



Entrepreneurship and Economic Growth: A Review and Synthesis of Conceptual Arguments and Empirical Evidence

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Abstract. We review the literature on the nexus between entrepreneurship and economic growth and investigate the reasons for its inconclusive early findings. We trace them to the evolution of nations from the managed economies to the entrepreneurial economies and various discrepancies, both in the proxies used to measure entrepreneurship as well as in the settings within which this relationship has been explored. We also find that notwithstanding the continued assertion of a lack of empirical evidence on entrepreneurship-led economic growth, post-2004 research on the theme has fairly conclusively established the positivity of this relationship in the developed world and the persisting debate on this issue reflects just a lack of its awareness. We provide a synthesis of findings of the most recent research, discuss the unresolved issues, point to future research directions and analyse the implications of our findings for practice.

Keywords: economic growth, entrepreneurship, systematic review

1. Introduction

The academic interest sparked by Joseph Schumpeter's (1934) seminal work, *The Theory of Economic Development*, that postulated entrepreneurship as the prime driver of economic growth (Kirzner, 1973; Cipolla, 1981; Jovanovic, 1982; Schmitz, 1989) continues unabated (e.g. Aghion, Akcigit & Howitt, 2013; Antony, Klarl & Lehmann, 2017). The premise that entrepreneurship, involving formation of new enterprises, would influence economic growth—a rise in a country's output of goods and services—has a strong intuitive appeal and an undeniable inherent logic (Fritsch, 2008; Minniti, & Lévesque, 2010; Casares & Khan, 2016; Fritsch & Wyrwich, 2017). Surprisingly, however, the consequent

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scholarly empirical inquiry, has not supported unequivocally, this seemingly self-evident expectation (Dejardin, 2011). At the same time, governments in both developed and developing countries, oblivious to this ambiguous academic verdict, have spent significant resources on entrepreneurship promotion over the past several decades (Shane, 2009). Higher-education seekers and universities too are in the fray with ‘remarkable’ (Kuratko, 2005: 577) and ‘exceptional’ (Katz, 2003: 284) growth of entrepreneurship education in developed countries. To unravel this impasse, this paper scrutinises research on the relationship between entrepreneurship and economic growth that has appeared in highly regarded journals² in the last two and half decades.

2. Entrepreneurship and Economic Change: The Theoretical Foundations

Kirzner’s (1973) original thesis, later revisited by Davidsson (2003), visualises entrepreneurship as a set of ‘competitive behaviours’ driving the ‘market processes’. Kirzner (1973) defines entrepreneurship as the start of *any* new economic activity in the market. This involves both the start-up activity of new entrants as well as forays of existing firms into new markets through innovation as well as imitation. That such acts would influence economic growth is understandable. However, this view of entrepreneurship is different from some of its later perceptions, for instance, in Carree & Thurik (2003) where the acts of long established firms are excluded from entrepreneurship. Cipolla (1981), focusing only on new firms, postulates that entrepreneurship induces growth in four ways. Widespread adoption of new methods of production, reallocation of productive resources to emerging opportunities, diversification into new areas of activity and penetration in new markets. Evolutionary economists, such as Jovanovic (1982), view entrepreneurs as harbingers of change, bringing fresh ideas and thinking to the marketplace, enhancing the intensity of competition and fuelling economic growth in its wake. Similarly, Wennekers & Thurik (1999) visualise the link between entrepreneurship and economic growth via innovations, change, competition and rivalry.

Influenced by Romer’s (1986) growth model, Schmitz (1989) proposes a framework in which economic growth is endogenously determined by people who make a rational choice between employment and entrepreneurship and postulates —with the aid of certain assumptions— that the volume of output added to an economy by an entrepreneur exceeds the volume added by the same individual through employment. This is how, he theorises, entrepreneurship leads

2. We have used the Association of Business Schools 2015 journal quality rating (ABS, 2015) of 2 or above for this purpose. We recognise that journal quality ratings do have limitations (Mingers & Yang, 2017). However, the ABS ratings reflect significant scholarly effort and have wide acceptability in academic circles. We believe that the works included in this review based, principally, on the ABS ratings do represent high calibre works in the genre.

to economic growth. Subsequent models do not include the role of existing firms in the entrepreneurial process, visualise only the start-up activity as an indicator of entrepreneurship and try to incorporate various consequences of start-up activity that lead to growth. One overlapping theme in this regard is innovation. It is either mentioned explicitly or is indicated in words or phrases such as 'change', 'fresh thinking' or 'adoption of new methods' shown to lead to creation of new markets and / or increased competition in existing markets, each in turn causing economic growth. Here too, Kirzner (1973) is different from the rest in observing a role of imitative acts of entrepreneurs in economic growth.

