



High Income Inequality as a Structural Factor in Entrepreneurial Activity

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Abstract

Statistical tests on a panel of data from 54 countries over the 2004–2009 period support the proposition that high income inequality and entrepreneurial activity share a positive linear relationship. In a novel approach, the dependent variable is defined from two independent and uncorrelated perspectives: (1) the World Bank Group Entrepreneurship Snapshot, which measures new business entry density based on secondary official sources; and (2) the Total Early Stage Entrepreneurial Activity of the Global Entrepreneurship Monitor project, which is a survey-based measure of formal and informal entrepreneurial participation rates. The empirical strategy is based on the logic that economies with increasing concentrations of wealth tend to encourage entrepreneurial activity because entrepreneurs accumulate more income than workers. Following the disequalizing model, once this inequality appears, it is reinforced in successive generations. The intuition behind this outcome is that a certain level of initial capital is required to establish a new enterprise, which implies that the probability of becoming an entrepreneur increases if an individual has inherited wealth.

Keywords: entrepreneurial activity; income inequality; institutions; gini index.

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1. Introduction

The widening development gap among countries is an omnipresent and well-documented trend (Kreutzmann, 2008). Approximately 80% of the world's total gross domestic product (GDP) belongs to the 1 billion people living in developed countries, and the remaining 20% is shared by the 5 billion people living in the developing world. The vast majority of the world's population is poor. This concentration of wealth is a puzzle that has not yet been adequately solved in the management literature. In fact, the relationship between business creation and wealth remains one of the most understudied and important issues in the growing field of entrepreneurship (Fairlie and Krashinsky, 2012).

The general objective of this paper is to bridge two sub-disciplines in the respective fields of management and economics: entrepreneurship and development economics. According to Naudé (2010), entrepreneurship and development economics have evolved in relative isolation with respect to one another; because development economics is the sub-discipline in economics that addresses growth and structural change in economies, this gap is a surprising limitation in the academic literature. Bapuji and Riaz (2013) add that management literature requires more empirical work that addresses the linkages between economic inequality and management, rather than focusing solely on either one in isolation.

This paper takes a small step toward understanding the origins of entrepreneurial activity by investigating the extent to which income inequality is a determining factor; specifically, it asks whether inequalities in income distribution play an important role in fostering entrepreneurial activity. I draw on panel data from 54 nations for the period 2004-2009 to test the proposition that the level of income inequality affects the rates of entrepreneurial activity across nations. Based on cross-country statistical analyses of such panel data, I posit that a rise in income inequality increases the probability of entrepreneurial activity. As a novel approach, I use two indicators for entrepreneurial activity as dependent variables, each of which reflects a different aspect of entrepreneurship.

The results indicate that there is a positive linear relationship among income inequality and the following two independent measures of entrepreneurial activity across nations: (1) entry density, as derived from the World Bank Group Entrepreneurship Snapshot (WBGES); and (2) Total Early Stage Entrepreneurial Activity (TEA), as derived from the Global Entrepreneurship Monitor (GEM) project. The results are robust to a wide range of macroeconomic, institutional, and competitiveness controls.

Entrepreneurs accumulate more income than workers, which leads to concentrations of wealth (Quadrini, 1999), and also have higher wealth-income ratios and higher saving rates than workers. These different saving patterns generate higher asset holdings and higher levels of wealth concentration in the hands of entrepreneurs (Meh, 2005). Moreover, previous generations of wealthier families are more likely to be characterized by individuals who have engaged in entrepreneurial activities than the previous generations of other families; thus, because the wealth accumulated during business periods is generally not depleted immediately, these entrepreneurial families have greater resources to start or restart businesses (Quadrini, 1999). These features of the family dynamics of entrepreneurs further reinforce the intuition that the probability of becoming an entrepreneur increases if an individual has inherited wealth because initial capital is required to establish new enterprises (Holtz-Eakin et al., 1994a; 1994b).

The findings of this paper complement the arguments of Shane (2009) that the typical start-up is not innovative, generates little wealth, does not make markets more competitive, and creates few jobs. Shane (2009) adds that government resources are founding wage-substitution businesses that have more in common with self-employment than with the creation of high-growth start-ups. The practical implications of the findings are grounded in the conceptual framework that self-employed individuals at the lower end of the distribution are fundamentally different from the self-employed individuals at the upper end of the distribution (Tamvada, 2010). Therefore, "entrepreneurship-supporting policies could be particularly successful in reducing inequality if directed at the low-income, low-wealth, and relatively uneducated segments of society" (Kimhi, 2010: 89).

