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Income inequality and entrepreneurship

Antonio Lecuna

School of Business and Economics, Universidad Del Desarrollo, Las Condes, Santiago, Chile

ABSTRACT

Many scholars argue that entrepreneurship concentrates wealth not only because rich families choose entrepreneurial occupations more often but also because entrepreneurs tend to earn and save more income than workers. However, based on panel data obtained from 54 countries during the period of 2006–2012, this empirical study found that public policies targeting formal and informal entrepreneurs are associated with decreased inequalities in the distribution of income. The data reveal no significant effect of high-aspiration entrepreneurs or newly registered firms on income distribution, suggesting that the informal information captured in the 'total entrepreneurial activity' measurement is a crucial factor explaining the variations observed in income inequality. Because entrepreneurial activity could be particularly successful in decreasing income inequality if targeted at the informal segments of society, the novel findings presented here open a new theoretical perspective that contradicts the commonly used conceptual framework, which tends to associate entrepreneurial activity with higher-income inequality.

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1. Introduction

Because development encompasses more than only economic growth (Sen, 2001), Naudé (2011, p. 34) claims that entrepreneurship scholars should focus on other relevant issues (e.g., income inequality). This study contributes to bridging the empirical gap between income inequality and entrepreneurship. Income inequality is relevant because increasing inequality harms the poor and adversely affects the middle class (Winkelmann & Winkelmann, 2010), whereas entrepreneurship, although vital to economic growth (Markin, Swab, & Marshall, 2017, p. 2–3), is typically considered an essential factor in creating and destroying personal wealth (Choi, 1999, p. 240). Understanding inequality from the entrepreneurship point of view is very important because strong evidence suggests that income inequality slows economic growth

CONTACT Antonio Lecuna alecuna@udd.cl
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(Atems, 2013). However, entrepreneurship and income inequality tend to move together (Atems & Shand, 2018), which generates a paradox: if entrepreneurship is expected to increase income inequality and income inequality is expected to decrease economic growth, then how can entrepreneurship encourage economic growth? Maybe we are missing something. This paper enhances our understanding of the origins of income inequality by investigating the extent to which entrepreneurial activity is a determining factor. Following Naudé (2010), the guiding research questions are as follows: how much of the observed income inequality is due to entrepreneurship, and when is entrepreneurship consistent with a reduction in inequalities?

Three independent measures of entrepreneurial activity were used as independent variables: new business density (NBD), total entrepreneurial activity (TEA), and high-aspiration entrepreneurship (HAE). Moreover, because TEA captures both formal and informal entrepreneurs, the effect of informality in entrepreneurship can be predicted. Drawing upon a cross-country 7-year panel data analysis, this study found that tax-declaring startups and high-growth entrepreneurs are not significantly associated with the Gini coefficient (higher Gini implies greater income inequality). However, the total number of entrepreneurs, including formal and informal entrepreneurs, is negatively correlated with the Gini coefficient. The practical implications suggest that self-employed individuals at the lower end of the income distribution fundamentally differ from 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, p. 89) by addressing issues such as the lack of opportunities (Mühlböck et al., 2018), the different cultural dimensions that affect entrepreneurship efficiency (Fernández-Serrano et al., 2018, p. 123), and entrepreneurial decision-making under resource scarcity (Nouri & Ahmady, 2018, p. 76–77). At the same time, innovation and high performance should be targeted despite the cultural uniqueness (Rigtering, Eggers, Kraus, & Chang, 2017, p. 314) and personality traits of small family business founders (Franco & Prata, 2019, p. 58–59).

This paper is organised as follows. The empirical evidence associating increasing entrepreneurial activity with increased income inequality is reviewed before formulating three 'pessimistic' hypotheses, which associate increasing entrepreneurial activity with increasing income inequality from three entrepreneurial perspectives. Then, the available data are defined. Subsequently, the statistical methods are described and the most significant results are reported. The final section analyses the results and offers a conclusion.

2. Theoretical framework

Kreutzmann (2008) formulated the following contradiction related to the widening inequality gap: the impossibility of catching up among underdeveloped countries has become so fixed in people's minds that the possibility of new exclusions and dependencies seems acceptable. Kreutzmann's (2008) contradiction is grounded on the rich getting richer (RGR) theory, which, in turn, is grounded on the disequalising model. According to Ljungqvist (1993), the disequalising model argues that even if all

households are initially equal, in the long run, inequalities will emerge since the offspring of such households must choose occupations with different entry costs. As inequalities increase, wealth accumulation occurs, leading to more enterprise creation (Ragoubi & El Harbi, 2017). However, after reaching a certain inequality threshold, this relationship becomes negative (an inverted U-shaped relationship between entrepreneurship and income inequality (Kuznets, 1995)).