Subsequently, relatively more comprehensive multi-layer models have been proposed. The one by Carree & Thurik (2003) is not fundamentally different from the previous models in the sense that it also counts innovation, new market entry and competition as the consequences of entrepreneurship that result in economic growth. This model, however, adds more layers to the framework by showing that the entrepreneurial influence on growth can be analysed at the levels of an individual entrepreneur, a business firm or at the national or regional level. At each level, preconditions, elements and impact of entrepreneurship on economic growth are similar. However, the chain of causation in each case is different.

The more contemporary Global Entrepreneurship Monitor (GEM) model (Kelley, Singer & Herrington, 2016) on which a significant part of recent empirical research is focussed (Álvarez, Urbano & Amorós, 2014), unlike Carree & Thurik's (2003) work, ignores the role of the individual in entrepreneurship-led economic growth and identifies the business firm as the vehicle that carries the entrepreneurial influence on economic change. Importantly, and correctly, it shows that both existing as well as new firms play a part in this process which, in a way, marks a return to the Kirzner thesis, abandoned by the later thinkers. However, unlike Kirzner, it does not see the role of entrepreneurial imitation in the process of economic change. This is a mistake, as imitation does have a role in transforming entrepreneurial acts into economic change (Phelan, 1997; Mukoyama, 2003; Vyas, 2005). The GEM model lists a set of conditions needed for the existing firms to perform well and cause economic growth as well as the conditions needed to boost start-up activity and allow new firms to perform well. However, unlike previous models, it does not explain the link between start-up activity and start-up performance on the one hand and existing firm performance and economic change on the other. This omission, though, does not affect its logical integrity as the thesis that high-performing existing and new firms would cause economic growth is widely recognised (Autio, 2005).

A key recent development has been the emergence of the knowledge spillover theory of entrepreneurship (KSTE) (Audretsch, Keilbach & Lehmann, 2005; Acs, Audretsch, Braunerhjelm, & Carlsson, 2009; Acs, Audretsch & Lehmann, 2013). It identifies the individual entrepreneur as the key agent in the process, who commercialises knowledge that spills over from incumbent organisations and uses it to usher in innovations that lead to economic growth. KSTE interprets the

superior economic performance of countries and regions essentially in terms of the ability of entrepreneurs to commercialise the knowledge that spills over from extant organisations. Following Arrow (1962), Acs *et al.* (2013) argue that in an environment of uncertainty, asymmetric information and heterogeneous valuation of knowledge, only some individuals are able to visualise true potential of spilled knowledge as well as are able to commercialise it successfully. They identify one further cause of national and regional growth disparities. The presence and permeability of *knowledge filters* that restrict spill over and commercialisation of knowledge for innovation. The extrinsic knowledge filters include regulations and other obstructions to formation of firms and intrinsic knowledge filters are uncertainty, information asymmetry and high transactions costs. KSTE explains the relative economic success of societies in terms of the presence and extent of permeability of knowledge filters, entrepreneurs' abilities to penetrate them and an environment of low uncertainty and affordable transaction costs.

3. The Empirical Evidence

Notwithstanding conceptual as well as intuitive expectations of a positive effect of entrepreneurship on economic growth, the outcomes of early empirical investigations of such influence turned out to be baffling (Fritsch, 2008). Reynolds (1994) is often cited (for instance, in Wong, Ho & Autio, 2005 and Fritsch, 2008) for his finding that the degree of entrepreneurship is positively related to growth in the USA³ and the same is reported by Ashcroft & Love (1996) for the UK. At the same time, however, Fritsch (1996, 1997) and Audretsch & Fritsch (1996) do not find such a link in Germany. Contrary to this, Carree, van Stel, Thurik & Wennekers (2002) analysing 1976-1996 data from 23 OECD countries successfully measure an 'equilibrium business ownership rate' and claim that any developed country below or above this threshold would have reduced economic growth.⁴ In contrast, Blanchflower (2000: 471), finds "... no evidence that increases in the self-employment rate increased the real growth rate of the economy". He in fact finds that a rise in the self-employment rate decreases economic growth. A subsequent review of literature on this relationship by Van Praag & Versloot (2007) also highlights such conflicting nature of evidence.

