The Impact of Institution, and Entrepreneurship on Growth of Economies: An Empirical Analysis

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Abstract

Research on the relationship between institution, entrepreneurship and economic growth is not new. However, most studies tend to concentrate on the impact of either institutional quality and economic growth or entrepreneurship and economic growth without examining how the interaction term of entrepreneurship and institution influences economic performance. The scope of this research is to contribute to existing researches by way of analyzing both the individual and joint impact on economic performance of entrepreneurship and institutional quality for 25 countries during the period 2002-2015. Since previous studies are plagued by endogeneity and causality problems, this research uses the system Generalized Method of Moments to handle these problems. Results show that engaging in entrepreneurial activities and institutional quality improvement contribute to high economic growth. Furthermore, there is overwhelming evidence of a rise in economic growth resulting from an increase of entrepreneurial activitiy engagements in a well-functioning institutional environment. However, when only the institutional environment is improved without improving entrepreneurship as well, a decline in economic growth is realized. The deduction is therefore that high levels of institution tend to play a substitutive role on entrepreneurship to stimulate economic growth.

Keywords: Economic growth, entrepreneurship, generalized method of moments, ınstitutions.

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1. Introduction

Conventionally, neoclassical theories regard capital, labor and technology as leading factors that stimulate economic growth. A renewed thinking from new growth models also emphasizes the important role of entrepreneurship to the mantra of economic growth. From business literature standpoint Schumpeter (1934), Acs and Audretsch (1988) as well as Wennekers and Thurik (1999), emphasize entrepreneurship as an innovation driver and ultimately spur economic growth. As a result of its pertinence to economy through employment creation and supplying new technology, entrepreneurship is increasingly gaining coverage in academic and policy making circles (Carree & Thurik, 2003; Van Stel, Carree, & Thurik, 2004, 2005; Acs & Varga, 2005; Wong, Ho & Autio, 2005; Acs, 2006; Méndez-Picazo, Galindo-Martín & Ribeiro-Soriano, 2012; Palagashvili, 2015; Herrington & Kew, 2017). According to Kressel and Lento (2012), entrepreneurship is regarded as both an engine and catalyst to economic growth. Nevertheless, Ahmad and Hoffmann (2008) argue that the pursuit to adopt economic policies that rest on entrepreneurship as a tool to spur economic growth continue to be hampered by inadequate empirical information.

Acs, Desai and Hessels (2008) and Palagashvili (2015) further highlight that entrepreneurship's contribution to economic growth can be successful if good infrastructure, political stability and good governance prevail. Both respect for property rights and adherence to rule of law do not only signal how entrepreneurs operate but legitimize their activities and protect them against expropriation (Troilo, 2011). A politically stable environment, respect for property rights and predictable regulations incentivize entrepreneurs to start and expand existing investments (Desai, Gompers & Lerner, 2003; Estrin, Korosteleva & Mickiewicz, 2009; Friedman, 2011; Aidis, Estrin & Mickiewicz, 2012). These factors not only provide minimum assurance to entrepreneurs but also provide confidence and trust. Contrariwise, Troilo (2011) bemoan that unnecessary regulations and laws can hinder entrepreneurial engagements. As a way to mitigate the above, Kiliç, Arica & Topkaya (2013) suggest that policy makers should quest for a desire to create a hassle free business operating environment for entrepreneurs so that high levels of economic growth can be attained.

An increase in economic growth (income level) may open avenues for individuals to exploit and engage in entrepreneurship since they may have enough resources at their disposal resulting in employment creation (Acs, 2006; Acs, Desai & Klapper, 2008). In contrast, contraction of economic growth, specifically in times of crisis, may imply limited employment opportunities prompting individuals to be innovative and feel the need to engage in entrepreneurship. Carree and Thurik ((2003); (2010)) call this scenario a "*refugee effect*". As the economy stabilizes people look for jobs and entrepreneurship participation rate starts to decrease. Alternatively, Acs (2006), Carree and Thurik ((2003); (2010)) and Bosma (2013) highlight the possibility of a "*Schumpeter effect*" whereby high entrepreneurship entice new entrants which in turn create more employment resulting in high economic growth rates.

Scholarly papers relating economic growth, entrepreneurship and institutional quality mainly address the indirect link of institution and economic growth through entrepreneurship (Acs et al., 2008; Méndez-Picazo et al., 2012; Palagashvili, 2015). The joint impact of entrepreneurship and institutions on economic growth is less documented both empirically and theoretically (Wennekers & Thurik, 1999). Similarly, bi-directional links among these variables can exist which most studies tend to ignore or fail to account (Acs et al., 2008). Kiliç et al. (2013) analyze the connection of these three variables in a single equation but they, however, did not interact the entrepreneurship and institution and use it as one of the explanatory variables.

