2a	Entrepreneurs with necessity motive increases inequality	Accepted
H2b	Entrepreneurs with opportunity motive reduces inequality	Rejected
H3a	There is interaction effect between GDP per capita and entrepreneurial activities that affect the inequality	Rejected
H3b	There is interaction effect between entrepreneurial framework conditions and entrepreneurial activities that affect the inequality	Accepted
H4	Hypothesis 4: There is a curvilinear relationship observed on relationship between entrepreneurial activities and inequality, following Kuznet's curve theory on economic development.	Accepted

The first three hypotheses H1,H2a & H3b investigate the relationship of different type of entrepreneurial activities in relation to income inequality. The hypotheses are tested by OLS linear regression method with assumption testing that dependent variable is normally distributed and the result is listed in Table 4.1b, Table 4.1c and Table 4.1d. Based on the

statistical results all the three entrepreneurship variables show positive sign and are statistically significant, therefore I accepted the hypothesis H1 & H2a, and rejected H2b. The findings aligned with earlier study carried by Atems and Shand (2017), their results from GMM method discovered positive coefficient and highly significant which shows a percentage point of increase in the self-employment rate increases inequality. Though the results are not directly comparable with their studies (as I use country level data and previous study used US-state level data) it is worthwhile to note that my findings on relationship between entrepreneurship and inequality are also consistent with, among others, Lippman and Aldrich (2005) and Lewellyn (2018). The recent configurational theory developed by Lewellyn (2018) explains salient features that cause necessity entrepreneurship to produce high inequality can be observed in poorly-managed institutions. People who engage in necessity entrepreneurship mostly come from low income ranks involved in informal sectors, to overcome day-to-day survival. Such group are less likely to be advantaged in contexts with high state coordination, weak or strong intermediaries, capital-based financial systems, weak education systems, low levels of centralized bargaining by unions, and low levels of societal trust (Lewellyn, 2018). Given the importance of innovation process, opportunity-based entrepreneurships recognize an opportunity gap and create a business to fill it, and thus opportunity entrepreneurship is arguably effective in income distribution. This view is strongly backed by Schumpeter's (2002) on creative destruction theory which has long dominated entrepreneurships literatures. However, statistical results did not illustrate such suggestion. Opportunity entrepreneurship is seen to have positive relationship with inequality, although with lower R^2 value. In interaction model, there is no interaction between TEA and GDP, thus I reject hypothesis 3a. I would argue the result of interaction effect between TEA and GDP cannot be justified due to insufficient sample size. There are three groups with no sample are observed (Fig. 4.1a), which in this case may lead to

misconception of results. For better discussion in this area, I would suggest to re-run analysis with more samples and equal distribution samples in every groups of entrepreneurship & GDP level. Another possible explanations perhaps can be due to economic growth is more likely linked to innovation process rather than the number of entrepreneurial activities. This is also supported by Galindo & Mendez-Picazo (2013) who reported positive significant effect between innovations and economic growth (measured by GDP in millions of US dollar) by implementing GLS cross-section weight estimation methodology. The entrepreneurial activity must encourage innovation process in a sense that it introduces new production forms and destroying existing structures. Unfortunately, TEA variable from GEM do not distinguish entrepreneurial activities according to its innovativeness, rather it is reflecting more of entrepreneurial intent, or so call "entrepreneurial spirit". For this reason, TEA perhaps loses its economic relevance to GDP variable and do not show notable interaction effect. An interesting finding is there is a positive and significant interaction effect between TEA and entrepreneurial framework conditions, and therefore I accept hypothesis 3b. This highlights the importance of public support from institutions in order to facilitate productive entrepreneurship. The supports mainly in the form of availability of subsidies and grants from public institution, as well as fair & equal public policies (e.g. taxes and regulations) towards small and medium enterprises. As reflected in Schumpeterian perspective, 'social climate' is the second factor (first factor being innovation process) to be considered to reduce social opposition to the innovation process. Schumpeter did not clearly define the variables that make up social climate, however in general terms it would include democracy level and, especially, income distribution (Galindo & Mendez-Picazo, 2013).