This inconsistent evidence naturally causes the concern "whether there is a robust base to hypothesized entrepreneurship-driven growth in the process of economic advancement" (Jiang, Wang & Wu, 2010: 522). Governments and quasi-government organisations are, at the same time, forewarned to withhold any

3. He, however, says this with some caveats. Please see Appendix 1.

4. In 2007 they reconfirm this for negative deviations and show that "...for the business ownership rate being below its 'equilibrium' rate, there appears to be a significant negative effect on economic growth..." (Carree, van Stel, Thurik & Wennekers, 2007: 288).

policy action until there is “strong statistical evidence” on a definite link between entrepreneurship and economic growth (Salgado-Banda, 2007: 3) as the “relationship between entrepreneurship and aspects of economic performance has not been explored sufficiently” (Tang & Koveos, 2004: 161). It is also suggested that “more work is warranted on this question” (Blanchflower, 2000: 498) and further research is needed in “...other countries or for other time periods...” (Audretsch & Keilbach, 2004b: 615).

4. Research Process

To unravel the above conflicting evidence, this research undertakes identification and scrutiny of key empirical studies in the last 25 years on the relationship between entrepreneurship and economic growth. To find appropriate publications for this review, in the database search engine EBSCO ‘entrepreneurship’ and ‘economic growth’ were entered as search items identified as ‘*subject terms*’. The search was restricted to full text, peer reviewed articles in English. The search yielded 584 journal articles. Using the filter ‘*published in*’, articles that appeared in journals with ABS (2015) ranking of 2 or above were short-listed. The chosen articles are largely from the journals *Small Business Economics*, *Regional Studies*, *Entrepreneurship & Regional Development*, *International Review of Entrepreneurship* and *Journal of Business Research*. From the perusal of these articles, those that did not deal with the issue of the relationship between entrepreneurship and economic growth were discarded. One Max Planck Institute discussion paper, one Freiberg working paper and one article by Zoltan Acs were included for their high relevance. This resulted in the selection of 34 journal articles. A summary of this collection is provided in Table 1, which shows that the bulk of research on this theme is published in the journal *Small Business Economics* and a small number of dedicated scholars have led the effort. These include Acs, Audretsch, Autio, Bosma, Braunerhjelm, Carree, Fritsch, Keilbach, Reynolds, Sanders, Thurik, Van Stel, and Wennekers. A good part of this research is based on the data generated by GEM’s annual Adult Population Surveys conducted around the world.

5. The Findings

A careful and iterative scrutiny of the selected literature revealed a mix of myriad, varied and complex reasons for the aforementioned conflicting findings. We conclude that partly, it is due to the influence of the historical evolution of modern societies from the managed economies to the entrepreneurial economies; partly, it is due to discrepancies in measurement of entrepreneurship and associated phenomena; partly, it is due to the difference between short and long-term

impacts of entrepreneurship and the non-consideration of reversed causality issues; and partly, it is due to the coexistence of a broad spectrum of societies from the economically advanced and technologically sophisticated to the materially impoverished and technically underdeveloped. Due to this extreme polarity of context within which this relationship has been examined and multiplicity of measures deployed to investigate it, despite meticulous data collection, careful analysis, methodological rigor and significant intellectual effort, the findings are incompatible as a diversely measured relationship plays out differently in diverse settings with distinct outcomes.