As such, this research attempts to close this literature gap by analyzing both the individual and interactive impact of engaging in entrepreneurship and institutional quality on economic performance. Hypotheses of this research are as follows; high entrepreneurial activities and better institutions denoted by perceived capabilities (PC) and good governance index (GI) respectively can lead to high economic growth. Secondly, engaging in entrepreneurial activities in an environment with better institutions stimulates economic growth.

Results strongly suggest that enterpreneurship and better institutions individually lead to high economic growth. Also, increasing entrepreneurship under an improved institutional environment has an overall effect of spurring economic growth. However, it is sad to note that even if the institutional environment is improved without incresing the level of entrepreneurial activities, a decline in economic growth is realized. Having completed the introduction in Section 1, following are Sections 2 to 6. Section 2 briefly explains entrepreneurship and how it is measured within the context of different organizations. This is followed by a review of relevant literature in Section 3. The study's methodology and estimation strategy is described in Section 4. It is in this section where data sources are also provided. Lastly, in Section 5 research findings are both brought forward and discussed while a conclusion is in Section 6.

2. Definition and measurement of entrepreneurship

Entrepreneurship is a multidiscipline concept without a universally agreed single theoretical definition. This is because it is found in various academic fields like business, economics, management and sociology. Consequently, entrepreneurship's definition and measurement problems (Powell & Weber, 2013) further exacerbate the way it relates with economic growth (Carree & Thurik, 2003; Bianchi & Biffignandi, 2009). Also, this makes entrepreneurship statistics incomparable across countries. Nowadays, governments can no longer afford to give a deaf ear and keep a blind eye on entrepreneurship as it is commonly used as a policy option to take an economy out of crisis (Henrekson, 2006; OECD, 2009). Moreover, entrepreneurship's impact on economic growth can be direct or indirect since many other variables can have an effect on growth (Wennekers & Thurik, 1999). However, Acs (2006) argues that decisions to participate in entrepreneurial activities can be influenced by current prevailing business environment and institutions which can incite or discourage business start-ups.

The definition of entrepreneurship is not straightforward, however Ahmad and Hoffmann (2008), Ahmad and Seymour (2008), and OECD (2009) define it as "*an enterprising human action that is aimed at generating value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets and opportunities*". Also, Gries and Naudé (2011) define it in a slightly different way as "*the resource, process and state of being through and in which individuals utilise positive opportunities in the market by creating and growing new business firms*". This definition is consistent with previous literature and is comparable across countries.

The Organization for Economic Cooperation and Development (OECD) entrepreneurship framework through its entrepreneurship indicator programme comprises determinants that impact on entrepreneurial activities. However, its sample data is small and the time frame is short. The Global Entrepreneurship Monitor (GEM) has a conceptual framework which classifies entrepreneurial activities by phase, impact and type. The sum of early stage entrepreneurship commonly known as total entrepreneurial activities (TEA) is GEM's main indicator. However, due to data deficiencies exhibited by TEA, perceived capabilities (PC) is used as a measure of entrepreneurship. As Acs and Amorós (2008) highlight, GEM database provides both a harmonized and internationally comparable dataset. For the purpose of this research, entrepreneurship data from GEM database is used.

3. Literature review

According to Croitoru (2012), Schumpeter (1934) is one of the first economists to emphasize the cardinal role of entrepreneurship in economic growth. His arguments are that it is through innovation and technology progress that entrepreneurship results in high economic growth rates. Early empirical growth theories suggest that economic growth is influenced by population growth rate (human capital), capital accumulation, geography and technology just to mention a few. For a long time, mainstream economists failed to recognize the importance of entrepreneurship in influencing economic performance. Surprisingly, as highlighted by Audretsch and Keilbach (2004), Audretsch, Keilbach & Lehmann, (2006) and Baliamoune-Lutz (2015), entrepreneurship is usually not accounted for in traditional growth models yet in basic economics it is considered as one of the factors of production. However, according to Van Stel et al. (2005) the exclusion of entrepreneurship in growth equations is sensibly acceptable because of measurability and comparability problems. Also, for other factors there are readily available secondary sources from which data can be extracted. This makes it easy to compute their impact on economic growth. Entrepreneurship is key in influencing economic growth via combining all the other factors of production in anticipation for a high return. According to a 2009 report by the OECD, due to the importance of entrepreneurship most OECD member states are now prioritizing entrepreneurship as a policy objective.

As cited in Acs (2006), Robert Lucas finds the number of firm size to be influenced by high economic development. This clearly suggests a two-directional causal link connecting economic growth and entrepreneurship. Contrariwise, Acs and Amorós (2008) find economic growth to be entrepreneurship reducing. Their findings are also supported by Amorós and Cristi (2008).

However, high entrepreneurial activities are not always associated with high economic growth rates. Countries that are in the same level of growth may experience varying entrepreneurial activities (Van Stel et al., 2005). Entrepreneurship's impact on growth can either be positive or negative. In developing countries, the impact can be negative while positive in developed countries (Acs, 2006; Acs & Naudé, 2013).