With regards to the best fit model, based on results on Table 4.3a, I confirmed the relationship between entrepreneurial activity and inequality forms nonlinear mathematical model, thus I accept hypothesis 4. The nonlinear model suggests inverted U-shaped curve and

all beta values showed negative values which implies that the quadratic effect is going down. As entrepreneurship rate increases, the inequality increases too, until a certain maximum point of entrepreneurship, then following Kuznets curve, inequality starts to go down as economy trickle down. In earlier studies, Kuznets (1955) has confirmed the inverted U-shape relationship exists between economic development and income inequality, at the initial stages of development inequality increases but decreases as development continues. Therefore, according Kuznets, at initial stage of development, income inequality can be good. The same context we can relate to entrepreneurial activities with regards to inequality. Despite entrepreneurial activities arguably may respond to increase of income inequality gap in the beginning, however as economic model is transforming with the help of technological progress, it creates more room for small and new firms to make profit and reduce income inequality. This shifting is evident from the increase share of information and communications technology (ICT) capital in the total capital stock that has risen rapidly over the past 20 years across all income level (Jaumotte, Lall, & Papageorgiou, 2013). Jovanovic (2009) as well agreed that uunique distribution of technologies and incomes are compatible with constant growth. The beneficial effect of technological progress in developing countries are particularly noticeable on shifting of underemployed agricultural workers to manufacturing or service sectors where the marginal product of labour is higher also aggregates productivity, raising the income of those who continue to remain dependent on agriculture (Jaumotte, Lall, & Papageorgiou, 2013). In developed countries, the use of technology is widespread in both manufacturing and services, affecting a substantial segment of the economy. Altogether, the impact of technological progress have resulted in economy to be more diversified and cause entrepreneurial activities to depart from its turning point, and towards lower inequality.

In comparison to Ragoubi & El-Harbi (2018) who investigated a similar type of model but in the reverse direction. I would argue that this study and Ragoubi & El-Harbi's cannot be directly compared. As my analysis focused mainly on entrepreneurship and to measure how different type of entrepreneurship result in inequality, whereas Ragoubi & El-Harbi focused much on the outcome of spatial interdependence on entrepreneurial activity as the result of different economic level between countries. The only similarity observed is probably Kuznets nonlinear curve explaining how inequality can foster economic growth and diversify job opportunities.

In addition, I explored further the intention of entrepreneurial activities in two component parts: necessity and opportunity. My findings suggest both necessity and opportunity entrepreneurship form an inverted U-shape nonlinear relationship. Opportunity entrepreneurship appears to have a better fit nonlinear regression with about 1.4% improved predictability as opposed to necessity entrepreneurship with < 1% predictability to measure inequality (Table 4.3b and Table 4.3c). Correspond to that, I believe the idea that people who are driven by opportunity to start a venture and with desire for independence to increase their income, though they may struggle financially in the beginning to fund their ventures, however at the peak of entrepreneurial activity, they will gain a momentum to generate income to sustain their business, and therefore consistently reduce inequality in a country. The opportunity-driven entrepreneurs focus on innovation process, they are not inventors because they adopt the inventions created by others. Rather they are agents for creative destruction, assimilate the existing structures with technological advances, and for this reason they create new industries and causes relevant structural changes in economy. This behaviour is prevalent in primarily developed countries where opportunities may be expected to be more abundant, and individuals may have more alternatives to make a living. In these countries, government institutions highly encourage innovative entrepreneurship by means of

providing social environment (e.g. start-up incubators, lease spaces with low rental price for newly established firms, ease to start business etc), as well as to ensure entrepreneurs can access financial resources that they need to develop their activity. Hence, monetary policy plays important role in this process, central banks may help to facilitate credit in favour of small and medium-sized enterprises, to accelerate the innovation process. It would have a positive effect on society as a whole. However, it is also necessary to consider the negative effect of this kind of policy. Such an increase would result in higher prices and the consequence would be that the goods and services could be less competitive and the firms could lose position in the marketplace (Galindo & Mendez-Picazo, 2013).