Table 1: The reviewed empirical works, by journal and author

Journal	No. of articles	Authors	Years
<i>Small Business Economics</i>	13	Acs, Audretsch, Autio, Bosma, Braunerhjelm, Carree, Carlsson, Chrisman, Conroy, Content, Dejardin, De Massis, Fang, Fritsch, Hessels, Ho, Memili, Reynolds, Sanders, Stam, Thurik, Van Stel, Varga, Weiler, Wennekers, Wong	1997, 2002, 2005, 2008, 2010, 2011, 2013, 2015, 2016, 2017, 2018
<i>Regional Studies</i>	6	Acs, Armington, Audretsch, Borgman, Braunerhjelm, Bruce, Deskins, Fritsch, Gosling, Hill, Mueller, Obschonka, Potter, Rentfrow, Reynolds, Rork, Stuetzer	1994, 1997, 2002, 2004, 2009, 2018
<i>Entrepreneurship & Regional Development</i>	4	Carree, Fayolle, Fernandes, Ferreira, Galindo-Martín, Méndez-Picazo, Peterson, Raposo, Ribeiro-Soriano, Thurik, Valliere, Van Stel, Wennekers	2007, 2009, 2012, 2017
<i>Journal of Business Research</i>	2	Castaño, Galindo, Méndez	2014, 2016
<i>International Review of Entrepreneurship</i>	2	Casares, Khan, Ivanovi-Djuki, Lepojevi, Stefanovi, van Stel, Petrovi	2016, 2018
<i>Max Planck Institute discussion papers*</i>	1	Audretsch, Keilbach	2004
<i>Freiberg working papers*</i>	1	Fritsch, Mueller	2004
<i>Labour Economics</i>	1	Blanchflower	2000
<i>Journal of Evolutionary Economics</i>	1	Beugelsdijk	2007
<i>Review of Industrial Organization</i>	1	Fritsch	1996
<i>The Annals of Regional Science</i>	1	Audretsch, Keilbach	2005
<i>Innovations*</i>	1	Acs	2006

Note: * Sources not listed on ABC. We have included them due to their high relevance.

6. The Principal Causes of Conflicting Evidence

6.1. The Evolutionary Argument

Audretsch & Thurik (2001) are the first to highlight that the developed countries have undergone a vital transformation since circa 1970. Until this time, industrialised countries had an economic structure dominated by the expanding large corporations concurrent with a declining share of self-employment and small firms in the national output. They call this a phase of *managed economy*. Subsequently, first in the USA and then in Western Europe and other developed countries, a new phase of rising self-employment and decline in the share of large corporations commenced, which continues unabated until today.⁵ The most telling evidence of this was the drop in employment share of the 500 largest US corporations (Fortune 500) from 20% in 1970 to 8.5% in 1996 (Carlsson, 1999). Audretsch & Thurik (2001) call this phase the *entrepreneurial economy*. The reason why the findings of early studies conducted in Germany and the USA conflicted was that the US data (Reynolds, 1994) included the period when the American economy was well and truly in an *entrepreneurial* phase whereas the German data (Fritsch, 1996, 1997; Audretsch & Fritsch, 1996), though, came from quite a similar period, related to times when the German economy was still very much in a *managed* stage. It is now well understood that in the entrepreneurial phase of evolution small start-ups taking advantage of unfolding technological opportunity become the source of economic growth whereas in managed economies large incumbent firms through scaling up of operations and exploitation of economies of scale are its source (Audretsch & Thurik, 2010). This is the reason that in the studies that measure entrepreneurship as start-up rates in economies in their entrepreneurial phase, the relationship between entrepreneurship and economic growth is invariably positive. However, this is not the case when the data comes from economies in their managed phase.

6.2. Diversity of Measurement Argument

As Bruns, Bosma, Sanders & Schramm, (2017: 33) observe "...there is a measurement problem of entrepreneurship, which led to the use of many different proxies for entrepreneurship...". Some of the measures of entrepreneurship used in the empirical research are:

Self-employment rate: Percentage of people in self-employment as part of the total working age population. Self-employed in agriculture are often excluded.

5. Casares and Khan (2016) report a recent decline in business entry rates in the United States though.

Business start-up rate: Percentage of start-ups —businesses that are younger than a specific age⁶— as a part of the total number of existing businesses.

Total early-stage Entrepreneurial Activity (TEA): Percentage of people who have either started a business in the last 42 months or who are actively preparing to start a business (nascent entrepreneur). This is a *sample* statistic and the number of people surveyed is a small part of total population. This is a measure developed by GEM and has 3 significant parts, *High-expectation entrepreneurial activity (HEA)*, *Opportunity entrepreneurial activity (OEA)* and *Necessity entrepreneurial activity (NEA)* each with a different implication for growth (Ivanovi-Djuki *et al.*, 2018).

Three further measures of entrepreneurship used in research include *total number of competitive firms*, *business turbulence or the sum of business entries and exits*, and *changes in size distribution of firms* (Carree & Thurik, 2010).