The rest of the article is structured as follows. The next section presents the theoretical arguments related to the relationship between entrepreneurial activity and income inequality. I then provide a description of the variables of interest and the sample selection. Next, I define the structural factors in entrepreneurial activity and describe a series of statistical tests together with their most significant findings. The last section concludes with a discussion and suggestions for future research, in addition to addressing the main limitations of the study.

2. Theoretical framework

Entrepreneurial activity is frequently considered a key source of jobs (Bednarzik, 2000) and economic growth (Schumpeter, 1934), even during economic crisis (Kraus et al., 2012). However, despite the growing list of beneficial consequences, entrepreneurial activity should not be considered an umbrella policy, mainly because entrepreneurship

might also be linked to wealth accumulation and distribution (Holtz-Eakin et al., 1994a, 1994b; Quadrini, 1999; Gentry and Hubbard, 1999; Meh, 2005).

In this study, I contribute to the argument that links entrepreneurial activity and income inequality by using data in the statistical tests that cover a larger sample (54 countries) and a more recent period (from 2004 to 2009) than the previous literature. Measuring entrepreneurial activity as the dependent variable from two independent and uncorrelated perspectives is also a novel approach compared with the previous literature.

Disqualifying Model

Three models have essentially tried to explain patterns of income inequality. The neutral model suggests that societies that begin equal remain equal over the long run. Thus, variations in the level of development across countries can be explained by historical differences in inequality (Galor and Zeira, 1993; Ghatak and Jiang, 2002). The equalizing model predicts that wealth differences among households tend to vanish over the long run because market forces offer a variety of investment options (Becker and Tomes, 1979; Loury, 1981). In contrast, the disqualifying model argues that, even if all households begin equally, the children of such households must choose occupations that have varying entry costs, which results in inequality for the following generation (Ljungqvist, 1993); once this inequality appears, it tends to be reinforced in successive generations (Freeman, 1996). The conceptual framework of this paper is based on the disqualifying model because entrepreneurs tend to accumulate more income than workers, which encourages concentrations of wealth among entrepreneurs that are difficult to reverse. The logic is straightforward. The higher targeted wealth-income ratio leads to higher saving rates among enterprising households compared with worker households. The different saving patterns of entrepreneurs and workers in turn result in higher asset holdings and a higher level of concentration in the entire distribution of wealth for entrepreneurs (Meh, 2005: 707). Tamvada (2010) also found patterns of an unequal distribution of income among entrepreneurs because those individuals who also hire others have the highest returns in terms of consumption, whereas the self-employed, i.e., those entrepreneurs who work for themselves, have slightly lower returns than salaried employees.

Liquidity Constraint Argument

Empirical work on the impact of liquidity constraints on the decision to become an entrepreneur is grounded in the argument that initial capital is typically required to establish a new enterprise; thus, the probability of becoming an entrepreneur increases if an individual has inherited wealth. Us-

ing data from the 1981 and 1985 federal individual income tax returns of a group of people who received inheritances in 1982 and 1983 that includes information about the size of their inheritances, Holtz-Eakin et al. (1994a) found that an inheritance of \$150,000 increases the probability that an individual will continue as a sole proprietor by 1.3 percentage points and that the receipts of any surviving enterprise increase by almost 20%. Similarly, Holtz-Eakin et al. (1994b) suggest that a \$100,000 inheritance increases the probability of making the transition to entrepreneurship from 19.3% to 22.6%, or 3.3 percentage points.

Quadrini (1999) reached similar conclusions: in wealthier families, individuals who have engaged in business activities during previous periods are more common than those who have not, and these families have greater resources to restart businesses because the wealth accumulated during the business period is generally not depleted immediately. Using family wealth data for the years 1984 and 1989 from the Panel Study of Income Dynamics (an annual national survey conducted since 1968 on a sample of more than 4,800 U.S. families), Quadrini (1999) concludes that owning a business can only be partially financed with external funds, such that only those with sufficient personal wealth are able to found profitable businesses. These findings support Blanchflower and Oswald (1990), who suggest that if owning a substantial capital stock is important to starting a business, then those who receive a lump sum of capital should have a higher probability of success.

Ultimately, because of liquidity constraints, only those entrepreneurs who have substantial personal financial resources will survive and grow in the medium to long run because the average entrepreneur cannot borrow sufficiently to attain profit-maximizing levels of capital (Holtz-Eakin et al., 1994a). This intuition is consistent with empirical regularities of firm size dynamics: smaller firms fail more often than large firms. Firms in fact become larger because their exit rates are lower (Meh, 2005); thus, the larger the project, the lower its probability of receiving bad shocks. Based mainly on these arguments, I therefore hypothesize that a rise in income inequality increases the probability of entrepreneurial activity.