As opposed to opportunity entrepreneurship, the necessity-driven entrepreneurs mostly observed in developing countries in a form of informal sectors to survive day-to-day living basis. The nonlinear coefficient though it is positive and significant is considered to reflect weak relationship. Low R^2 change implies very little difference compared to the linear model. Besides, there appears to be few outliers observed in diagram that perhaps what drives the regression to appear more nonlinear. The finding suggests increasing rate of necessity entrepreneurship lead to income inequality. This confirms previous study by Lippman, Davis, & Aldrich (2005), using Gini index as the independent variable and entrepreneurship as dependent variable, discovered high wealth inequality raises a nation's level of necessity entrepreneurship at an increasing rate, whereas at intermediate level of inequality, opportunity entrepreneurship shows a curvilinear relationship.

Finally, there is no single recipe for achieving prosperity. While entrepreneurship in neoliberal market possess a positive public disclosure, past researches cannot confirm empirically with yes/no answer. The link between the two is more complex and external factors - such as a country's degree of economic development, per capita income, research and development, globalisation - are mixed, and contingent on each other and other factors.

Therefore, the challenge is for government to craft regulations that can find balance between economic and social factors, one must understand the complexity between the two rather than simply 'leave it to the free market'. Entrepreneurs, both with necessity and opportunity motive will likely to cause inequality, hence the solutions lies on the control of how to orientate the business environment more receptive to innovation. One way is to reduce high regulatory burdens to setting up a business, such as the need to buy permits or licenses and other entry barriers, may discourage innovative entrepreneurship (Kritikos, 2014). High regulatory circumstances also make possible for individual particularly in developing countries to participate in corruption, if the tax and revenues collection system are not effectively regulated and enforced. Corruption may make entrepreneurs unwilling to trust the institutions that are necessary to protect intellectual property rights. Asides from enforcing strict policies and regulations on property rights to protect entrepreneurs creativity, other policy that is deemed useful is to charge considerably low administrative burden for start-ups to foster innovations. This includes reducing time to register a business, less number of fees, bureaucratic steps and reporting requirements. As Kritikos (2014) suggested, all this can be achieved by setting up a state-of-the-art online e administration for all standard businesses. In addition, as technological progress is seen to be more pervasive nowadays, substitution of unskilled workers may occur. With this regards, policymakers need to prepare for the potential job losses that may occur as a result to creative destruction.

6. RECOMMENDATIONS

My recommendation for future analysis in this area is to run the entrepreneurship data using alternative methods in effort to eliminate the heteroskedasticity effect that may be present owing to the big difference of economic level between developed and developing countries. The methods recommended are as follows:

- Weighted regression model using GMM
- Box-cox transformation approach

The GEM data is designed specifically to allow cross-sectional data analysis and it is not exclusively one-dimensional (as hypothesized many times). Therefore, I am also suggesting future analysis to still be executed within cross-section approach, not only measuring motivations but as well as aspirations. Key variable for aspirations adapted from GEM can be for example:

- Entrepreneurship with high growth expectations
- Entrepreneurship with (self-reported) innovative characteristics
- Entrepreneurship with (self-reported) international orientation

With compilations of both aspirations and motivations study, hopefully we would contribute to entrepreneurship literatures in addressing the missing part of what controls entrepreneurship to function effectively in reduction of inequality.

