Analogous Relationship Between International Rankings by Entrepreneurship and Human Development Indexes

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Abstract

This study empirically examines the hypothesis of equality of the measures of entrepreneurship and human development by evaluating the Global Entrepreneurship Index (GEI) and the Human Development Index (HDI) for 2016 and 2017 through method comparison analysis. There were no systematic or proportional differences in the ranking of nations by the two measures. A validation analysis shows that the two indices are highly correlated identical predictors of other entrepreneurship variables. Thus, HDI can replace GEI as an entrepreneurship measure. Moreover, this study highlights issues in nations' rankings. The implication for policymakers is to exercise caution in interpreting such rankings and in evaluating policy effects by observing the changes in rankings over a period of time. Our study, which establishes a positive relationship between entrepreneurship and human development, emphasises the need for increasing the specificity of entrepreneurship measures, otherwise these indices become mere measures of human development.

Keywords: Global Entrepreneurship Index, Human Development Index, Ranking of Nations By Indices, Passing–Bablok Regression, Bland–Altman Analysis

JEL Classification: E01, L26, O15

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1. Introduction

Since entrepreneurs and entrepreneurship are recognised to be among the drivers of a nation's economy, it is critical to measure entrepreneurship for formulating economic development policies. Entrepreneurship is a multifaceted, heterogeneous activity (Thurik et al., 2002). In the absence of internationally comparable indicators that capture the real innovative nature of entrepreneurship, it is difficult to draw firm conclusions about the true level of entrepreneurial activity in a country (Kukoc and Regan, 2008). Further, the fluid definition of entrepreneurship makes its measurement problematic. Entrepreneurship has been described variously as the creation of new combinations (Schumpeter, 1934), the reallocation of resources (Herron and Robinson, 1993), the discovery and exploitation of opportunities (Companys and McMullen, 2007), and the ability to take risks (Antoncic et al., 2018), to list a few. Studies with a solid theoretical foundation use valid, reliable measures and are critical to advancing research (Slavek and Drnovsek, 2012). The ability and skill to measure variables accurately is a cornerstone to progress in studying entrepreneurship (Reynolds, 2010). Research on entrepreneurship relies far too heavily on measures whose reliability, validity, or measurement errors are not reported, and the issues faced in construct development are not described (Slavek and Drnovsek, 2012). Although many measures of national entrepreneurship, such as the Total Early-stage Entrepreneurial Activity (TEA) from the Global Entrepreneurship Monitor (GEM), the Global Entrepreneurship Index (GEI) developed by the Global Entrepreneurship Development Institute and the Distance to Frontier Scores (DTFS) proposed by the World Bank are available, the search for a definitive measure of entrepreneurship continues.

Measuring entrepreneurship based only on the count of entrepreneurs, as in TEA, or of the self-employed may be misleading. Entrepreneurship is an action affected by institutional framework conditions, driven by incentives and promoted by a conducive entrepreneurial ecosystem (Ács et al., 2018). Countries with high levels of human development have a high GEI rank and DTFS (The World Bank Group, 2019). This fact prompted the hypothesis that the markers of human development are surrogate markers of the entrepreneurial ecosystem.

This study addresses three basic questions. How interrelated are human development and entrepreneurship? Can measures of human development replace measures of national entrepreneurship? Are HDI and GEI identical predictors of entrepreneurship variables from a different dataset? To answer the above questions, we have used the two method comparison analyses: Passing–Bablok regression and Bland–Altman analysis. Method comparison analysis helps to understand the equality of measures and answers the question of whether one measurement can replace another, and whether there are any systematic or proportional differences between the measures.

The remainder of this paper is structured as follows. In the next section, we review studies on HDI and GEI and discuss the measures of entrepreneurship. In the third section, we describe the

variables, the data, and the methods used in the analysis. Next, we discuss the results. Lastly, we present the conclusions of this study and offer suggestions for future research.