According to Van Stel et al. (2005) and Bosma (2013), there are various channels (innovation, value creation, job creation and competition) through which entrepreneurship can impact economic growth. First and foremost, entrepreneurs are believed to be business and innovation creators. They create jobs and raise productivity levels through technology change which result in high output (economic growth). Entrepreneurship is also viewed as the backbone through which an economy operates (OECD, 2008). It is through innovations and inventions entrepreneurs bring new products into the market (Acs & Armington, 2006). Entrepreneurs know that they can be rewarded for their knowledge and innovation hence competition is induced which in turn leads to production of high quality products.

In addition, Carree, Van Stel, Thurik & Wennekers (2002) establish increasing business ownership triggering economic growth. Their deduction is from 23 OECD subscribing countries. However, this is only evident for long-equilibrium relationship not for short to medium term.

Analyzing the effect relating entrepreneurial activities and economic growth, Acs and Varga (2005) and Van Stel et al. (2005) find entrepreneurship very impactful to economic growth. However, Van Stel et al. (2005) find the interaction more pronounced in rich countries than in transition and developing ones. They suggest a country's state of development as a determining factor on the economic growth impact of entrepreneurship.

Acs, Audretsch, Braunerhjelm & Carlsson (2005) find that entrepreneurship had a positive effect on economic performance of 18 countries. Among various regions in Germany, Audretsch et al. (2006) find overall entrepreneurship, information and communication technology entrepreneurship and high technology entrepreneurship to be positive and statistically significant in determining economic growth.

Salgado-Banda (2007) uses patent applications and self-employment data as proxy for productive entrepreneurship for 22 OECD countries from 1975 to 1998 and find economic growth impact of patent and self-employment to be strongly positive and negative respectively. Also within OECD countries, Amaghouss and Ibourk (2012), Amorós, Fernández & Tapia (2012) and Kiliç et al. (2013) concur with Salgado-Banda (2007)'s results relating entrepreneurship and growth. However, their time spans and sample sizes are different.

Wong et al. (2005) find entrepreneurial activity engagement in 37 countries very influential to their growths. Also examining the impact of high expectation entrepreneurship activity, opportunity TEA and necessity TEA on GDP per capita growth rate for a group of 24 developed and 20 emerging countries, Valliere and Peterson (2009) only find evidence of high expectation entrepreneurship to be significant and positively related to GDP per capita growth in the case of developed countries.

A seminal work by Pavlyk (2010) also points to the fact that increase in entrepreneurial activities can help deliver an economy out of economic crisis. This evidence is based on a case study on Ukrainian regions. In general, she finds that entrepreneurship to be highly linked increasing economic growth for all regions in the country.

According to Naudé (2013) the entrepreneurship-growth nexus can be positive or negative. Acs et al. (2008) find high entrepreneurial activities not translating to high growth rates. Ample evidence is from Ecuador, Peru and Uganda where both high entrepreneurship and low growth exist. On the other hand, Argentina and Brazil also have high income per capita but coupled with persistent low entrepreneurial activities. However, the direction of the impact may not be clear as both institutions and entrepreneurship may respond to an already increasing growth (Ahmad & Hoffmann, 2008).

Kacho and Dahmardeh (2017) also argue that good institutions differentiate successful economies from unsuccessful ones as they provide guarantee as well as promote investment, innovation and participation in economic activities. The same sentiments are further buttressed by Nawaz, Iqbal & Khan (2014) and Siyakiya (2017) who find the impact on economic growth of institutional improvements to be more evident in developed countries than in developing ones.

4. Econometric strategy and methodology

Controlling for macroeconomic stability with previous growth, and current investment and government expenditure, individual impacts of institution and entrepreneurship on growth are first examined. The growth equation incorporating these variables is specified as:

$$\ln GDPpc_{it} = \alpha_0 + \alpha_1 \ln GDPpc_{it\_1} + \alpha_2 GFCF_{it} + \alpha_3 EXP_{it} + \alpha_4 PC_{it} + \alpha_5 GI_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad \textbf{(1)}$$

Where

$GDPpc$ is Gross Domestic Product per capita, which is a measure of economic growth;

$GFCF$ is investment measurement in the economy (Efendic, Pugh & Adnett, 2009; Valeriani and Peluso, 2011; Nawaz, Iqbal & Khan, 2014);

EXP is expenditure;

PC is perceived capabilities which is a measure of entrepreneurship;

GI is governance index;

δ_i is a country dummy;

μ_t is time dummy;

ε_{it} is error term;

i and t represent country and year respectively.

The α s are coefficients to be estimated. A detailed list, explanation, data sources as well as expected signs of variables are presented in Table 1. The lag of GDP per capita, investment and government expenditure are used as control variables. In line with new growth literature, the lag of GDP per capita can take any sign, with a positive sign showing conditional convergence while a negative sign indicating conditional divergence (Islam, 1995; Slesman, Baharumshah & Ra'ees, 2015).