3. Data definition and sample selection

Dependent Variables

The measure for the first dependent variable (i.e., entrepreneurial activity) is from the 2010 dataset of the WBGES. The WBGES uses new business entry density to measure entrepreneurial activity. This measure is calculated as the number of newly registered firms as a percentage of the economy's working-age population (15–64 years of age) normalized by 1,000 for the six-year period from 2004 through 2009 (Klap-

per and Love, 2010; World Bank, 2010). The second dependent variable comes from the GEM project's TEA measurement. TEA is the participation rate of working-age individuals in the early stages of venture creation (Amorós, 2011). This "early stage" work includes "nascent entrepreneurship," the stage that occurs before a new firm is opened, and "owning-managing a new firm," which includes an additional 42 months after the start-up date (Bosma et al., 2012: 20).

Although business registration is an official record and the TEA rate is an estimate that is based on phone surveys, using TEA has advantages because it focuses on the person and on both formal and informal work (Amorós, 2011). Unregistered firms that belong to the informal sectors of the economy in fact may comprise as much as 80% of the economic activity in developing countries (Bosma et al., 2012). Thus, including informal entrepreneurship in the measurement of entrepreneurial activity should generate more accurate results. Moreover, as has been argued elsewhere (Hinojosa-Martínez and Albornoz-Pardo, 2013; Cabana-Villca et al., 2013), GEM data is a sufficiently valid empirical source of information.

Main independent variable

The focal point of the analysis is income inequality, which can be measured accurately by the Gini index, which is a scale that measures the degree of inequality in a country's income distribution. The more equal a country's income distribution is, the lower its Gini index, whereas the more unequal a country's income distribution is, the higher its Gini index. If income is distributed with perfect equality, the index value is zero; if income is distributed with perfect inequality, the index value is 100.

Three secondary sources of information were used as measurements for the Gini index: the Central Intelligence Agency World Factbook (CIA - The World Factbook), the United Nations Development Programme indicators (UNDP), and the United Nations University World Institute for Development Economics Research income inequality database (UNU-WIDER). The definition and methodology for calculating the Gini index are practically identical in these three sources. In cases in which data were available from more than two sources, the average for that period was used (Refer to Table A1 in the appendix.)

Sample

The sampling technique is probability systematic, in which the initial sampling point is selected at random and the cases are then selected at regular intervals. The initial sampling point is the WBGES dataset of 115 developing and industrial countries for the 2004-2009 period. In the analysis, the

world sample was first trimmed to 62 countries and included only those countries that appeared in both the GEM and the WBGES dataset during the 2004-2009 period. The second cut was made because of a lack of data for six countries once the macroeconomic variables included in the World Economic Outlook (WEO) database were used (these variables are defined in the regression models as "basic effects"). These six countries include the following: Bolivia, Guatemala, India, and Uganda (lack of unemployment data); Macedonia (lack of investment data); and Switzerland (lack of savings data). The next cut (Tunisia) reduced the sample to 55 countries and was made to conform to the use of data from the Global Competitiveness Index (GCI). The final sample number of 54 countries (shown in Table A2 in the appendix) was arrived at by eliminating Algeria, for which data required to calculate the Gini coefficient were missing.

4. Structural factors in entrepreneurial activity

Three sources of information are used to measure the structural factors in entrepreneurial activity: the WEO database from the International Monetary Fund, the Worldwide Governance Indicators (WGIs) from the World Bank, and the GCI from the World Economic Forum, Executive Opinion Survey Dataset. (Table 1 at the end of this section presents the descriptive statistics of all variables.)

World Economic Outlook (WEO)

The values for the 2004-2009 period from the April 2012 WEO database are used to measure four basic effect factors. The first three factors are expected to demonstrate a positive relationship with both measures of entrepreneurial activity (i.e., WBGES and TEA), whereas the unemployment rate is expected to have a strong negative sign (Bednarzik, 2000).

1. Log GDP per capita: Data are derived by first converting GDPs in their national currencies to U.S. dollars and then dividing by the total applicable population. GDP per capita is expressed using logs to avoid giving excessive weight to extremely high and low observations.

2. Investment rate: This factor is expressed as the ratio of total investment in the current local currency to GDP in the current local currency. Total investment, or gross capital formation, is the total value of the gross fixed capital formation, changes in inventories, and acquisitions, less the disposal of valuables for a unit or sector.