2. Literature Review

2.1. Measurement of Entrepreneurship

Since the nature of entrepreneurship is multifaceted, its measurement is a challenging proposition (Kilby, 2003). One of the earliest attempts at comparative cross-country entrepreneurship measurement was launched by the GEM. Although this attempt had limitations (Hindle, 2006), mainly because of its reliance on a single measure—the TEA—the GEM has made significant contributions to the measurement of entrepreneurship, particularly after the introduction of other variables, such as the motivational index, employee entrepreneurial activity and the business discontinuation rate. The lack of clear definitions and the reliance on single measures probably explain the contradictory findings on using different entrepreneurship measures (Marcotte, 2013).

Three of the widely used indices, the Ease of Doing Business Index, the Global Competitiveness Index and the Index of Economic Freedom, try to capture the institutional features of the participating countries. The Ease of Doing Business Index, published by World Bank, considers 12 measures of the regulations available for facilitating businesses. This index is based on the DTFS. Another widely used index is the Global Competitiveness Index, published yearly by the World Economic Forum. One criticism of this index is that it assigns different weights to the pillars based on the nations' development. The Index of Economic Freedom, another global index, uses data on ten freedom categories, including business, economy, government functioning, and human rights.

The TEA and the business discontinuation rates from the GEM data are examples of the measures of entrepreneurial performance. The measures of 'impact of entrepreneurship' focus on the major social and economic objectives of entrepreneurship, such as employment opportunity creation, economic growth, and poverty alleviation. Two examples of such measures are the gross domestic product and the employment generated. Entrepreneurship is heavily dependent on the economy's reward structure (Baumol, 1990). This reward structure determines three types of entrepreneurship: productive, unproductive and destructive. Government institutions influence all three types of entrepreneurial activities in a country (Welter and Smallbone, 2011). Most of the available measures focus on 'entrepreneurial performance', whereas GEI also includes the 'quality and context' (Marcotte, 2013) of the country's entrepreneurial activity. In this study, we evaluate the GEI in detail.

2.2. Global Entrepreneurship Index

The GEI, developed in 2009 to study the entrepreneurial health of a nation's ecosystem is the flagship project of the Global Entrepreneurship Development Institute (Ács, Szerb, and Lloyd, 2018). One of the aims of the GEI is to compensate for the drawbacks of the GEM database. The GEM database focuses on the individual factors, and also lacks institutional variables. The GEI includes

both individual and environmental factorsThe GEI views entrepreneurship as a complex phenomenon rather than as a one-dimensional activity, such as self-employment, and includes 14 pillars combining both individual and institutional variables (Ács et al., 2015). These 14 pillars are classified under the three headings: attitudes, abilities and aspirations (Ács, Szerb, and Lloyd, 2018): i) attitudes aim to study the feelings of the population of a country towards entrepreneurs and entrepreneurship; ii) abilities focus on individual entrepreneurs and business characteristics; and iii) aspiration focuses of the quality of nascent businesses (Ács, Szerb and Autio 2017). The GEI was developed by compiling many international databases such as the World Economic Forum, World Bank Transparency International, UNESCO, etc . In 2019, the GEI score (Ács et al., 2019) ranged from 8.8 (Chad) to 86.2 (the United States). The United States has been the top-ranked nation by GEI since 2012 (Ács et al., 2015).

The term 'entrepreneurial ecosystem' refers to a firm's external environment and includes an interconnected group of actors committed to creating new ventures (Cohen, 2006). The conducive nature of this external environment draws entrepreneurs into close geographic, institutional and interactive proximity. While high-technology businesses are evident in countries with a high national income, a large number of self-employed workers and small businesses are common in countries with a low national income (Wennekers et al., 2010). However, small businesses are not expected to be engines of economic development (Naudé, Amorós, and Cristi 2014). A suitable ecosystem makes it more lucrative to be entrepreneurial, and hence, the GEI is an appropriate index for the current study.

Since measurements can be associated with errors, the scores have confidence intervals (CIs). The CIs of the scores (GEI 2017) vary widely, ranging from 1.1 (Burkina Faso) to as much as 21.6 (Hong Kong). The CIs of the scores reflect the nations' ranks. The ranks are only point estimates. In the academic literature and in the print media, only ranks are mentioned without any reference to CIs. Hence, this study highlights the issues in ranking nations using these indexes.