The second objective is to find the joint effect of entrepreneurship and institutional quality (governance) on economic growth. In the second equation, a new variable which is the multiplicative interaction of institutional quality and entrepreneurship is substituted in equation 1. Choosing which variable should be a moderator is based on the researcher and the theory underlying the model (Aguinis, Gottfredson & Wright, 2011). Here, the expectation is that better institutions act as incentives for entrepreneurs to start and operate business. Although previous studies find both institutional quality and entrepreneurship affecting economic growth, given the hypothesis of the second equation institutions are introduced as a moderator variable. When an interaction term is introduced in the equation, both the independent variables and the moderator variable should be included as well (Cohen, West & Aiken, 2003; Jaccard and Turrisi, 2003; Stock and Watson, 2007). The equation expressing this relationship is:

$$\ln GDPpc_{it} = \beta_0 + \beta_1 \ln GDPpc_{it\_1} + \beta_2 GFCF_{it} + \beta_3 EXP_{it} + \beta_4 PC_{it} + \beta_5 GI_{it} + \beta_6 PCG_{it} + \delta_i + \mu_t + \varepsilon_{it} \qquad \textbf{(2)}$$

From equation 1 and 2, the emphasis is on the estimated coefficients of entrepreneurship, institutional quality and that of the interaction term. A positive sign for the coefficients of entrepreneurship and institutional quality signifies their positive influence on economic growth. As for the sign of β_6, a positive implies the complementary effect of entrepreneurship and institutional quality on economic growth while a negative sign connotes their substitutability in impacting economic growth. A positive sign would suggest that the growth effects of entrepreneurship is enhanced in countries that have stable and good institutional environment. According to Jaccard and Turrisi (2003) when an interaction term is included, the effect of the independent variable on the dependent variable varies depending on the moderator variable. The authors also argue that inclusion of the multiplicative term can even reverse the impact of the independent variable on the dependent variable making interpretation of results difficult.

To estimate coefficients in equations 1 and 2, Ordinary Least Squares

(OLS) could have been applied. However, due to reverse causality between economic growth and entrepreneurship (Carree & Thurik, 2003; 2010) and between economic growth and institutions (Dawson, 2003; Valeriani & Peluso, 2011), using OLS in this case is deemed inappropriate. According to Wooldridge (2001), this is as a result of independent variables themselves might be highly correlated (multicollinearity, that is, one independent variable might explain another independent variable or independent variables strongly related) or endogeneity problems due to regressor(s) correlated to the error term. Correlation matrix in Table 3 reveals that the lag of GDP per capita, human capital index and the institutional variable are highly correlated with over 0. 70. Also omission of relevant variables or inclusion of irrelevant variables in the model may lead to high standard errors of the error term. When one of the regressors is a lagged variable of the dependent variable OLS estimators are biased as this lagged variable is highly correlated with the unobserved entity effects (Baltagi, 1998). One possible way of solving the above econometric problems is through the use of Instrumental Variable (IV) approach or Two-Stage Least Squares (2SLS) approach (Wooldridge, 2001). However, finding a valid or good instrument can be very challenging rendering IV approach not a good choice. Also both 2SLS and IV tend to have high standard errors which is a sign of insignificant coefficient estimates (Wooldridge, 2001). Lagged Dependent Variable (LDV) model can be applied, but usually the lagged variable is highly correlated with unobserved effects making coefficient estimates invalid (Nickell, 1981; Wooldridge, 2001). Also with a small time series and a large panel entity, according to Nickell (1981) demeaning the dependent and independent variables using the Fixed Effects Model (FEM) can result in correlation between explanatory variables and error term. Possible drawbacks of FEM, OLS, IV, SLS and LDV can be handled by using the system Generalized Method of Moments (GMM). Besides handling endogeneity problems, GMM particularly two-steps result in efficiency gains compared to OLS and 2SLS (Cameron & Trivedi, 2005; Roodman, 2009a; 2009b). This works when independent variables are strongly exogenous. Endogeneity test is performed and the results reveal the presence of endogeneity[2] hence OLS and 2SLS cannot be applied. System GMM is also appropriate in circumstances where the number of time

[2]Tests results are provided upon request from the author.

periods are less than the number of entities (Arellano & Bond, 1991; Blundell & Bond, 1998) or where a lagged variable of the dependent variable is used as one of the regressor (Arellano & Bover, 1995; Elhorst, 2010). With a dataset containing 25 countries, 14 years (2002-2015) and a lagged variable, GMM is appropriate compared to all the other models above.

The system GMM estimation allows the use of instrument variables. Good instruments should not be correlated with error term but with regressor and simultaneously be excluded from the list of regressors. Always, instruments should be minimized (their number), otherwise efficiency is compromised (Cameron & Trivedi, 2005). Generally, instruments are auto-generated from their lags, however, the system GMM allows for the inclusion of external instruments (Roodman, 2009a; 2009b). One other possible way of getting valid instruments is through allowing for time unvarying constant. Relaxing the above assumption can lead to false Sagan-Hansen test results (Sato & Söderbom, 2013).