3. Savings rate: This factor is expressed as the ratio of gross national savings in the current local currency to GDP in the current local currency. Gross national savings is gross disposable income less final consumption expenditures after taking into account an adjustment for pension funds.

4. Unemployment rate: The unemployment rate is expressed as the percentage of unemployed workers in the total labor force. As defined by the International Labour Organization, unemployed workers are those who are currently not working but are willing and able to work for pay and are actively searching for work.

Worldwide Governance Indicators

According to the Organisation for Economic Co-operation and Development (OECD) (1998), institutions are essential for understanding the outcomes observed in entrepreneurship, where institutions are broadly understood as the “rules of the game” (Naudé, 2010: 1). However, measuring the umbrella term “institutions” is a difficult task. I used three WGIs for the period 2004–2009. These variables are expected to have strong positive coefficients. (WGI scores range from approximately -2.5 to 2.5, with higher values corresponding to better levels of governance.)

1. Voice and accountability: This variable reflects perceptions about the extent to which a country’s citizens are able to participate in selecting their government and to exercise rights involving freedom of expression, freedom of association, and a free media.

2. Political stability and the absence of violence: This variable reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, which includes politically motivated violence and terrorism.

3. Rule of law: This variable reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, particularly with respect to the quality of contract enforcement, property rights, the police, and the courts, in addition to the likelihood of crime and violence.

Global Competitiveness Index

The OECD (1998) report also includes other competitiveness issues as potential factors of entrepreneurial activity, such as the quality of infrastructure and the availability of venture capital. These factors are measured effectively using the GCIs (the GCI scores are expressed on a scale ranging from 1 to 7, with 7 being the most desirable outcome). The GCIs, however, are available only for the 2006–2009 period. All GCI variables are expected to have a strong positive coefficient except for the number of procedures and days required to start a business.

1. Venture capital availability. This indicator asks, “How easy is it for entrepreneurs with innovative but risky projects to find venture capital?” [1 = very difficult; 7 = very easy].

2. Quality of the educational system. This indicator asks, “How well does the educational system in your country meet the needs of a competitive economy?” [1 = not well at all; 7 = very well].

3. Property rights. This indicator asks, “How would you rate the protection of property rights, including financial assets, in your country?” [1 = very weak; 7 = very strong].

	Observations	Mean	Standard Deviation	Minimum	Maximum
Entrepreneurship Snapshots (WBGES)	298	3.82	4.29	0.09	27.03
Total Entrepreneurial Activity (TEA)	208	8.7%	6.1%	1%	40%
GINI index	185	38.07	10.49	23	67.4
Log GDP per capita	324	4.10	0.48	3.04	4.98
Investment rate	324	23.1%	4.6%	14%	40%
Savings rate	324	22.1%	7.3%	-4%	48%
Unemployment rate	324	8.5%	5.1%	1%	31%
Voice & accountability	324	0.64	0.77	-1.22	1.83
Political stability & absence of violence	324	0.24	0.85	-2.20	1.59
Rule of law	324	0.63	0.94	-1.03	2.01
Venture capital availability	215	3.56	0.85	1.96	5.38
Quality of overall infrastructure	215	4.55	1.29	1.97	6.70
Property Rights	215	5.13	1.03	2.78	6.67

Table 1. Descriptive Statistics

5. Empirical tests and results

Between-effects (BE) models with the ordinary least squares (OLS) option are used in all the specifications. Because the p-value of the Hausman test is not significant, the choice of fixed-effects models is rejected. BE models estimate the cross-sectional information in the data, the fixed-effects models use the time-series information in the data, and the random-effects estimator is a matrix-weighted average of the results from these two models. BE models fit “random-

effects models by using the between-regression estimator” (StataCorp, 2009: 442). Regressions with between effects are equivalent to taking the mean of each variable for each case across time and running a regression on the collapsed dataset of the means. The BE model should be used to control for omitted variables that change over time but are constant between cases. This characteristic is typical for cross-country estimates that explain entrepreneurial activity using both the individual and combined effects of macroeconomic factors, institutional factors, and competitiveness factors. In