2.3. Entrepreneurship and Human Development

There are conflicting views on the relationship between entrepreneurship and human development; Gries and Naudé (2011) found a positive association, whereas Dvouletý et al. (2018) analysed 48 developing countries from 2000–2015 but failed to find any relationship between entrepreneurship and development. Maniyalath and Narendran's (2016) study on female entrepreneurship found a negative association between HDI and female entrepreneurship rates.

Entrepreneurship contributes to the economic and social aspects of sustainable development (Dhahri and Omri, 2018) and is increasingly recognised as the main player in social development (Patzelt and Shepherd, 2011). As a family becomes entrepreneurial and economically empowered, it begins to enjoy self-respect, a sense of belonging to the community, and self-fulfilment. This aspect plays a major part in improving the quality of life and in human development. The bidirectional

relationship between entrepreneurship and each of the three variables used to calculate HDI—national income, education level and health—are discussed in the section on HDI.

Entrepreneurial activities are considered to economically empower families, which helps them feel self-respect, self-fulfilment, and a sense of belonging to the community (Dhahri and Omri, 2018). Economic empowerment provides individuals with freedom of choice, which assists in contributing to their ability to work, earn income, and accumulate wealth (Gries and Naudé, 2011). Thus, entrepreneurship is recognised as a critical component of human development (Patzelt and Shepherd, 2011).

2.4. Human Development Index

The three variables used for calculating HDI are education (level of schooling), health (life expectancy) and income (gross national income per capita). Each variable can affect entrepreneurship. First, entrepreneurship contributes significantly to the education of the people. Entrepreneurs establish private enterprises in the education sector to meet the unfulfilled demand for education. Studies have shown a significant relationship between education and entrepreneurship (Unger et al., 2011; Rauch and Rijsdijk, 2013). Second, entrepreneurship is linked to the quality of healthcare delivery (Itri et al., 2015). With increasing competition, entrepreneurship can lead to reduced healthcare costs. Lastly, for decades social scientists have argued that entrepreneurship facilitates economic development through job creation and increased productivity (Schumpeter, 1934; Ács, 2006; Urbano et al., 2019). Thus, we expect the HDI to be an effective predictor of national entrepreneurship.

We postulate that productive entrepreneurship that affects all three components of the HDI will be strongly correlated with human development. That is, the HDI, which is a composite measure of national income, life expectancy and educational level, will influence the determinants, performance and impact of entrepreneurship. Thus, the HDI is expected to be an effective predictor of national entrepreneurship. From this, we develop the hypothesis that it will be possible to predict the entrepreneurship of a nation from its HDI ranking and that the relative rank of a nation by HDI will be identical to the rank of that nation by an entrepreneurship measurement index.

2.5. Hypotheses

From the above discussions and our research questions, we develop the following hypotheses:

Hypothesis 1: The HDI will have a strong positive correlation with GEI.

Hypothesis 2: The rankings of nations by HDI are similar to the rankings of nations by GEI.

Hypothesis 3: The GEI and the HDI will be identical predictors of other measures of entrepreneurship, namely the DTFS and the TEA.

3. Research Method

3.1. Data

The data for this study are taken from published databases for the years 2016 and 2017. The HDI data were from the UNDP (2019). The GEI data are published annually by the Global Entrepreneurship Development Institute (Ács et al., 2016, 2017). The data were from Australia and 121 other nations worldwide (37 were from Europe, 32 from Africa, 28 from Asia, ten from South America, seven from Central America and seven from North America). The number of high, medium and low-income economies were 43, 44 and 35, respectively.

The HDI values ranged between 0.4 and 1.0, whereas the GEI values were between 14 and 100. These GEI and HDI values were not normally distributed. Due to the wide variation in the values of HDI and GEI, we converted the variables to percentile ranks for an equating method before analysis. The percentile ranks of HDI and GEI, calculated separately for each year, were used in the method comparison studies. The percentile rankings were normally distributed (Kolmogorov–Smirnov test for normal distribution: Percentile ranks of GEI, P = 0.363; percentile ranks of HDI, P = 0.226).

3.2. Study Design

The study involved four steps. The first was identifying the type of association between the HDI and the GEI using a scatter diagram. The second step was investigating the agreement between the percentile ranks of the HDI and the GEI using Passing–Bablok regression (PBR) followed by the Bland–Altman plot analysis. The last step involved validating the HDI and the GEI against the DTFS and the TEA.