Atems and Shand (2018) also found a positive relationship between entrepreneurship and income inequality. Their results suggest that policies aiming to promote entrepreneurship increase inequality and may be detrimental to growth, which is consistent with Shane (2009). Entrepreneurialism may well be an amplifier of wealth inequality in societies for many reasons. For instance, Lippmann, Davis, and Aldrich (2005) explain that countries with greater income inequality have higher rates of entrepreneurial activity because 'those in the upper end of the income distribution have surplus capital to invest in new business ventures. Conversely, in societies in which large segments of the population have few financial resources, self-employment may be the only viable form of employment for many people'.

Meh, 2005, p. 707) further argues that entrepreneurs have higher-saving rates than workers, mainly because entrepreneurs need to save more since their income is more irregular (Carter, 2011). The different saving patterns between entrepreneurs and workers, in turn, result in higher-asset holdings and a higher level of wealth concentration among entrepreneurs across the entire distribution. To support the wealth accumulation argument, Quadrini (1999) proposes that previous generations of wealthier families are more likely to be characterised by individuals who have engaged in entrepreneurial activities than the previous generations of non-entrepreneurial families. Thus, because the wealth accumulated during business periods is generally not depleted immediately, these entrepreneurial families have more considerable resources to start or restart businesses. These features of entrepreneurial family dynamics reinforce the notion 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 inheritance argument is relevant because individuals born into wealth have more considerable financial resources, significantly increasing the probability of self-employment entry (Fairlie & Krashinsky, 2012, p. 298). Such entrepreneurs have the resources to undertake larger-scale ventures before using outside sources of funding, thereby overcoming liquidity constraints (Bhide, 2000, p. 93). Decreased liquidity constraints, in turn, enable wealthy entrepreneurs to have higher-opportunity costs (Cassar, 2006, p. 629). Tamvada (2010) also found patterns of an unequal distribution of income among entrepreneurs because those individuals who hire others have the highest returns in terms of consumption. Therefore, growth-enhancing policies could be a better measure for reducing inequality than policies aiming to encourage entrepreneurship given that most self-employed and small-scale entrepreneurs have lower earnings than the average working population (Hamilton, 2000).

Similarly, Frid, Wyman, and Coffey (2016) show that according to the liquidity constraints theory, low-wealth and moderately wealthy nascent entrepreneurs face liquidity constraints and are significantly more likely to disengage from the startup

process during gestation. However, once the gestation process is over, wealth does not affect the success of a new venture. Therefore, these authors show that talent is evenly distributed, while the opportunity is not. According to Xavier-Oliveira, Laplume, and Pathak (2015), in the face of increasing income inequality, 'more individuals pursue entrepreneurship regardless of the nature of motivations, though the majority is expected to be driven by push factors for the betterment of their own economic conditions' (necessity entrepreneurship (Reynolds et al., 2005)). This argument further supports the use of different measures of entrepreneurial activity given that different outcomes should be expected from formal, informal, and high-aspiration entrepreneurs.

In summary, grounded on the RGR theory, the disequalising model, and mainly on the arguments presented above, the following three hypotheses are addressed based on the conceptual framework that entrepreneurial activity leads to higher-income inequality: (H1) increasing the number of formally registered startups increases income inequalities; (H2) increasing the percentage of high-aspiration entrepreneurs in terms of expected employment increases income inequalities; and (H3) increasing the percentage of formal and informal entrepreneurs increases income inequalities. These hypotheses extend Lecunás (2014) findings, which suggest that entrepreneurial activity benefits from moderate levels of inequality. However, different from Lecuna (2014), the three hypotheses explain income inequalities using three different measures of entrepreneurial activity as dependent variables instead of independent variables. Furthermore, the results presented here are based on a more extensive database, including the introduction of a quality measure of entrepreneurship (high-aspiration entrepreneurs). The three measures of entrepreneurial activity are used because according to the literature, observed results may vary across different types of entrepreneurial activities.