Dependent Variables: WBGES & TEA	I Macroeconomic basic effect		II Basic effect + institu- tional indicators		III Whole-set (including competitiveness indi- cators)	
	WBGES	TEA	WBGES	TEA	WBGES	TEA
GINI index	0.11 (1.78)*	0.002 (1.78)*	0.14 (2.26)**	0.001 (1.71)*	0.15 (3.11)***	0.002 (1.78)*
Log GDP per capita	4.26 (2.97)***	-0.07 (-3.06)***	0.59 (0.24)	-0.12 (-3.29)***	2.56 (1.38)	-0.11 (-2.92)***
Investment rate	18.68 (1.55)	-0.017 (-0.11)	15.75 (1.31)	0.08 (0.47)	20.45 (2.60)**	0.09 -0.56
Savings rate	-19.86 (-2.24)**	-0.19 (-1.34)	-25.19 (-2.60)**	-0.06 (-0.37)	-22.28 (-3.38)***	-0.06 (-0.41)
Unemployment rate	-40.19 (-2.54)**	-0.41 (-2.02)*	-39.86 (-2.60)**	-0.43 (-2.09)**	-23.32 (-2.02)*	-0.36 (-1.61)
Voice & accountability			-1.11 (-0.85)	0.04 (1.74)*	-1.80 (-1.87)*	0.03 (1.53)
Political stability & absence of violence			1.46 (1.49)	-0.01 (-1.06)	1.08 (1.52)	-0.01 (-0.79)
Rule of law			2.01 (1.70)*	0.01 (0.45)	1.86 (1.13)	0.01 (0.23)
Venture capital availability					2.26 (2.80)***	0.02 (1.02)
Quality of overall infrastructure					-0.13 (-0.18)	-0.004 (-0.29)
Property rights					-1.55 (-1.27)	-0.01 (-0.48)
Adjusted R-squared	35%	42%	45%	48%	62%	53%
N	171	129	171	129	102	83

Table 2. Cross-country results for entrepreneurial activity, panel data 2004-2009. (Between-estimates linear regression models, OLS)

Notes: Heteroskedasticity-consistent t-ratios (White, 1980) in parentheses.

***Significant at 1%; **significant at 5%; *significant at 10%.

particular, BE models use the variation among countries to estimate the effect of the omitted independent variables on the two measurements of entrepreneurial activity. In all the specifications, the BE models are consistent because the panel-level means of the regressors are uncorrelated with the panel-specific heterogeneity terms.

Table 2 shows that three factors are clearly the most significant. The first is that entrepreneurial activity is consistently associated with more income inequality. The estimated coefficients of the income inequality regressor are always significant, assuming that classical assumptions hold. However, the slope coefficients are relatively small, which implies that an improvement (i.e., decrease) in the Gini index score of approximately six units is associated with a decrease in the registration of approximately one new firm for every 1,000 working-age adults and with an approximately 1 percentage point decrease in the number of working-age individuals who engage in some type of entrepreneurial activity (assuming that all other factors affecting entrepreneurial activity are held constant). Statistically speaking, the explanatory power of income inequality regarding entrepreneurial activity is reasonably good as judged by the usual t-test of significance. In all statistical tests, I compute robust standard errors for which I correct for potential heteroskedasticity and for the potential correlation of the error term across observations. The negative estimator of the parameter in the TEA specifications, however, does not confirm the underlying theory, but this result should not be surprising. In fact, a growing stream of research has documented a negative relationship between entrepreneurial activity and economic growth in developing countries (Van Stel et al., 2005). One explanation for this negative relationship is that the TEA measurement captures both formally and informally registered businesses (Bosma et al., 2012). Another explanation is that entrepreneurial activity has two drivers (Acs and Amorós, 2008; Amorós and Cristi, 2008). The first is necessity-driven entrepreneurship, which is common in poor countries. The second is opportunity-driven entrepreneurship, which is common in wealthy countries.

The third significant factor in terms of significance, the unemployment rate, supports the underlying theory (Bednarzik, 2000). As predicted, the WBGES specifications indicate that if the unemployment rate decreases by 1 percentage point, the median number of newly registered firms per 1,000 working-age individuals increases by approximately 4 on average (significant at the 5–10% level). The TEA specifications support these findings; that is, a decrease in the unemployment rate by 1 percentage point, *ceteris paribus*, is associated with an increase of less than half a percentage point in the average number of working-age adults who engage in entrepreneurial behavior. However, it is also notable that after the competitiveness indicators entered the

regression, the unemployment rate in the TEA specification lost significance, which is a typical sign of multicollinearity issues. These signs of multicollinearity are similar to the effect observed with log GDP per capita once the institutional indicators entered the WBGES specifications.