3.3. Method Comparison Analysis

The measurement of variables always has some amount of error. When comparing two methods, one must seek to determine not only the agreement but also the differences. Correlation is not the ideal method, because correlation coefficients estimate the strength of the linear relationship between two variables, and not the differences, which are brought out by the ‘limits of agreement’. However, before performing the method comparison analysis it is important to correlate the two methods that are compared. To this end, this study used PBR and Bland–Altman analysis, which considers the agreement and the difference between measures, respectively.

3.4. Passing–Bablok Regression

This nonparametric regression analysis is robust to data outliers and the distribution of errors (Bilic-Zulle, 2011). The aim of evaluating using PBR is to make statistical inferences about the equality of the methods used. The assumptions required for proper application of this method are that the variables compared are positively correlated, continuously distributed, and have a linear relationship. No assumptions are made about the data distribution. Under the assumption of a linear relationship between the two methods of measuring a parameter, the regression equation is: $Y = a + bX$

The estimated values for a and b were tested against the null hypothesis that intercept a is equal to zero and slope b is equal to one. If the estimated values differ only by chance from intercept a = 0 and slope b = 1, then the interpretation is that the methods are equal, and one can be used instead of the other to measure a parameter.

The estimated PBR equation is: YHDI = a + bGEI

The analysis tested whether a = 0 and b = 1. If yes, then it follows that YHDI = bGEI and that one measure can be used instead of the other.

3.5. Bland–Altman Plot Analysis

The second method comparison technique we employed is a mean difference or limits of agreement analysis: Bland–Altman (1986) analysis. The Bland–Altman plot is formed by plotting the differences between paired variables (i.e., GEI and HDI) on the Y-axis versus the averages of the values on the X-axis. A horizontal line denoting the mean of the difference is drawn as a measure of bias. On either side of this line at 1.96 times the standard deviation of the differences, two lines are drawn, which form the limits of agreement. From the plot, the bias and the systematic and proportional differences are calculated. In the absence of bias, if the differences are within acceptable limits, the hypothesis of equality of the measures is supported.

3.6. Validation

If the HDI and GEI measure identical parameters, then it is likely that the prediction of entrepreneurship variables by these indexes from a different dataset will be identical. We validated the indices using the DTFS from the World Bank, the Ease of Doing Business scores and the TEA scores from GEM data.

4. Analysis of Results

HDI and GEI are well correlated, with a correlation coefficient of 0.91 (95% CI: 0.88 to 0.93; $p < 0.0001$). The relationship between HDI and GEI is exponential. The scatter plot (Figure 1) of HDI and GEI has two distinct parts. At lower HDI levels, the rise in GEI is minimal but significant, and this increases further as HDI values exceed 0.7. When HDI ≤ 0.7, the correlation coefficient with GEI is 0.68 (CI: 0.53 to 0.79; $p < 0.0001$). When HDI exceeds 0.7, the coefficient is 0.83 (CI: 0.78 to 0.88; $p < 0.0001$). The difference between the two correlation coefficients is significant, with $p = 0.011$. The countries with an HDI less than 0.7 are mainly low-income or factor-driven economies.

To evaluate whether the impact of HDI and its components (life expectancy, educational status and national income) on GEI vary with the stages of economic development, we performed a regression analysis with GEI as the dependent variable, adjusting for the five stages of economic development. The five stages analysed are the factor-driven, the transition between factor- and efficiency-driven, the efficiency-driven, the transition between efficiency- and innovation-driven and

the innovation-driven stages. HDI and its components (except life expectancy, p = 0.117) were significant predictors of GEI.

Figure 2 shows the scatter diagram of the PBR analysis, with the regression line (solid line), the CI for the regression line (dashed lines), and the identity line (x = y, dotted line). In this figure, the identity line and the regression lines overlap; hence, only three lines are visible in the diagram. The observations are distributed symmetrically on either side of the regression line.