7. CONCLUSION

It is confirmed that there are positive association between different type of entrepreneurships with inequality based on Pearson correlation. The linear relationship as dictated by OLS regression method verified positive and significant relationship between entrepreneurial activities and entrepreneurship, suggesting entrepreneurial activities resulted in higher inequality. GDP per capita and entrepreneurial framework conditions are among control variables that can moderate negatively the relationship between entrepreneurship and inequality as evident in the multiple linear regression equation. However, only entrepreneurial framework condition is seen to have a significant positive interaction effect in accordance to TEA. Entrepreneurial framework condition in this context represents two factors: first, the role of financial institutional for funding availability and second, the extent to which public policies support entrepreneurship to which it is considered as a relevant economic issue. Conversely, the statistic results suggests that inequality seems at worst when there is high number of entrepreneurial activities with low to moderate support from financial institutions and public policy. Whereas inequality remains at low, when both entrepreneurial framework conditions and entrepreneurships are at highest. The finding verified Schumpeter's statement that for innovation process to grow, it requires two main factors: first, the availability of financial institutions to support entrepreneur to develop their activity, secondly a 'social climate' that emphasize on income distribution to reduce social stress. Moreover, I have also presented the nature of relationship on two different entrepreneurial activities; one that is based on necessity and another is based on opportunity. My finding suggested both necessity and opportunity entrepreneurship form inverted U-shaped curvilinear relationship with income inequality, but with necessity entrepreneurship shows a steeper negative slope indicating inequality rises in faster rate compared to other. Necessity entrepreneurship also responsible for a bigger contribution to income inequality 56.9% as

compared to opportunity entrepreneurship 52.3%. Since both entrepreneurial activities will likely to result in inequality, institutions have huge responsibilities to adjust the regulatory environment in favour of entrepreneurship but also to focus on innovative process. In particular, it is also important to adjust policies in a way that it would favour entrepreneurs to execute their innovative process, such as: enforcing policy on protection of intellectual and other property rights, streamline and enforce commercial laws, improve the business climate, reduce regulatory burdens, and create a culture of second chances for entrepreneurs who fail.

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APPENDIX A - Classification of countries based on income

- Low income (less than $1,005)
- Lower middle income ($1,006–$3,955)
- Upper middle income ($3,956–$12,235)
- High income (more than $12,235)

East Asia and Pacific

American Samoa	Upper middle income
Australia	High income
Brunei Darussalam	High income
Cambodia	Lower middle income
China	Upper middle income
Fiji	Upper middle income
French Polynesia	High income
Guam	High income
Hong Kong SAR,	High income
Indonesia	Lower middle income
Japan	High income
Kiribati	Lower middle income
Korea, Dem. People's Rep.	Low income
Korea, Rep.	High income
Lao PDR	Lower middle income
Macao SAR, China	High income
Malaysia	Upper middle income
Marshall Islands	Upper middle income
Micronesia, Fed. Sts.	Lower middle income
Mongolia	Lower middle income
Myanmar	Lower middle income
Nauru	Upper middle income
New Caledonia	High income
New Zealand	High income
Northern Mariana Islands	High income
Palau	High income
Papua New Guinea	Lower middle income
Philippines	Lower middle income
Samoa	Upper middle income
Singapore	High income
Solomon Islands	Lower middle income
Thailand	Upper middle income
Timor-Leste	Lower middle income
Tonga	Upper middle income
Tuvalu	Upper middle income
Vanuatu	Lower middle income
Vietnam	Lower middle income

Latin America and the Caribbean

Antigua and Barbuda	High income
Argentina	Upper middle income
Aruba	High income
Bahamas, The	High income
Barbados	High income
Belize	Upper middle income
Bolivia	Lower middle income
Brazil	Upper middle income
British Virgin Islands	High income
Cayman Islands	High income
Chile	High income
Colombia	Upper middle income
Costa Rica	Upper middle income
Cuba	Upper middle income
Curaçao	High income
Dominica	Upper middle income
Dominican Republic	Upper middle income
Ecuador	Upper middle income
El Salvador	Lower middle income