In fact, estimating an individual joint relationship between entrepreneurial activity and its determining factors is not free of a potentially high degree of multicollinearity among explanatory variables. The first signs of multicollinearity are high pairwise correlations (shown in Table A3 in the appendix). Pairwise correlations between explanatory variables are relatively low except for log GDP per capita. More importantly, the low correlations between the Gini index and the other predictors might suggest that multicollinearity is most likely not a problem for the main variable of interest. However, in the strictest sense, high pairwise correlations among explanatory variables are frequently unreliable and misleading, “for pairwise correlations can be low (suggesting no serious collinearity problems) yet collinearity is suspected because very few t ratios are statistically significant” (Guratti and Porter, 2010: 254–255).

As an alternative to simple pairwise correlations, a few indicators signal the existence of multicollinearity in concrete applications. For example, the main variable of interest—the Gini index—generates very small changes in the estimated regression coefficients when the institutional and competitiveness predictor variables are added. Moreover, I also used the variance inflation factor (VIF) for the entire dataset as an indicator of multicollinearity. The VIF values ranged from the two lowest, 1.33 (investment rate) and 1.76 (unemployment rate), to the two highest, 17.89 (rule of law) and 10.30 (property rights). In theory, when the VIF value is less than 10, multicollinearity is not a problem. The VIF cutoff value of 10 was originally suggested by Marquardt (1970, p. 610) and was later validated by Marquardt (1987), O’Brien (2007), and Mason and Perreault (1991). Once the two problematic variables—“rule of law” and “property rights”—were dropped from the equation, the mean VIF decreases from 5.34 to 2.64 (Gini index VIF scores decreased from 2.32 to 1.77).

Finally, I also ran several regressions that always included the Gini index, but I omitted explanatory variables with relatively high degrees of collinearity. In this way, I marginally controlled for plausible scenarios in which the main inde-

Interpretations of the empirical results follow the principle of Ockham’s razor to maintain simplicity in the explanations. William Ockham (1285–1349) argues that a complicated explanation should not be accepted without good reason and writes as follows: “Frustra fit per plura, quod fieri potest per pauciora – It is vain to do with more what can be done with less” (Gujarati and Porter, 2010: 27).

pendent variable might capture the explanatory power of similar predictors. In all cases, the Gini index had strong and significant positive coefficients in the regression models. For example, the first two columns of Table A4, which test multicollinearity issues after dropping “rule of law” and “property rights,” are plausibly the most robust models, which results mainly because the significance is more evenly distributed among explanatory variables and the overall fits of the models report values as high as 73%.

Although it is possible to alleviate (but never eliminate) potential endogeneity between entrepreneurial activity and its explanatory factors, the last two columns of Table A4 address issues of endogeneity by lagging all explanatory variables one year. It is important to note that the endogeneity tests do not affect the size or direction of the coefficients. Endogeneity tests, however, decrease the number of observations, which affects the validity of the results, i.e., regarding the TEA specifications. Table A4 also confirms venture capital availability as a significant determining factor of entrepreneurial activity, which is logical.

6. Conclusion

Contrary to the mainstream literature that associates entrepreneurial activity to overall well-being, this paper specifically suggests that entrepreneurial activity is associated with greater income inequality (within the limitation of a world sample of 54 countries). Following the disequalizing model, which predicts that income inequality is reinforced over successive generations (Freeman, 1996), the arguments to support these findings are based on the logic that entrepreneurs tend to accumulate more income than workers, which leads to concentrations of wealth among entrepreneurs (Quadrini, 1999). Enterprising households also have a higher wealth-income ratio than workers and thus have higher saving rates, which leads to higher asset holding in the hands of entrepreneurs (Meh, 2005). A higher concentration of wealth and higher asset holding, in turn, increases the probability among enterprising families of receiving inherited wealth (Holtz-Eakin et al., 1994a; 1994b). In addition, those individuals who receive a lump sum of capital should have a higher probability of becoming successful entrepreneurs because owning a stock of capital is important to starting a business (Blanchflower and Oswald, 1990).

The conclusions presented here are subject to a number of limitations. First, the Gini coefficients for different countries are sometimes calculated using different methods. Some coefficients are calculated using expenditures, whereas others use revenues (Alesina, Di Tella, MacCulloch, 2004: 2013-2014). Furthermore, the measurements of the two dependent variables might also be misleading because data based on the registration of firms are dubious in highly corrupt

countries and also because the GEM data might present bias issues due to their collection from phone surveys. Another limitation of studying income inequality and entrepreneurial activity is that there might be a problem of reverse causality. For example, individuals may have a higher tendency to report themselves as entrepreneurs out of sheer necessity when inequality is high because there are no jobs available in the economy.