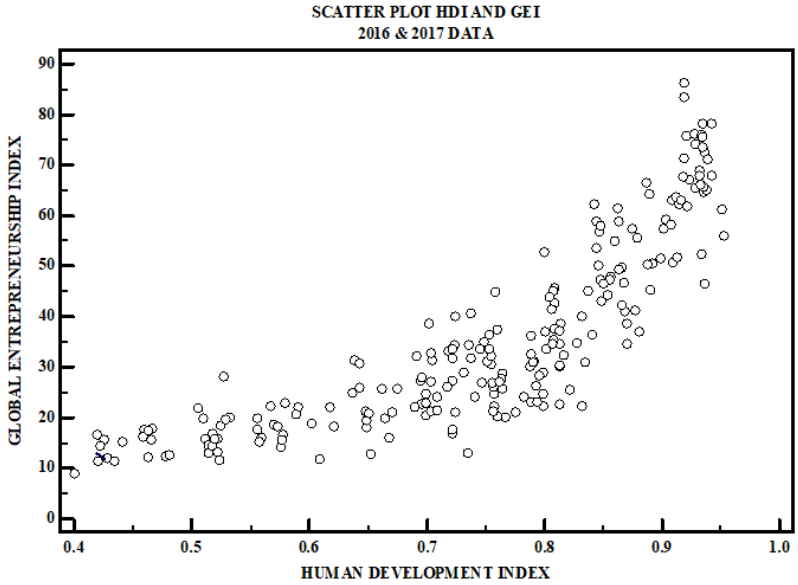

Figure 1. Scatter plot of HDI and GEI: 2016 and 2017 data

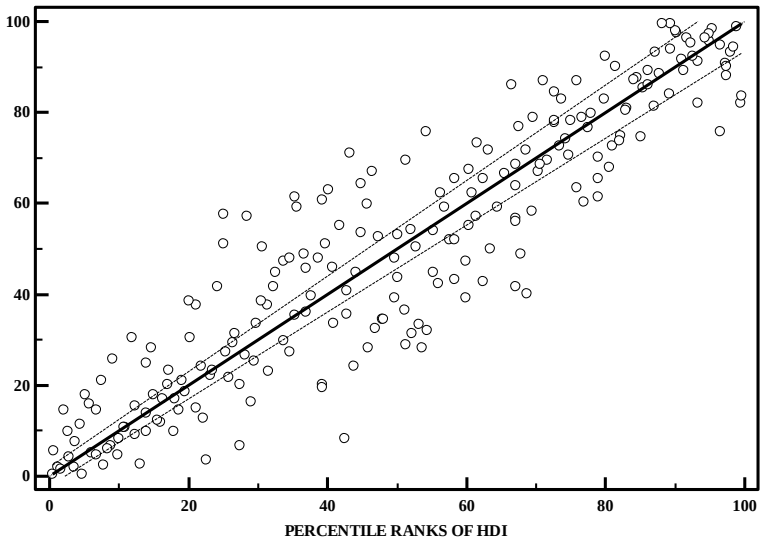

Figure 2. Passing–Bablok regression. GEI and HDI 2016 and 2017 data

The regression equation shows that intercept a = 0 (CI- -2.16 to 2.04) and slope b = 1 (CI = 0.96 to 1.05). Intercept a = 0, it indicates that there is no systematic difference between the percentile ranks of GEI and HDI and the null hypothesis of equality can be accepted. Slope b = 1 indicates that there is

no proportional difference between the percentile ranks. A cumulative sum (CUSUM) test for linearity indicates that the linear model fits the data. From the PBR results, which show the absence of any proportional difference, the null hypothesis of equality of the GEI and the HDI percentile ranks is accepted.

Figure 3 shows the Bland–Altman plot. The figure shows the line of equality at zero. On either side of the line of equality is the 95% CI of the mean of differences. The regression line of the differences overlaps the line of equality, indicating the absence of bias and systematic difference between the variables. At 22.5 and −22.5, two horizontal error bars represent the 95% CI for the upper and lower limits of agreement. Ninety-six percent of the observations fall in between the agreement limits. The differences are distributed evenly at the lower and higher percentile ranks. The histogram (Figure 4) shows that the differences between the percentile ranks of GEI and HDI are distributed normally. The Bland–Altman plot analysis also supports the null hypothesis of equality of the measures.