Lags of GDP per capita, investment, expenditure, entrepreneurship and institution are used as internally generated instruments while human capital index is an external one. Human capital index exhibits high levels of multicollinearity with lag of GDP per capita and institutional variable[3]. The appropriateness of the system GMM results are heavily dependent on the fulfillment of two main assumptions namely first order serial autocorrelation (AR(1)) and the over-identification restriction (Hansen J test) (Roodman, 2009a; 2009b). A highly significant p-value of the AR(1) and a small p-value of the Hansen test are generally desirable as they respectively signify the absence of first order serial correlation and validity of instruments. Roodman (2009a; 2009b) suggest that a p-value of Hansen test for instrument validity to be within the benchmark of 0.10 and 0.25. He further warned for a p-value close to 0.25 and above to be viewed with great alarm since it is a sign of invalid instruments emanating from instrument proliferation. This can result in misleading results from the system GMM model.

[3]See Table 3.

The GMM[4] model consider an autoregressive panel model of the form (Baltagi, 2008; Blundell & Bond, 1998):

$$y_{it} = \alpha y_{it-1} + \beta^{'} X_{it} + \eta_i + v_{it} \qquad \textbf{(3)}$$

where $\mu_{it} = \eta_i + v_{it}$ is the fixed effects decomposition of the error term. For the purpose of evaluating the relationship of independent variable and its lagged variable we consider the initial condition of autoregressive (AR(1)) with both η_i and v_{it} being independent and identically distributed of $IID(0, \sigma_\eta^2)$ and $IID(0, \sigma_v^2)$ respectively. This decomposes to:

$$y_{it} = \alpha y_{it-1} + \eta_i + v_{it} \qquad \textbf{(4)}$$

where i= 1, 2, 3, …, 25 and t = 1, 2, 3, …, 14.

With the intention of getting consistent parameters, individual effects are eliminated through differencing equation 5. Performing this operation result in the following:

$$y_{it} - y_{i,t-1} = \alpha\,(y_{i,t-1} - y_{i,t-2}) + (v_{it} - v_{i,t-2}) \qquad \textbf{(5)}$$

Equation 6 is enough for the sake of building intuition, readers can get explicit and detailed derivations of the moment restrictions and their conditions from relevant textbooks and journals. The system GMM usually gives considerable results if variables are not autocorrelated in their first order. AR(1) value is the basis to reject or fail to reject the presence of autocorrelation. Small AR(1) is desirable since it implies absence of autocorrelation. Also in most of the Monte Carlo studies compared to difference GMM, system GMM has proved to have better inferences (Bun & Kleibergen, 2010). The second hypothesis is that instruments are exogenous (Roodman, 2009a; 2009b). The number of instruments both internal and external usually should not exceed the number of groups, otherwise too many instruments weaken the model. This uses the Hansen test which is a test for over-identification restriction. Instruments are considered to be valid if they are exogenous and uncorrelated with the error term, otherwise one can fail to reject the null hypothesis. According to

[4]It uses the xtabond2 Stata command.

Roodman (2009b) a preferable Hansen test p-value not too small or too high is substantially appropriate. Contrary to Roodman (2009a; 2009b), some researchers argue that the validity of instruments is also based on a large p-value of the Hansen test which Roodman disputes as a misleading conclusion. The number of internally generated instruments from lags can be manageable if the time series is less than 10, however if it is greater as in this case restricting the number of lags is acceptable (Baum, 2013). As a way of circumventing the problem of instrument proliferation stemming from internally generated instruments, the number of lags is restricted to 3. Otherwise taking comfort in default lags is tantamount to loss of degrees of freedom. The system GMM model has an option that allows researchers to perform several commands on variables and in this case the collapse and orthogonal command is invoked.

To unravel the two hypothesizes of this paper, system GMM (precisely two-steps) is applied on balanced panel dataset comprising 25 countries and 14 year period (2002-2015)[5]. Data availability on all the variables determines country list selection. For those countries with missing data for some variables, estimates through averaging existing done are performed. According to Windmeijer (2005), two-steps system has more efficiency gains than one-step. Also, the standard errors and bias of two-steps are lower than those of the one-step.