The hypotheses further serve as a counterargument to Choi's (1999) 'optimistic' critique of the poor getting poorer hypothesis and Kuznet's (1955) inverted U-shape theory, which argues that 'income inequality increases until a critical income level is attained, after which inequality begins to decrease' (Dobson & Ramlogan, 2009, p. 226). This study also revisits ancient views regarding entrepreneurs. According to Kontošić Pamić and Belullo (2018, p. 1592), entrepreneurs were the 'merchants' that made archaic trade possible. For example, in Babylonia, entrepreneurs managed the estates and supplies of the palace and its armed forces, while in ancient Greece and Rome, entrepreneurs controlled handicraft production, trade, and credit. Historically, entrepreneurs have been considered debased and corrupt.

3. Methods

This study related the degree of income inequality in society as a dependent variable and three measures of entrepreneurial activity as the main independent variables. This research used unbalanced panel data from an availability sample of 54 economies. Fixed effects (FE) were used instead of random effects because of the highly significant p-value of the Hausman test, which is unsurprising due to the observed heterogeneity across the countries. The use of FE is the appropriate estimation

technique because a certain factor within a country may impact or bias entrepreneurial activity or income inequality. FE models are specifically designed to study the causes of changes within an entity, including a country, such as exploring the relationship between entrepreneurship and inequality within a country, which is particularly relevant because each country has characteristics that may influence entrepreneurial activity. The FE model controls for all time-invariant differences across countries. Therefore, the estimated coefficients of the FE models cannot be biased since those time-invariant characteristics are unique to each country. Because each country is different, the country's error term and constant (which captures individual characteristics) should not be correlated with the others. If the error terms are correlated, the FE model is not suitable since the inferences may not be correct. For this study, the FE model removes the effect of those time-invariant characteristics to assess the net effect of entrepreneurship on income inequalities.

3.1. Sample selection

The sample first included countries that appeared in both the World Bank's annual Doing Business report (WBDBR) and the Global Entrepreneurship Monitor (GEM) Adult Population Survey data datasets of the 2006–2012 period (the relevant variables were not available before 2006 and after 2012). China is not included in this sample due to a lack of data in the WB database. Then, the following six countries were eliminated because their data related to the macroeconomic variables included in the WEO database were incomplete: Bolivia, Guatemala, India, Macedonia, Switzerland, and Uganda. The final elimination (Tunisia and Algeria) reduced the sample to 54 countries, which coincided with the use of the institutional data from the WGI.

As shown in Table A1 (see appendix), the final sample group of 54 countries mostly consists of 'very high human development' countries and no countries from the 'low human development' category. This selection bias is a considerable statistical limitation of the sample and is a natural consequence of using GEM data. As GEM country surveys are relatively expensive, developed countries are more likely to be able to afford the costs of conducting these surveys (Aidis, Estrin, & Mickiewicz, 2012).

3.2. Measures of income inequality and entrepreneurship

This section defines the dependent and independent variables used to test the hypotheses. The dependent variable in the analysis is income inequality and is measured by the Gini index, which is a scale ranging from 0 to 100 that calculates the degree of inequality in a country's income distribution (higher values indicate greater income inequalities). Following Lecuna (2014), four secondary sources of information were used: the Central Intelligence Agency World Factbook (CIA The World Factbook), the United Nations Development Programme indicators (UNDP), the United Nations University World Institute for Development Economics Research income inequality database (UNU-WIDER), and the World Bank (WB). The definitions and methodologies used to calculate the Gini index are practically identical among these four

Table 1. Definitions of the dependent and independent variables.

Variable	Name	Definition	Mean	SD	N° Obs	Years
Gini*	Gini index	Measures the degree of inequality in the distribution of family income in a country	36	9.28	404	2004-2012
NBD**	New business density	Number of newly registered corporations per 1,000 working-age people (aged 15–64 years)	4.27	4.87	434	2006-2012
TEA***	Total entrepreneurial activity	% of the population aged 18-64 years who are either nascent entrepreneurs or owner managers of new businesses in logs	8.9%	5.8%	325	2006-2012
HAE***	High-aspiration entrepreneurs	% of TEA expecting to employ at least 5 employees in the following 5 years in logs	26.7%	10.3%	313	2006-2012

*Sources: CIA The World Factbook, UNDP, UNU-WIDER, WB.
**Source: WB's annual Doing Business report (Entrepreneurship Project, June 2013).
***Source: GEM Adult Population Survey data, 2006–2012.

sources. In cases in which data were available from more than two sources, the average during that period was used. The Gini index has been used and validated in many studies and many contexts. For example, using the Gini index, Jakovčević, Dumičić, and Anđelinović (2017) studied Croatia's insurance gross premiums.