Europe and Central Asia

Albania	Upper middle income
Andorra	High income
Armenia	Lower middle income
Austria	High income
Azerbaijan	Upper middle income
Belarus	Upper middle income
Belgium	High income
Bosnia and Herzegovina	Upper middle income
Bulgaria	Upper middle income
Channel Islands	High income
Croatia	Upper middle income
Cyprus	High income
Czech Republic	High income
Denmark	High income
Estonia	High income
Faroe Islands	High income
Finland	High income
France	High income
Georgia	Lower middle income
Germany	High income
Gibraltar	High income
Greece	High income
Greenland	High income
Hungary	High income
Iceland	High income
Ireland	High income
Isle of Man	High income
Italy	High income
Kazakhstan	Upper middle income
Kosovo	Lower middle income
Kyrgyz Republic	Lower middle income
Latvia	High income
Liechtenstein	High income
Lithuania	High income
Luxembourg	High income
Macedonia, FYR	Upper middle income
Moldova	Lower middle income
Monaco	High income
Montenegro	Upper middle income
Netherlands	High income
Norway	High income
Poland	High income
Portugal	High income
Romania	Upper middle income
Russian Federation	Upper middle income
San Marino	High income
Serbia	Upper middle income
Slovak Republic	High income
Slovenia	High income
Spain	High income
Sweden	High income
Switzerland	High income
Tajikistan	Lower middle income
Turkey	Upper middle income
Turkmenistan	Upper middle income
Ukraine	Lower middle income
United Kingdom	High income
Uzbekistan	Lower middle income

APPENDIX B – Frequency table of all variables

		GINI Index	TEA	Necessity entrepreneurship	Opportunity entrepreneurship	GDP in current US$	Entrepreneurial_Framework_ Conditions
N	Valid	674	531	426	426	947	482
	Missing	305	448	553	553	32	497
Mean		35.7374	10.2935	2.6697	7.3668	20212.35	5.1158
Median		33.9500	8.2200	1.7866	5.8826	10153.94	5.0500
Mode		33.60	6.53	.15[a]	1.11[a]	136[a]	4.74
Std. Deviation		7.81146	6.66173	2.46714	4.78725	22827.468	.82349
Variance		61.019	44.379	6.087	22.918	521093305.126	.678
Minimum		23.70	1.48	.15	1.11	136	3.18
Maximum		60.50	40.27	14.90	31.62	119225	7.62
a. Multiple modes exist. The smallest value is shown							

APPENDIX C – Interaction effects detailed results in SPSS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11135.628[a]	34	327.518	12.580	.000	.641
Intercept	51722.888	1	51722.888	1986.713	.000	.892
TEA_Cat	469.334	2	234.667	9.014	.000	.070
TEA_NEC_Cat	17.495	2	8.748	.336	.715	.003
TEA_OPP_Cat	5.406	2	2.703	.104	.901	.001
GDP_Cat	125.544	2	62.772	2.411	.092	.020
FrameworkCond_Cat	51.196	2	25.598	.983	.376	.008
TEA_Cat * TEA_NEC_Cat	8.340	2	4.170	.160	.852	.001
TEA_Cat * TEA_OPP_Cat	.000	0	.	.	.	.000
TEA_Cat * GDP_Cat	76.725	1	76.725	2.947	.087	.012
TEA_Cat * FrameworkCond_Cat	275.315	3	91.772	3.525	.016	.042
TEA_NEC_Cat * TEA_OPP_Cat	128.645	3	42.882	1.647	.179	.020
TEA_NEC_Cat * GDP_Cat	56.462	2	28.231	1.084	.340	.009
TEA_NEC_Cat * FrameworkCond_Cat	28.964	2	14.482	.556	.574	.005
TEA_OPP_Cat * GDP_Cat	45.002	1	45.002	1.729	.190	.007
TEA_OPP_Cat * FrameworkCond_Cat	8.029	2	4.015	.154	.857	.001
GDP_Cat * FrameworkCond_Cat	83.144	3	27.715	1.065	.365	.013
TEA_Cat * TEA_NEC_Cat * TEA_OPP_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_NEC_Cat * GDP_Cat	.241	1	.241	.009	.923	.000
TEA_Cat * TEA_NEC_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000