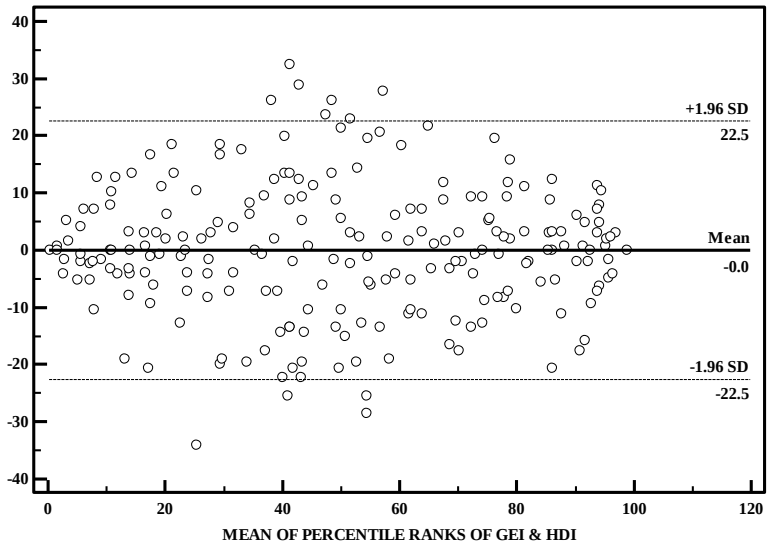

Figure 3. Bland–Altman plot analysis. Percentile ranks of GEI and HDI 2016 and 2017 data

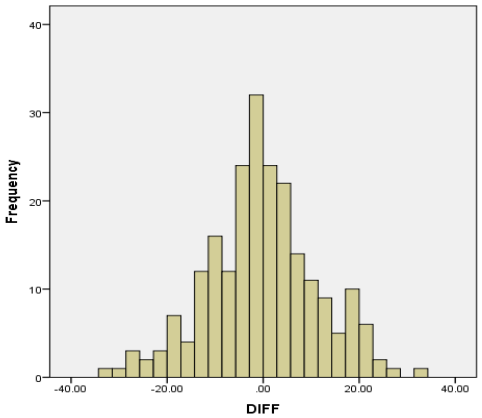

Figure 4. Histogram of distribution of differences between percentile ranks of GEI and HDI (DIFF). Kolmogorov–Smirnov Test P=0.20, Accept normality. Mean = 0.00; Median = 0.00. 95% CI mean = -1.52 to 1.52. Std. Dev 11.49

4.1. Validation

For validation, we estimated the correlation coefficients of GEI and HDI with DTFS and TEA. The Spearman's rank correlation coefficients for DTFS with GEI was 0.81 (CI: 0.76 to 0.85; p = 0.0001) and with HDI was 0.84 (CI: 0.79 to 0.87; p = 0.0001). The difference between the two coefficients was not significant (p = 0.365). TEA was also used for a validity check. TEA was negatively correlated with HDI (coefficient: −0.38; CI: −0.52 to −0.06; p = 0.017) and with GEI (correlation coefficient: –0.31; CI: −0.58 to −0.14; p = 0.003). The difference between the two coefficients was not significant (p = 0.651).

5. Discussion

The analysis proved that there are no systematic or proportional differences in the percentile ranking of nations by HDI and GEI. Thus, these rankings are interchangeable. To know whether this conclusion is limited to the data for the years 2016 and 2017, the analysis was repeated with the data for the years 2014, 2015 and 2018. The analysis yielded identical results. The results of the PBR analysis for 2014 and 2015 (126 economies each year) yielded results for the intercept as 0.99 (CI: −1.35 to 3.85) and for the slope as 0.99 (CI: 0.94 to 1.04). In 2018, (data from 135 nations) the PBR results were intercept -0.74 (CI: -4.53 to 2.75) and slope is equal to 1 (CI: 0.94 to 1.07). The CUSUM test for 2014, 2015 and 2018 showed no significant (p > 0.05) deviation from linearity.

In all the PB regression analyses for the five years from 2014 to 2018, the null hypothesis of equality of the GEI and HDI percentile ranks was accepted, with the 95% CI of the intercept overlapping zero and that of the slope overlapping one. This analysis also indicated that the results are robust. In other words, the ranking of nations by HDI is identical to the ranking of nations by GEI.