Moreover, this study utilised the 2013 WBDBR and the GEM project to support the independent variable measurements, and the GEM project is considered the most essential institution for the provision of relevant information towards understanding the entrepreneurial phenomenon (Fernández-Serrano, Berbegal, Velasco, & Expósito, 2018, p. 107). These databases have been used separately in previous publications to measure the rates of firm formation at the country level, although studies have found conflicting results depending on the dataset employed (Acs, Desai, & Klapper, 2008). The 2013 volume of the WBDBR reports the variable NBD, which indicates the number of newly registered corporations per 1,000 working-age people (those aged 15–64 years). This measure of entrepreneurial activity from 139 company registrars shows the number of newly registered firms. The GEM project comprises harmonised, internationally comparable data to evaluate entrepreneurship activity across different countries among the adult working-age (18–64 years) population. This database contains various entrepreneurial measures that are constructed based on a survey known as the Adult Population Survey (APS). The empirical strategy used two measures, i.e., TEA and HAE (the definitions of the dependent and independent variables are provided in Table 1).

The TEA indicates the percentage of the adult population involved in entrepreneurial activity who are either nascent entrepreneurs or owner-managers of new businesses. The TEA calculates the percentage of both opportunity-driven entrepreneurship and necessity-based entrepreneurship. While some scholars have sought to distinguish these metrics in studying the rates of entrepreneurship, other scholars have argued that the distinction is mostly irrelevant because 'people can build high-growth, job-creating, wealth-generating companies even if their motivation for starting a business was a necessity'; meanwhile, 'the majority of "opportunity" entrepreneurs are not interested in growing their businesses, and fewer still manage to do so' (Shane, 2009, p. 142).

The TEA provides advantages because it focuses on the individual and both formal and informal work. Similar to the Entrepreneurship Eurobarometer developed by the Gallup Organization, GEM studies examine the grassroots-level behaviour of individuals who are starting and managing formal and informal businesses; however, GEM studies cover more countries over a more extended period. This approach provides a more detailed picture of entrepreneurial activity than other firm-creation measures, including the Organization for Economic Co-operation and Development (OECD)/ Kauffman Entrepreneurship Indicators Program focusing on information found in official national registry datasets, which are often unreliable in corrupt countries.

The second measure used from the GEM database is HAE, which considers high-aspiration ventures that are a part of the TEA. The HAE demonstrates the percentage of the TEA expected to employ at least five employees in the following five years. The HAE is positively correlated (.24) with the indicator of entrepreneurial activity developed by the World Bank (NBD), which is unsurprising since both intend to measure formal high-growth startups. In contrast, the TEA is negatively correlated with the HAE (−.01) and NBD (−.03), which is also unsurprising since the informality information captured by the TEA partially explains the different behaviour patterns that exist between formal and informal entrepreneurs and, hence, accounts for the non-significant pairwise correlations with high-growth tax-declaring startups (the correlation coefficients are overall relatively weak, which is a good indication that the three independent variables do not present multicollinearity issues).

3.3. Control factors in income inequality

The following five variables related to the macroeconomic environment were used in all specifications: income, unemployment, poverty, inflation, and investments. Income is measured by the logarithm of the gross domestic product (GDP) (current prices in U.S. dollars). The values are based on the GDP in national currency converted to U.S. dollars using market exchange rates (yearly average). Unemployment refers to the percentage of the total labour force that is unemployed. The unemployment rate can be defined by either the national definition, the ILO harmonised definition, or the OECD harmonised definition. Poverty refers to the percentage of the population living in households with consumption or income per person below the poverty line. The default poverty line is $1.9 per day in 2011 PPP. Inflation refers to annual percentages based on year-to-year changes in average consumer prices. Investments are expressed as a ratio of the total investment in current local currency and GDP in current local currency. Investment is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector.

According to Berg and Sachs (1988) and Sachs (1989), countries with extreme income inequality, *ceteris paribus*, may be prone to 'bad' macroeconomic policies. Of the five macroeconomic controls tested, poverty is likely the most influential. Mookherjee and Ray (2010, p. 3) claim that poverty and inequality share a strong and intimate relationship. In the presence of poverty, skilled wages are high relative to unskilled wages. Hence, a society that is sufficiently poor (but equal) in one

generation could experience high inequality in the next generation, which could subsequently become entrenched (Mookherjee & Ray, 2010, p. 12), as predicted by the disequalising model. The previous analysis of poverty can be extended to accommodate initial inequality (Mookherjee & Ray, 2010, p. 3), which, for this study, was controlled for by lagging the Gini variable twice: by one and two periods.