TEA_Cat * TEA_OPP_Cat * GDP_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_OPP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_NEC_Cat * TEA_OPP_Cat * GDP_Cat	.000	0	.	.	.	.000
TEA_NEC_Cat * TEA_OPP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_NEC_Cat * GDP_Cat * FrameworkCond_Cat	6.483	1	6.483	.249	.618	.001
TEA_OPP_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_NEC_Cat * TEA_OPP_Cat * GDP_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_NEC_Cat * TEA_OPP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_NEC_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_OPP_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_NEC_Cat * TEA_OPP_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
TEA_Cat * TEA_NEC_Cat * TEA_OPP_Cat * GDP_Cat * FrameworkCond_Cat	.000	0	.	.	.	.000
Error	6248.258	240	26.034			

Total	369183.627	275				
Corrected Total	17383.886	274				
a. R Squared = .641 (Adjusted R Squared = .590)						

APPENDIX D – SPSS regression results to test nonlinear relationship.

i) SPSS regression results to test nonlinear relationship between TEA and inequality.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.745[a]	.555	.551	5.28255	.555	133.568	3	321	.000
2	.746[b]	.557	.551	5.28083	.002	1.208	1	320	.272

a. Predictors: (Constant), Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business

b. Predictors: (Constant), Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, TEA_squared

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11181.753	3	3727.251	133.568	.000[b]
	Residual	8957.599	321	27.905		
	Total	20139.353	324			
2	Regression	11215.452	4	2803.863	100.543	.000[c]
	Residual	8923.901	320	27.887		
	Total	20139.353	324			

a. Dependent Variable: GINI Index

b. Predictors: (Constant), Entrepreneurial_Framework_Conditions, Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, GDP in current US$

c. Predictors: (Constant), Entrepreneurial_Framework_Conditions, Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, GDP in current US$, TEA_squared

ii) SPSS regression results to test nonlinear relationship between necessity entrepreneurship and inequality.

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.751[a]	.563	.558	5.19944	.563	101.532	3	236	.000
2	.756[b]	.572	.564	5.16181	.008	4.453	1	235	.036

a. Predictors: (Constant), Entrepreneurial_Framework_Conditions, % 18-64 pop: TEA and Necessity motive (entr because of no better choice for work) , GDP in current US$

b. Predictors: (Constant), Entrepreneurial_Framework_Conditions, % 18-64 pop: TEA and Necessity motive (entr because of no better choice for work) , GDP in current US$, TEA_Nec_squared

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8234.509	3	2744.836	101.532	.000[b]
	Residual	6380.054	236	27.034		
	Total	14614.563	239			
2	Regression	8353.155	4	2088.289	78.377	.000[c]
	Residual	6261.408	235	26.644		
	Total	14614.563	239			

a. Dependent Variable: GINI Index

b. Predictors: (Constant), Entrepreneurial_Framework_Conditions, % 18-64 pop: TEA and Necessity motive (entr because of no better choice for work) , GDP in current US$

c. Predictors: (Constant), Entrepreneurial_Framework_Conditions, % 18-64 pop: TEA and Necessity motive (entr because of no better choice for work) , GDP in current US$, TEA_Nec_squared

iii) SPSS regression results to test nonlinear relationship between opportunity entrepreneurship and inequality.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.735[a]	.540	.534	5.33755	.540	92.327	3	236	.000
2	.744[b]	.554	.546	5.26860	.014	7.218	1	235	.008

a. Predictors: (Constant), % 18-64 pop: TEA and Opportunity motive, Entrepreneurial_Framework_Conditions, GDP in current US$

b. Predictors: (Constant), % 18-64 pop: TEA and Opportunity motive, Entrepreneurial_Framework_Conditions, GDP in current US$, TEA_Opp_squared

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7891.048	3	2630.349	92.327	.000[b]
	Residual	6723.516	236	28.489		
	Total	14614.563	239			
2	Regression	8091.401	4	2022.850	72.874	.000[c]
	Residual	6523.162	235	27.758		
	Total	14614.563	239			

a. Dependent Variable: GINI Index

b. Predictors: (Constant), % 18-64 pop: TEA and Opportunity motive, Entrepreneurial_Framework_Conditions, GDP in current US$

c. Predictors: (Constant), % 18-64 pop: TEA and Opportunity motive, Entrepreneurial_Framework_Conditions, GDP in current US$, TEA_Opp_squared