An interesting extension of the findings presented here would be to study the specific conditions required to reverse the association between income inequality and entrepreneurial activity. One research opportunity is to qualitatively explore specific cases in which fostering high-growth entrepreneurship is accompanied by a positive impact on income inequality. Shane (2009) specifically argues that it is good public policy to stop subsidizing the formation of the typical start-up and instead to focus on the subset of businesses with growth potential. Kimhi (2010: 89) also suggested, “entrepreneurship-supporting policies could be particularly successful in reducing inequality if directed at the low-income, low-wealth, and relatively uneducated segments of society.” These are relevant issues because high-growth entrepreneurship has the potential to raise people out of poverty, encourage innovation, create jobs, reduce unemployment, make markets more competitive, and enhance economic growth. Finally, future research should focus on developing economies because there has been little formal investigation of the relationship between entrepreneurship and income inequality in developing countries (Naudé, 2010). These extensions of this study are left for future research.

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Appendixes

	2004			2005			2006			2007			2008			2009		
	CIA	UNDP	WIDER	CIA	UNDP	WIDER	CIA	UNDP	WIDER	CIA	UNDP	WIDER	CIA	UNDP	WIDER	CIA	UNDP	WIDER
Argentina		51		49		50	48		48	47			46			46		46
Australia		29						31										
Austria		26				26			25		26							
Belgium		26			28	28			28									
Bosnia and Herzegovina						36				36	36							
Brazil		57		57		56	57			56			55			55		
Canada					32													
Chile							52									52		52
Colombia		56		56			59			59			57			57		
Croatia						29						34						27
Czech Republic						26			25			27						31
Denmark		24				24			24									
Dominican Republic		51		51		51	52		52	49	48		49			49		
Egypt		34		32								31						
Finland		25				26			26					27				
France		28				28			27					33				
Germany		28				26		27	27									
Greece		33			33	33			34									
Hong Kong											53							
Hungary		27				28			26	31								25
Iceland		24			25	25		28	26									
Indonesia				34	39	39												37
Ireland		32				32			32									
Israel														39				
Italy		33				33		32	32									
Jamaica		46				46												
Japan														38				
Jordan							38				40		34					
Kazakhstan		37				42	31		41	31			29			29		28
Korea		32																
Latvia						39			39	36			37					
Malaysia		40								46						46		46
Mexico		50				51	48						48	52				
Morocco										41	41							
Netherlands						27			26		31							
New Zealand		34																
Norway		25				28			30					25				
Panama		55		54			55											52
Peru		48		51	51	48	51			52			49			49		
Philippines							44	46								43		
Poland		35		35		37	34	34	34	34			34			34		
Portugal		38				38			38		39							
Romania		36		32		36	32		36	32			31			30		
Russia		47		38		45	42		45	44			42			40		
Serbia		33		33		31	30		35	29			28	28		28		
Singapore														48				
Slovenia		24	30			28			31					28				
South Africa						65	67									63		
Spain		31				32	32		31									
Sweden		23				23	23		23									
Thailand							42						41			40		54
Turkey				43			40			39			39					
United Kingdom						34	34		32									
Uruguay		46		46		45	47			48			46			46		

Table A1. Gini data

Very High Human Development	MBGES	TEA	High Human Development	MBGES	TEA	Medium Human Development	MBGES	TEA
Argentina	0.56	13.04	Bosnia & Herz.	0.71	6.73	Dominican Rep.	2.13	18.21
Australia	6.33	12.07	Brazil	2.10	12.75	Egypt	0.13	13.11
Austria	0.64	3.86	Colombia	1.02	23.07	Indonesia	0.17	19.28
Belgium	4.15	3.27	Jamaica	1.12	18.92	Jordan	0.59	14.25
Canada	8.00	8.43	Kazakhstan	2.88	9.36	Morocco	0.98	15.75
Chile	2.18	12.31	Malaysia	2.60	7.75	Philippines	0.23	20.44
Croatia	2.95	6.48	Mexico	0.62	8.09	South Africa	1.13	5.90
Czech Rep.	2.53	7.85	Panama	3.04	9.59	Thailand	0.64	20.94
Denmark	6.29	4.81	Peru	2.13	30.58			
Finland	3.20	5.63	Romania	5.75	4.34			
France	3.14	4.82	Russian Fed.	4.03	3.73			
Germany	1.18	4.51	Serbia	2.10	7.02			
Greece	0.94	7.42	Turkey	0.99	5.87			
Hong Kong	15.25	5.52	Uruguay	3.08	12.21			
Hungary	4.46	5.81						
Iceland	14.61	11.58						
Ireland	5.97	8.14						
Israel	4.66	6.15						
Italy	1.89	4.35						
Japan	1.43	3.27						
Korea, Rep.	1.56	8.50						
Latvia	5.88	6.94						
Netherlands	2.95	5.41						
New Zealand	22.85	16.12						
Norway	4.84	8.18						
Poland	0.49	8.83						
Portugal	4.01	6.37						
Singapore	6.55	5.93						
Slovenia	3.49	4.69						
Spain	4.57	6.30						
Sweden	4.04	3.84						
United Kingdom	9.25	5.90						