Following Lecuna and Chávez (2018), in addition to the macroeconomic controls and initial inequality, five government (formal) institutional controls were included using the World Bank's Worldwide Governance Indicators (WGI). These indicators are control of corruption, rule of law, voice and accountability, political stability and absence of violence, and property rights. The control of corruption reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, and 'capture' of the state by elites and private interests. The rule of law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, particularly the quality of contract enforcement, property rights, the police, and the courts and the likelihood of crime and violence. Voice and accountability reflect perceptions of the extent to which a country's citizens can participate in selecting their government, freedom of expression, freedom of association, and free media. Political stability reflects perceptions of the likelihood that the government could be destabilised or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. Property rights refer to the following question: to what extent are property rights, including financial assets, protected?

According to Naudé (2010), the two sub-disciplines within the respective fields of economics and management, i.e., development economics and entrepreneurship, have converged based on the realisation that the institutional framework in a country or region is important for understanding the outcomes observed in each field, although few studies have specifically addressed the relationship between these institutional factors and entrepreneurship (Soriano and Dobon, 2009, p. 236). Countries with high-income inequality have a significantly greater likelihood, on average, of having weak institutions (Alesina and Tabellini, 1988; Sachs, 1989). Naudé (2010) adds that institutional failures lead to rent economies and rent economies, in turn, lead to income inequalities (see Table 2 for a description of the control variables).

Finally, the following five additional controls related to 'basic and business factors' derived from The Global Competitiveness Report were included: quality of education, life expectancy, ease of access to loans, flexibility of wage determination, and total tax rate. The education proxy asks the following question: in your country, how well does the education system meet the needs of a competitive economy? The health proxy refers to life expectancy at birth (in years). The personal finance proxy asks the following question: in your country, how easy is it to obtain a bank loan with only a good business plan and no collateral? The employment benefits proxy asks the following question: in your country, are wages generally set by a centralised bargaining process or each company (the questions are answered on a 1 to 7 scale with 7 being the most desirable answer).

The total tax rate proxy is particularly important because inequalities enhance the power of economic elites to resist taxation (Sachs, 1989, p. 8). Here, the total amount

Table 2. Descriptive statistics of the control variables.

Variables	Source	N° Obs	Mean	SD	Min	Max
Macroeconomic environment						
Income	WEO	486	4.14	0.46	3.04	5.01
Unemployment	WEO	486	8.7%	5.3%	0.7%	31.1%
Poverty	WPN	326	1.9%	3.6%	0.0%	23.1%
Inflation	WEO	486	4.2%	3.9%	−1.6%	51.5%
Investments	WEO	486	23.0%	4.6%	13.9%	40.0%
Formal institutions						
Control of corruption	WGI	486	0.67	1.05	−1.12	2.59
Rule of law	WGI	486	0.64	0.93	−1.03	2.01
Voice and accountability	WGI	486	0.63	0.77	−1.22	1.83
Property rights	GCR	377	4.99	1.02	2.65	6.67
Political stability	WGI	486	0.24	0.84	−2.20	1.59
Basic and business factors						
Quality of education	GCR	377	4.06	1.01	2.09	6.24
Life expectancy	GCR	377	75.8	5.68	48	83
Ease of access to loans	GCR	377	3.44	0.89	1.69	5.51
Flexibility of wage determination	GCR	377	4.69	0.99	2.21	6.42
Total tax rate	GCR	378	45.4%	15.7%	0.0%	82.4%

Sources: GCR = The Global Competitiveness Report; WGI = World Bank's Worldwide Governance Indicators; WEO = IMF World Economic Outlook Database; WPN = World Bank's PovcalNet.

of taxes refers to the sum of the following five different types of taxes and contributions payable after accounting for deductions and exemptions: profit or corporate income tax, social contributions and labour taxes paid by the employer, property taxes, turnover taxes, and other small taxes.

Based on simple pairwise correlations, which are often unreliable and misleading, among the control variables, the following three institutional indicators stand out as potential sources of multicollinearity: rule of law, control of corruption, and voice and accountability. The pairwise correlations between the Gini index and the three measures of entrepreneurship activity are weak in the case of NBD (.07) and HAE (.05) but relatively strong in the case of TEA (.56).