5. Discussion of results

Correlation results in Table 3 confirm that independent variables namely lag of GDP per capita, human capital index and institutional quality are highly correlated. According to Greene (2003), Gujarati (2004) and Wooldridge (2001) although severe multicollinearity among independent variables is not a big issue however, it can lead to less precise coefficient estimates hence low multicollinearity is generally acceptable. Regression results derived from the fixed effects and the system GMM approaches are presented in Tables 4 and 5 respectively. A glimpse of the FEM results in Table 4 column 1 show that coefficients of independent variables are as expected save for that of institution. Coefficients of the lag of GDP per capita, investment and entrepreneurship are positive and strongly significant

[5]Table 2 contains a comprehensive list of countries.

at 1%. Notably, when the interaction is introduced in column 2 entrepreneurship variable loses its explanatory power on economic growth. At first instance one is convinced to interpret that entrepreneurship, institution and the interaction term are insignificant as far as explaining changes in GDP per capita is concerned. Insignificance of coefficient estimates under the FEM is attributed to the inclusion of the lagged variable of dependent variable in the model as one of the explanatory variables. Due to the shortfall of the FEM in the presence of lagged variable(s), system GMM is carried out and its results are presented in Table 5. Parameter estimates in column 1 have signs as per the researcher's anticipation. A 1% increase in previous (lagged) GDP per capita results in an increase in current GDP per capita by 0. 815%. This is a sign of positive conditional convergence. Also a 1 unit increase in investment and entrepreneurship and improvement in institutional quality have an estimated effect of increasing economic growth by 0. 893%, 1. 16% and 1. 36% in that order. Though negative as expected, there is no evidence that reducing government expenditure can improve economic growth.

As shown in column 2 of Table 5, signs of parameters in equation 2 are as predicted except for that of the interaction term. The impact of entrepreneurship on economic growth is subject to the coefficient of the interaction term, that is, it is conditional to the value of the institutional index. Unlike in equation 1 where the impact of entrepreneurship on economic growth is uniform at every point while institution is allowed not to vary, in equation 2 the quality of institution is distinct at every point. Jaccard and Turrisi (2003) and Stock and Watson (2007) highlight that the coefficient of the interaction term does not represent main effects of the independent variable on dependent variable. They also warn against equating the value of the moderator variable to zero if the dataset does not have any zero. According to Jaccard and Turrisi (2003) and Jaccard, Wan & Turrisi (1990) the interaction term has to be significant in order to be interpretable hence signifying its relevance and inclusion in the model. In this regard, the effect of entrepreneurship on economic growth is conditional on institutional ranking[6]. Other independent variables not included in the

[6]$(\beta_4+\beta_6 GI_{it}) * PC_{it}$ SeeJaccard and Turrisi (2003) and Jaccard et al. (1990) and Stock and Watson (2007).

interaction term do not have an effect on other predictors, however they only affect the intercept (Jaccard & Turrisi, 2003). So holding all other variables when entrepreneurship and institutional ranking are at 40, GDP per capita is predicted to rise by 0. 7896% and when entrepreneurship and institutional ranking are at 40 and 60 respectively economies of countries in the sample are expected to grow by 0. 5944% on average. The idea is to see how economic growth reacts to changes in entrepreneurship alongside variations in the quality of institution. From these results one can conclude that undertaking entrepreneurship at low levels of institutional ranking contributes to higher GDP per capita than at higher levels of institutional ranking. Although the coefficient of the multiplication term is negative, it is interesting to note that in terms of its impact or influence on economic growth it is positive. The response of economic growth as a result of changes in entrepreneurship conditional on changes in institution increases at a decreasing rate. A plot graph (Graph 1) of the predicted values of entrepreneurship against institutional ranking also arrive at the same conclusion.

The negative coefficient of the interactive term may suggest that economic growth require a long term stable institutional environment (Zouhaier & Karim, 2012). The other reason might be that improvements in institutional quality can negatively affect certain entrepreneurs in the society such that institutional improvements may fail to stimulate entrepreneurship resulting in less dividends from economic growth. This situation is similar to a study by Berggren, Bergh & Bjørnskov(2012) who find institutional stability to lower economic growth. Also, instead of institutions providing a promotional and motivational role to economic growth (Law & Habibullah, 2009) through entrepreneurship, it may create barriers resulting in economic recession (Butkiewicz & Yanikkaya, 2006).

Results are also supported by Boettke and Coyne (2009) and Palagashvili (2015) who establish that better institutions explains the rules of the game hence making entrepreneurship to be more attractive. Better institutions can determine where entrepreneurship and investment can occur thereby differentiating the level of economic growth among countries. According to Hall and Sobel (2008), better institutions reduces both uncertainty and transaction costs hence allowing individuals to take advantage and increase their participation in entrepreneurial activities. Méndez-Picazo et al. (2012)

also establish a positive and statistically significant impact of governance on entrepreneurship.