At lower levels of HDI (< 0.7) the rise in GEI is minimal but significant, and this increases further as HDI values exceed 0.7. This phenomenon has also been described by Ács & Naudé (2013). This is attributed to low levels of productive entrepreneurship in factor-driven economies. Productive entrepreneurship increases rapidly with economic development.

The validation analysis showed that the two indices are highly correlated identical predictors of DTFS and negative predictors of TEA. Hypothesis 3 was accepted, and it is obvious that GEI and HDI measure the same parameter. It is not surprising that a measure of entrepreneurship is directly correlated with a measure of human development. Our data show that they are identical, and that one measure can replace the other. One would expect GEI to have construct validity, to measure what it is supposed to measure and to distinguish human development from entrepreneurship. An acceptable measure of the entrepreneurial ecosystem should be able to differentiate nations based on the nation's degree of support to entrepreneurship. A measure of this ecosystem may be positively correlated with human development but should not be a mere measure of human development.

6. Conclusions

The study highlighted the direct positive relationship between human development and entrepreneurship. A novel method for comparing national rankings by different indexes is presented. Using the method comparison analysis, we showed the equality of the rankings of nations by HDI and GEI. We found that the HDI rankings can replace GEI rankings. Since HDI is derived from only three variables and GEI has 14 components, the HDI will be more reliable and precise, with narrower CIs compared to the GEI. Both are identical predictors of entrepreneurial variables from other datasets, such as the GEM and the DTFS. Hence, the GEI should be refined so that it becomes a better measure of entrepreneurship and can differentiate entrepreneurship from human development.

An important conclusion derived from this study is that HDI can be a crucial measurement criterion when evaluating the entrepreneurial ecosystem, given that the HDI percentile ranks are identical to the GEI ranks. The GEI appears to be a surrogate variable that measures human development. Hence, we call for increasing the specificity of the GEI so that it becomes a measure of entrepreneurship and not just a surrogate marker of human development.

References

Ács, Z., (2006), "How is Entrepreneurship Good for Economic Growth?" *Innovations,* 1(1), 97-107.

Ács, Z. and W. Naudé, (2013), "Entrepreneurship, Stages of Development, and Industrialization," *Pathways to Industrialization in the Twenty-first Century*, Szirmai, A., Naudé, W. and Alcorta, L (eds.). Oxford Scholarship Online, 373-392.

Ács, Z., L. Szerb, and E. Autio (2015). "Global Entrepreneurship and Development Index 2014," https://dx.doi.org/10.1007/978-3-319-14932-5_3

Ács, Z., L. Szerb, and A. Lloyd, (2018), "*The Global Entrepreneurship Index 2018*." Springer Cham https://doi.org/10.1007/978-3-030-03279-1

Antoncic, J. A., B. Antoncic, M. Gantar, R. D. Hisrich, L. J. Marks, A. A. Bachkirov, and M. L. Kakkonen, (2018), "Risk-taking Propensity and Entrepreneurship: The Role of Power Distance," *Journal of Enterprising Culture*, 26(1), 1-26.

Baumol, W. J., (1990), "Entrepreneurship: Productive, Unproductive and Destructive," *The Journal of Political Economy*, 98(5), 893-921.

Bilic-Zulle, L., (2011), "Comparison of Methods: Passing and Bablok rRgression," *Biochemia Medica*, 21(1), 49-52.

Bland, J. M. and D. G. Altman, (1986), "Statistical Methods for Assessing Agreement Between Two Methods of Clinical Measurement," *The Lancet*, 327(8476), 307-310.

Cohen, B., (2006), "Sustainable Valley Entrepreneurial Ecosystems," *Business Strategy and the Environment*, 15, 1-14.

Companys, Y. E. and J. S. McMullen, (2007), "Strategic Entrepreneurs at Work: The Nature, Discovery, and Exploitation of Entrepreneurial Opportunities," *Small Business Economics*, 28, 301-322.

Dhahri, S. and A. Omri, (2018), "Entrepreneurship Contribution to the Three Pillars of Sustainable Development: What does the Evidence Really Say?" *World Development*, 106, 64-77.