4. Results

As shown in the first column of Table 3, seven control variables exhibited significant coefficients, which corroborated the validity of the control variables as explanatory factors of income inequality. The highly significant and positive, but relatively small, coefficient of unemployment suggested that decreasing unemployment by approximately ten percentage points could improve the Gini coefficient by approximately two units. The significant (at the 10% level) and negative coefficient of income was consistent with the theory that links inequality in income distribution to slow capital accumulation and growth (Mo, 2000). Furthermore, as shown in column one, the macroeconomic factors seem to have captured most of the effect, followed by basic and business factors. Moreover, the weak *p*-values exhibited by the formal institutional variables could indicate issues of multicollinearity; however, the non-significant effect of initial inequality was surprising. Here, the one- and two-period previous Gini values are reported, but the additional tests that included the two controls separately did not reveal any significant results. These findings could suggest that the Gini coefficient does not significantly change over time.

Table 3. Cross-country results of income inequality (Gini), panel data 2006–2012. Fixed-effects linear regression models

	Control Variables	Main Effect	Collinearity Check
Entrepreneurial activity			
New business entry		0.04	0.06
		(0.35)	(0.65)
High-aspiration entrepreneurs		1.63	2.02
		(0.82)	(1.08)
Total entrepreneurial activity		−15.24	−12.20
		(2.27)**	(1.91)*
Macroeconomic environment			
Income	−4.25	−3.97	−3.76
	(1.96)*	(1.62)	(1.64)
Unemployment	19.39	17.42	17.34
	(2.89)***	(1.85)*	(1.83)*
Poverty	28.02	0.25	−2.61
	(2.18)**	(0.01)	(0.07)
Inflation	−0.08	−6.98	−8.40
	(0.02)	(1.11)	(1.35)
Investments	10.06	8.24	5.95
	(2.25)**	(1.52)	(1.12)
Institutional framework			
Control of corruption	−2.13	−0.51	
	(1.88)*	(0.35)	
Rule of law	2.43	3.89	
	(1.50)	(1.91)*	
Voice and accountability	−1.79	−3.59	
	(0.84)	(1.27)	
Property rights	−0.25	−0.35	−0.04
	(0.52)	(0.61)	(0.07)
Political stability	0.06	−0.35	−0.25
	(0.08)	(0.33)	(0.26)
Basic and business factors			
Quality of education	−0.68	−0.62	−0.73
	(1.38)	(1.20)	(1.43)
Life expectancy	0.22	−0.03	0.12
	(1.63)	(0.14)	(0.59)
Ease of access to loans	0.82	0.61	0.58
	(3.15)***	(1.96)*	(1.87)*
Flexibility of wage determination	0.95	0.94	0.99
	(2.36)**	(2.10)**	(2.24)**
Total tax rate	2.32	1.44	0.77
	(0.84)	(0.47)	(0.27)
Initial inequality			
Two periods	0.03	−0.03	−0.05
	(0.46)	(0.41)	(0.61)
One period	0.02	0.032	0.05
	(0.31)	(0.32)	(0.53)
R^2	0.32	0.42	0.38
N	198	140	140

Significance: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.
Heteroskedasticity-consistent t-ratios are shown in parentheses.
All independent variables were lagged one period (except for the two-period previous Gini).

Column two shows that the inclusion of the entrepreneurial-related variables increased the overall fit of the model from 32% to 42%. Of the three entrepreneurial measurements, the TEA was the only significant measure as the net number of formal and informal entrepreneurs increased by approximately 20 percentage points and the Gini coefficient decreased by approximately 3 points (significant at the 5% level). This finding contradicts Hypothesis H3, which proposes that total entrepreneurial activity leads to higher-income inequality. One phenomenon that could explain this

'optimistic' result is that in contrast to the RGR theory, the rich have no advantage over the poor because entrepreneurship consists of discovering opportunities rather than owning resources. Choi (1999, p. 255) further argues that wealthy entrepreneurs 'are less likely than the poor to venture off the proven, and beaten track, wherein consists entrepreneurship'. Another interesting finding shown in column two is the consistently significant positive coefficient of the flexibility of wage determination, which is thought provoking because it contradicts classical economic theory regarding the efficacy of minimum wages. As observed, this variable is based on the following question: are wages generally set by a centralised bargaining process or each company? Considering this question, a logical argument suggests that a centralised bargaining process leads to improved employment benefits, including a higher fixed minimum wage. Therefore, increasing minimum wages, in turn, are strongly associated with a decrease in income inequalities.