Sensitivity test

It is evident that insignificant key variables under the FEM become statistically significant under the system GMM. Firstly, it is important to note that the coefficient of the lagged dependent variable is closer to 1 which is an indication of dynamic stability (Baum, 2013). The AR(1), which is a measure of autoregressive, is statistically significant at 10% and 5% implying that the variables are not endogenous and that there is no first order serial autocorrelation. Additionally, the presence of second order autocorrelation is failed to be rejected as shown by AR(2) values of 0. 297 and 0. 620. According to Baum (2013) insignificant p-values of AR(2) signify that second lags are usable as instruments for their present values. Diagnostic tests attesting the validity of instruments based on the Hansen test are consistent and within the specified range of between 0. 10 and 0. 25 as Roodman (2009a; 2009b) explains. Hansen tests in column 1 and 2 of Table 5 are 0. 242 and 0. 236 respectively. Likewise, the number of panel entities (25 countries) is higher than the total number of instruments (22) used to run the model (Elbahnasawy & Ellis, 2016). This is therefore a confirmation of robust results. Also tests for relevance and inclusion of the interaction terms is performed (Baum, 2006; Cameron & Trivedi, 2010) and results prove that the interaction term is statistically different from zero. According to Baltagi (2008) and Baum (2006) excluding these variables from the model can lead to misleading results. A small p-value from the Wald test (Cameron & Trivedi, 2010) suggests relevance of the interaction term as one of the determinants of economic growth. The inclusion of year dummies and presence of heteroskedasticity in equations 1 and 2 is also tested. These tests confirm the importance of year dummies and the presence of heteroskedasticity in both equations (significant p-values, Prob > F = 0. 0000 and Prob>chi2 = 0. 0000 respectively in FEM). Heteroskedasticity does not affect coefficients but it affects their efficiency through high standard errors.

6. Conclusion

This research contributes to existing literature relating economic growth, entrepreneurship and the quality of institutional by analyzing a separate and combined effect of entrepreneurship with institutional quality on GDP per capita growth of 25 countries for a 14 year period. Results suggest that better institutions and high entrepreneurship promote economic growth. Generally, a conducive environment is key for entrepreneurship because it results in low levels of barriers to entry and cost of transaction and doing business for entrepreneurship. Based on the results, there is ample evidence that entrepreneurship and institutional quality are important determinants of economic growth. Even though factors such as investment and previous growth affect economic growth, it is apparent to note that institutional improvements have the highest impact on economic growth. Another important point to observe is that a combination of effective institutions and increased entrepreneurship stimulate economic growth. Moreover, understanding the obstacles and determinants which affect entrepreneurship, institutions and economic growth and the dynamics through which they are related is important for analyzing the effectiveness of various policy approaches.

Also having an appreciation of how entrepreneurship, individually and interactively with institutional quality relates with economic growth, is crucial for policy formulation and addressing deficiencies in literature. Indicators like institutional quality are closely watched by market participants and are very useful as they help in assessing and taking investment decisions. Also, investors use institutions to adjust their decisions on economic growth and profitability. In this regard, institutional quality improvements can lure investors to be more optimistic and confident about the future and can potentially invest more through high returns expectations.

In view of the above, priority should be invested on improving the quality of institutions by removing barriers, strengthening regulations and property rights, and providing incentives for entrepreneurs to invest, innovate and take active roles in building the economy. In addition to this, strong industrial policy and trade policy frameworks that encourage and support entrepreneurship through creating a favourable institutional environment is critical.

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Appendix

Table 1: A description of variables and their data sources

Variable Name	Explanation	Data Source Link	Expected Sign
Dependent Variable $GDPpc$	Annual per capita GDP	World Bank (WB)	
Independent Variables $GDPpc_{it\_1}$	Lag of GDP per capita	Own calculation of WB data	Positive/ negative
$GFCF$	Gross fixed capital formation to GDP ratio (%). Measurement of investment	WB	Positive
EXP	Gross national expenditure to GDP ratio (%). The higher the level of government expenditure the lower the rate of economic growth	WB	Negative
Variables of Interest PC	Perceived capabilities Entrepreneurship (people aged 18-64 years having existing or new business)	Global Entrepreneurship Monitor (GEM)	Positive
GI	Governance index is the simple average of the six governance indicators. Index ranges from 0-100, with 0 implying bad governance	World Governance Indicators Organization.	Positive
PCG	Multiplicative (interactive) term of entrepreneurship (PC) and governance index		Positive/ negative
HCI	Human Capital Index (2015 figures were averages of 2002 to 2014 figures)	Penn World Table 9	

Table 2: List of countries

Argentina	China	Germany	Japan	Spain
Australia	Croatia	Greece	Netherlands	Sweden
Belgium	Denmark	Hungary	Norway	Switzerland
Brazil	Finland	Ireland	Slovenia	United Kingdom
Chile	France	Italy	South Africa	United States of America

Table 3: Correlation matrix for variables

	lnGDPpcit	lnGDPpcit_1	GFCFit	EXPit	HCIit	PCit	GIit
lnGDPpcjt	1						
lnGDPpcit_1	0. 9340*	1					
	0. 0000						
GFCFit	-0. 2111*	-0. 2548*	1				
	0. 0001	0. 0000					
EXPit	-0. 1881*	-0. 1794*	0. 0416	1			
	0. 0004	0. 0008	0. 4378				
HCIit	0. 7729*	0. 7358*	-0. 2525*	-0. 1108*			
	0. 0000	0. 0000	0. 0000	0. 0383	1		
PCit	-0. 2069*	-0. 2078*	-0. 1573*	0. 0771	-0. 1082*	1	
	0. 0001	0. 0001	0. 0032	0. 1502	0. 0430		
GIit	0. 8277*	0. 7943*	-0. 1778*	-0. 2733*	0. 7376*	-0. 2251*	1
	0. 0000	0. 0000	0. 0008	0. 0000	0. 0000	0. 0000	

Source: Stata 12 output results.
Note: * means significant at 5%.