Dvouletý, O., A. Gordievskaya, and D. A. Procházka, (2018), "Investigating the Relationship Between Entrepreneurship and Regional Development: Case of Developing Countries," *Journal of Global Entrepreneurship Research*, 8(16), 1-9.

Gries, T. and W. Naudé, (2011), "Entrepreneurship and Human Development: A Capability Approach," *Journal of Public Economics*, 95(3-4), 216-224.

Herron, L., and R. B. Robinson Jr, (1993). "A structural model of the effects of entrepreneurial characteristics on venture performance," *Journal of business venturing*, *8*(3), 281-294.

Hindle, K., (2006), "A Measurement Framework for International Entrepreneurship Policy Research: From Impossible Index to Malleable Matrix," *International Journal of Entrepreneurship and*

Small Business, 3(2), 139-182.

Itri, A. N., D. H. Ballard, S. Kantartzis, J. C. Sullivan, J. A. Weisman, D. J. Durand, S. Ali, and A. P. Kansagra, (2015), "Entrepreneurship in the Academic Radiology Environment," *Academic Radiology*, 22(1), 14-24.

Kilby, P., (2003), "The Heffalump Revisited," *Journal of International Entrepreneurship*, 1(1), 13-29.

Kukoc, K., and D. Regan, (2008). "Measuring entrepreneurship. Economic Round-Up," (Summer 2008),15-26. https://treasury.gov.au/sites/default/files/2019-03/Economic_Roundup_Summer_2008.pdf#page=18

Maniyalath, N. and R. Narendran, (2016), "The Human Development Index Predicts Female Entrepreneurship Rates," *International Journal of Entrepreneurial Behaviour and Research*, 22(5), 745-766.

Marcotte, C., (2013), "Measuring Entrepreneurship at the Country Level: A Review and Research Agenda," *Entrepreneurship and Regional Development*, 25(3-4), 174-194.

Naudé, W., J. E. E. Amorós, and O. Cristi, (2014), "Romanticizing Penniless Entrepreneurs? The Relationship Between Start-Ups and Human Wellbeing Across Countries."

Patzelt, H. and D. A. Shepherd, (2011), "Recognizing Opportunities for Sustainable Development," *Entrepreneurship Theory and Practice*, 35, 631-652.

Rauch, A. and S. A. Rijsdijk, (2013), "The Effects of General and Specific Human Capital on Long-term Growth and Failure of Newly Founded Businesses," *Entrepreneurship Theory and Practice*, 37(4), 923-941.

Schumpeter, J.A., (1934), "The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle," *Harvard Economic Studies*, Cambridge: Harvard College.

Slavek A, and M. Drnovsek, (2012), "A Perspective on Scale Development in Entrepreneurship Research," *Economic and Business Review*, 14(1), 39-62.

The World Bank Group, (2019), "*Doing Business 2019. World Bank.*"

Thurik, R., S. Wenneker, and L. M. Uhlaner, (2002), "Entrepreneurship and Economic Performance: A Macro Perspective," *International Journal of Entrepreneurship Education*, 1(2), 157-179.

Unger, J. M., A. Rauch, M. Frese, and N. Rosenbusch, (2011), "Human Capital and Entrepreneurial Success: A Meta-Analytical Review," *Journal of Business Venturing*, 26(3), 341-358.

United Nations Development Programme, (2019), "*Human Development Report 2019: Beyond Income, Beyond Averages, Beyond Today*. *United Nations Development Program*."

Urbano, D., S. Aparicio, and D. Audretsch, (2019), "Twenty-five Years of Research on Institutions, Entrepreneurship, and Economic Growth: What has been Learned?" *Small Business Economics*, 53(1), 21-49.

Welter, F. and D. Smallbone, (2011), "Institutional Perspectives on Entrepreneurial Behavior in Challenging Environments," *Journal of Small Business Management*, 49(1), 107-125.

Wennekers, S., A. van Stel, M. Carree, and R. Thurik, (2010), "The Relationship Between Entrepreneurship and Economic Development: Is it U-Shaped?", *Foundations and Trends in Entrepreneurship*, 6(3), 167-237.