Finally, because estimating an individual joint relationship between income inequality and its determining factors is not free of a potentially high degree of collinearity among the explanatory variables, this study specifically used the variance inflation factor (VIF) test as an indicator of collinearity. The following three variables exhibited extremely high VIF values between 30 and 40: rule of law, control of corruption, and voice and accountability. After removing these variables, the average VIF decreased from 7.42 in the 'main effect' specification to 3.24 in the 'collinearity check' specification. Moreover, in the final specification, all explanatory factors scored below the 'rule of thumb' cut-off value of 10. In theory, a VIF of 10 or higher is a concern for collinearity. The VIF cut-off value of 10 was originally suggested by Marquardt (1970, p. 610) and was subsequently validated by Marquardt (1987), O'Brien (2007), and Mason and Perreault (1991).

4.1. Potential endogeneity

The direction of causality (or endogeneity) between income inequality and its determining factors (e.g., entrepreneurial activity) presents a problem that is very difficult to solve. Indeed, this is why income inequality studies must rely on the underlying theory. One statistical solution to this endogenous problem is to develop a research design that observes changes in the dependent variable (i.e., Gini index) over time and then relates these changes to the explanatory variables, including entrepreneurship. For example, it would be feasible, though not entirely accurate, to examine the three measures of entrepreneurial activity a few years before the Gini variable. With this approach, it may be plausible to verify the influential causality of entrepreneurship on income inequality. Therefore, to alleviate (but not eliminate) potential endogeneity issues, all independent variables were entered into the regression models with a one-period (year) lag except for a two-period initial inequality. Notably, however, the study did not aim to establish causality precisely.

However, even if a correct research design were to be developed, it is impossible to completely separate Gini from its determining factors because income inequality is the result of an extremely complex and continuously changing phenomenon that simultaneously involves several economic, political, cultural, and historical factors. In line

with this logic, Holland (1986, p. 959) argues that causal inference is impossible without making untested assumptions, which implies that there can be 'no causation without manipulation'. Moreover, it is impossible to accurately estimate how many periods should be lagged or which control variables should be used. The one-period lag that comes as a standard measure in most statistical packages is not an entirely valid approach. For these reasons, and also because endogeneity tests decrease the number of observations, interpretations of the results only go as far as suggesting an association or link.

5. Conclusion

In contrast to the growing stream of literature that associates income inequality with entrepreneurship, this empirical study found that total entrepreneurial activity, including both formal and informal entrepreneurs, is linked to improving the Gini coefficient. The statistical results of the proxies that measured tax-declaring registered startups and high-growth entrepreneurs based on expected employment are not significant, which suggests that entrepreneurship-related policies aimed at the informal sectors of the economy, should have a significant impact in decreasing income inequalities. The fixed-effects statistical results are based on a panel data availability sample during the 2006–2012 period (a variance inflation factor cut-off value of 10 was used in the collinearity checks).

5.1. Limitations and future research

An important limitation of this study is that a relationship can never establish a causal connection. Causality must be shown or inferred from the theory underlying the phenomenon that is tested empirically (Kendal & Stuart, 1961). It is important to recall that although all measures of entrepreneurial activity, macroeconomic factors, government institution factors, and basic and business variables are lagged one year to alleviate (but not eliminate) potential endogeneity between these variables and the Gini index, the aim of this study is to test the link between income inequality and entrepreneurship rather than to determine causation. Therefore, future work should determine the direction of causality while drawing on different sources of qualitative data.

The WB measure, i.e., new business registrations/population size, could also be questioned since (i) developing and developed nations are barely comparable; (ii) the procedures used to register a business are very unevenly regulated across countries; and (iii) in developed nations, many newly registered firms are 'shelf businesses' (holding companies without any activity) or subsidiaries of existing firms. Furthermore, the GEM measures could present certain methodological issues since the data are drawn from random population surveys with highly unequal sample sizes (e.g., 30,000 a year in Spain, 3,000 in Norway, 5,000 in China, etc.). Without appropriate sampling weights, using these data as independent variables in a country-level panel analysis is susceptible to biases (Reynolds et al., 2005).

Future research could also benefit from including cultural and behavioural controls due to their influence on certain types of entrepreneurship endeavours (Fernández-