Table 4: Fixed Effects Model results of equation 1

VARIABLES	1	2
lnGDPpcit_1	0. 123***	0. 122***
	(0. 0302)	(0. 0302)
GFCFit	0. 0518***	0. 0515***
	(0. 00539)	(0. 00540)
EXPit	-0. 00488	-0. 00517
	(0. 00425)	(0. 00426)
PCit	0. 00550***	0. 0146
	(0. 00203)	(0. 00989)
GIit	-0. 00137	0. 00406
	(0. 00471)	(0. 00745)
PCGit		-0. 000120
		(0. 000128)
year	0. 0504***	0. 0500***
	(0. 00288)	(0. 00291)
Observations	349	349
R-squared	0. 681	0. 682
Number of pid	25	25

Source: Stata 12 output results.

Note: *, ** and *** means significant at 10%, 5% and 1% respectively.

In brackets are standard errors controlled for heteroskedasticity.

Table 5: Two-steps system GMM results of equation 2

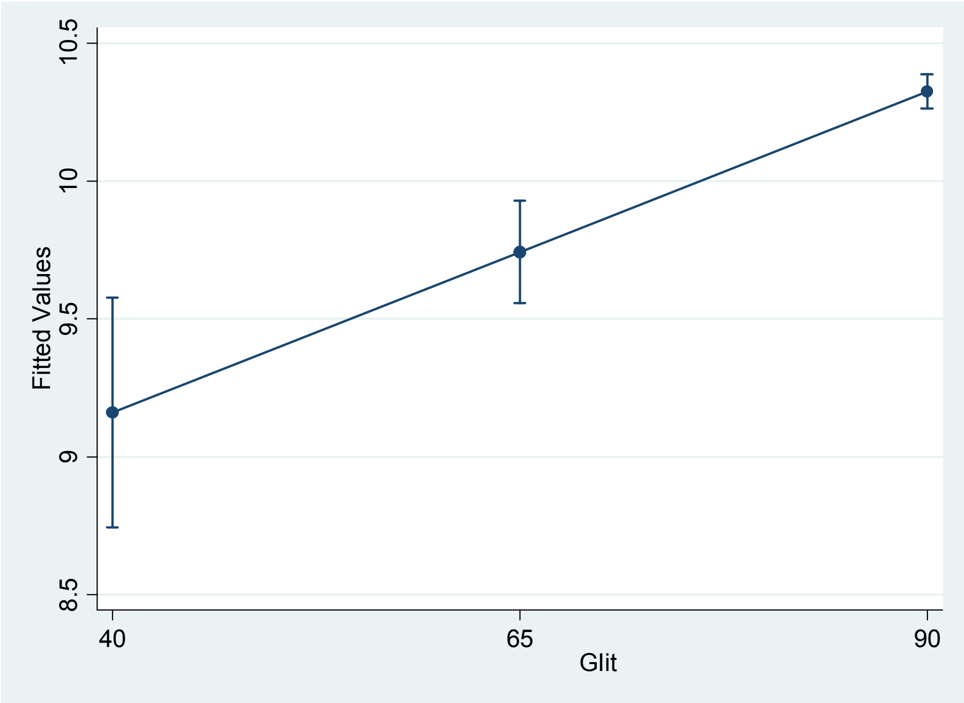
VARIABLES	1	2
lnGDPpcit_1	0. 815***	0. 830***
	(0. 0372)	(0. 0375)
GFCFit	0. 00893**	0. 00855**
	(0. 00346)	(0. 00371)
EXPit	-0. 000585	-0. 00653
	(0. 00382)	(0. 00412)
PCit	0. 0116***	0. 0295***
	(0. 00147)	(0. 00637)
GIit	0. 0136***	0. 0233***
	(0. 00249)	(0. 00473)
PCGit		-0. 000244***
		(7. 79e-05)
year	-0. 00296	-0. 00540*
	(0. 00215)	(0. 00265)
Constant	6. 109	10. 74*
	(4. 362)	(5. 366)
Observations	349	349
Number of pid	25	25
AR(1)	0. 063	0. 023
AR(2)	0. 297	0. 620
Hansen Test	0. 242	0. 236
No. of Instruments	22	22

Source: Stata 12 output results.

Note: *, ** and *** means significant at 10%, 5% and 1% respectively.

In brackets are standard errors controlled for heteroskedasticity.

Figure 1: Two-way plot graph for interaction term



Source: Stata 12 output results.