Table A2. Statistical sample

Note: The information reflects the available data for the average period of 2004–2009. Countries are subdivided in categories based on the Human Development Index (HDI) value determined by the United Nations Development Programme (UNDP). Countries are listed in alphabetical order.

	GINI index	Log GDP per capita	Investments rate	Savings rate	Unemployment rate	Voice & accountability	Political stability & absence of violence	Rule of law	Venture capital availability	Quality of Infrastructure	Property rights
GINI index	1										
Log GDP per capita	-.60*	1									
Investments rate	-.27*	-.10	1								
Savings rate	-.14	.11*	.18*	1							
Unemployment rate	.31*	-.48*	-.12*	-.46*	1						
Voice & accountability	-.48*	.80*	-.16*	-.19*	-.25*	1					
Political stability & absence of violence	-.60*	.75*	.05	.11*	-.36*	.71*	1				
Rule of law	-.62*	.87*	-.12*	.15*	-.46*	.78*	.78*	1			
Venture capital availability	-.40*	.63*	-.02	.37*	-.45*	.45*	.48*	.73*	1		
Quality of Infrastructure	-.34*	.72*	-.17*	.27*	-.43*	.50*	.62*	.84*	.68*	1	
Property rights	-.28*	.73*	-.15*	.15*	-.41*	.61*	.65*	.89*	.75*	.87*	1

Table A3. Pairwise correlation matrix of explanatory variables. Note: Significant at the 5% level.

Dependent Variables: WBGES & TEA	I		II		III	
	Low multicollinearity		Endogeneity test: Low multicollinearity		Endogeneity test: Whole-set	
	WBGES	TEA	WBGES	TEA	WBGES	TEA
GINI index	0.12 (2.81)***	0.002 (1.84)*	0.15 (2.91)***	0.004 (2.97)***	0.19 (3.26)***	0.003 (2.75)**
Log GDP per capita	2.85 (1.56)	-0.11 (-2.98)***	2.93 (1.22)	-0.16 (-3.70)***	2.85 (1.19)	-0.17 (-3.87)***
Investment rate	19.96 (2.56)**	0.09 (0.58)	24.04 (2.42)**	0.25 (1.58)	22.24 (2.20)**	0.29 (1.93)*
Savings rate	-20.79 (-3.24)***	-0.04 (-0.31)	-21.58 (-2.89)***	0.05 (0.48)	-26.06 (-3.23)***	0.11 (0.92)
Unemployment rate	-25.73 (-2.27)**	-0.36 (-1.71)*	-22.07 (-2.19)**	-0.21 (-1.13)	-24.14 (-2.36)**	-0.14 (-0.71)
Voice & accountability	-1.47 (-1.70)*	0.04 (1.98)*	-1.31 (-1.16)	0.04 (2.07)**	-2.13 (-1.57)	0.07 (2.70)**
Political stability & absence of violence	1.21 (1.75)*	-0.01 (-0.83)	1.31 (1.36)	-0.02 (-1.06)	0.94 (0.95)	-0.01 (-1.07)
Rule of law					2.72 (1.32)	-0.07 (-1.73)*
Venture capital availability	2.09 (3.02)***	0.01 (1.05)	2.95 (3.26)***	0.03 (1.97)*	3.14 (3.01)***	0.03 (2.19)**
Quality of overall infrastructure	-0.33 (-0.67)	-0.01 (-0.63)	-0.59 (-1.02)	0.01 (1.05)	-0.45 (-0.54)	0.01 (1.19)
Property Rights					-1.96 (-1.32)	0.03 (1.45)
Adjusted R-squared	60%	53%	60%	73%	63%	76%
N	102	83	80	62	80	62

Table A4. Multicollinearity and Endogeneity tests, panel data 2004-2009. (Between-estimates linear regression models, OLS)

Notes: Heteroskedasticity-consistent t-ratios (White, 1980) in parentheses.

***Significant at 1%; **significant at 5%; *significant at 10%.

Endogeneity is alleviated by lagging predictor variables 1 year.