Serrano et al., 2018, p. 123; Kedmenec & Strašek, 2017, p. 1468; Llanos-Contreras & Alonso-Dos-Santos, 2018; Pejic Bach, Aleksic, & Merkac-Skok, 2018), such as an overconfidence proxy (Simon & Kim, 2017, p. 17–18) and certain psychological motivational proxies (e.g., risk aversion), which are positively correlated with creative outcomes (Bogdan, Meșter, & Matica, 2018, p. 1299) (at least in developed and stable economies (McCarthy, Puffer, & Lamin, 2018, p. 210)). In addition, a measure of business background in the family could be used for its prediction of success (Ribeiro Soriano, 2003, p. 36) and future market anticipation (Rita, Priyanto, Andadari, & Haryanto, 2018, p. 59), and two different educational controls, i.e., secondary education and higher education, could be applied since the former can increase the formal entrepreneurship rates in certain contexts, while the latter cannot (Jimenez, Matos, Cámara, & Ragland, 2017, p. 354) if planned incorrectly (Olugbola, 2017, p. 14–15). Additionally, since entrepreneurship is a complex phenomenon that continuously evolves over time, future research should test other significant measures of entrepreneurial activity, including international new ventures (Martin & Javalgi 2018, p. 677), immigrant entrepreneurship (Emontspool & Servais, 2017, p. 267), and family businesses (Llanos-Contreras & Alonso-Dos-Santos, 2018, p. 578).

Despite the statistical limitations, the results presented here open the door to further delving into some of the relatively less-studied types of entrepreneurial activity and their relationship with income inequalities. These types of entrepreneurial activity include informal entrepreneurship. Far from being a hot topic of research (i.e., opportunity-oriented, women, senior, innovation-driven), informality has been observed as a symptom of other constraints (Ihrig & Moe, 2004) but has a large growth potential based on the necessity to survive as a motivation for entrepreneurship. Some scholars argue that informal entrepreneurship contributes to poverty alleviation (Tamvada, 2010). However, before asking the final question, contextual issues related to the entrepreneurial ecosystem need to be addressed. For example, are there educational systems promoting entrepreneurship as desirable and achievable and providing the necessary knowledge, skills, and feelings of self-confidence to prepare students to engage in such activities? (Olugbola, 2017). Are there public policies focused on the development of authentic leadership due to its positive impact on people's outcomes (Megeirhi, Kilic, Avci, Afsar, & Abubakar, 2018, p. 938–939) or management of knowledge transfer through organisational hierarchy, which is a vital resource for an increasingly demanding and changing environment? (Benavides-Espinosa & Roig-Dobón, 2011, p. 117).

Finally, taking into consideration the differences among countries responsible for encouraging entrepreneurship (Soriano et al., 2010, p. 221), future research should directly address the following question: can informal entrepreneurship decrease income inequality in developing economies? In this case, one relevant question is whether high inequality spurs informal entrepreneurship, which then lowers inequality over time. If this is true, informal entrepreneurship can serve as a 'catch-up' mechanism to reduce income inequality in the long run. Governments playing catch-up should 'help' informal entrepreneurs or should at least tolerate this behaviour and not interfere (Lecuna & Chávez, 2018). However, governments could make it easier and more advantageous to encourage informal entrepreneurs to enter the formal

sector over time (e.g., social security for entrepreneurs) or enhance knowledge-intensive services (i.e., incubators) (Mas-Verdu, Ribeiro, & Dobón, 2010, p. 5) targeting informal entrepreneurs. Public policies should also avoid centralised control over wages and regulations that make it difficult to enter markets. Informal entrepreneurship can increase wealth among the poor, turning some of the poor into small business owners and others into waged employees.

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Appendix

Table A1. Statistical sample (in parentheses, average Gini, 2004–2012 period).

Very high human development	High human development	Medium human development
Argentina (46)	Bosnia and Herzegovina (35)	Dominican Republic (49)
Australia (31)	Brazil (55)	Egypt (33)
Austria (28)	Colombia (57)	Indonesia (37)
Belgium (28)	Jamaica (45)	Jordan (37)
Canada (37)	Kazakhstan (31)	Morocco (41)
Chile (53)	Malaysia (45)	Philippines (45)
Croatia (30)	Mexico (49)	South Africa (64)
Czech Republic (27)	Panama (53)	Thailand (42)
Denmark (27)	Peru (49)	
Finland (27)	Romania (34)	
France (31)	Russian Federation (42)	
Germany (30)	Serbia (30)	
Greece (34)	Turkey (40)	
Hong Kong (51)	Uruguay (46)	
Hungary (28)		
Iceland (28)		
Ireland (32)		
Israel (40)		
Italy (33)		
Japan (34)		
Korea, Republic (32)		
Latvia (37)		
Netherlands (29)		
New Zealand (34)		
Norway (27)		
Poland (34)		
Portugal (37)		
Singapore (47)		
Slovenia (26)		
Spain (34)		
Sweden (26)		
United Kingdom (34)		

Notes: Countries are listed in alphabetical order and subdivided by categories based on the Human Development Index (HDI) value by the United Nations Development Program (UNDP).