Even within the US economy, and even using the data that comes from its entrepreneurial phase, the relationship between entrepreneurship and economic growth is discernibly positive only when entrepreneurship is measured appropriately. The most significant revelation in this regard is that self-employment, that includes farming, is a poor proxy for growth-causing entrepreneurship. This is the reason that despite substantial data and rigorous analysis, Blanchflower (2000) does not find a link between entrepreneurship and economic growth. As Acs (2006: 102) clarifies “self-employment, in agriculture and very small-scale companies does not lead to economic development because there is no mechanism to link the activity to development. As more and more of the population becomes involved in opportunity entrepreneurship and as more and more people leave necessity entrepreneurship, the more we see rising levels of economic development”. Further, as Wong, Ho & Autio (2005: 345) argue within three GEM measures of entrepreneurship “...high potential TEA (HEA) is the sole form of entrepreneurship that has any explanatory effect on differing rates of economic growth across (developed) nations ...(and)... truly significant contributions (to economic growth) are made by the fast growing, rather than new firms in general...”. Henrekson & Johansson (2010) concur with this.

6.3. Lagged Effect Argument

One other related reason why the early research on the relationship does not find a positive link is that the researchers use cross-sectional data rather than panel (longitudinal) data required to establish causality (Granger, 1969). Audretsch and

6. This age may differ from one study to another.

Fritsch (2002) attribute the weak empirical evidence to the fact that a very long time is required (up to 10 years, in view of Fritsch and Mueller, 2004a) for the cumulative effect of new entries to translate into enhanced growth performance. As most studies try to measure the effect concurrently or with a short lag, the effect is not captured by their data (Fritsch, 2008). Subsequent research involving panel data finds outcomes which make more sense. For instance, following the conceptual framework of Fritsch⁷ and Mueller (2004b), Carree & Thurik (2008) using panel data from 1972-2002 for 21 OECD countries show through a lagged effect analysis that the number of business owners influences employment change in three stages that start with a direct positive effect then a negative effect and eventually a positive effect. Another aspect of this issue is that there is a two-way causality between entrepreneurship and economic growth (Bruns *et al.*, 2017). Entrepreneurship influences –and is also influenced by– economic growth. This creates a classic identification problem which makes it very difficult to empirically isolate the effect of entrepreneurship on economic growth (Thurik *et al.*, 2008).

6.4. Differential Economic Attainment Argument

Another issue here is that the nature of influence of entrepreneurial activity on economic growth changes with the development of nations (Beugelsdijk, 2007). The link is multifaceted, non-linear and is best represented by a U-shaped curve indicating that entrepreneurship is high both at very high and very low ends of economic prosperity. This has a vital implication. High levels of entrepreneurship in poorer countries, to a large extent, reflect lack of employment opportunities and in affluent countries they represent rising economic opportunity (Wennekers, van Stel, Thurik & Reynolds, 2005). Van Stel, Carree & Thurik (2005) find that the effect of TEA is significantly positive for growth in relatively rich countries, whereas it is significantly negative in relatively poor countries. Valliere & Peterson (2009) advance this discourse by showing that the prevalence of opportunity-based entrepreneurship does not significantly differ between emerging and developed countries and it is, therefore, a poor predictor of economic growth. They argue that in emerging countries, high prevalence of necessity entrepreneurship contributes to personal employment whereas in developed countries high prevalence of high-expectation entrepreneurship contributes to economic growth. Fritsch (2008) argues that the effect of new business formation on employment growth depends on productivity levels in the region. Regions with high productivity, adequate resources and well-developed innovation systems are more suited to employment growth caused by new entries.

7. Subsequently, Braunerhjelm, Acs, Audretsch & Carlsson (2010) too use lagged effects in their analysis and establish a positive link between entrepreneurship and economic growth as we discuss later.

These outcomes are not possible in low productivity regions with poor quality entrants, resource constraints and ill-functioning innovation systems. Where new entries do not spur innovation, the growth consequences of new business formation would be limited. This is the reason that the (positive) entrepreneurship-growth nexus is visible in empirical data only in developed countries.

7. Recent Advances and the Current State of Play

A key finding of this review is that notwithstanding the continued assertion of a lack of empirical evidence on entrepreneurship-led economic growth (for instance Bosma, Content, Sanders & Stam, 2018: 484 and Hessels & Naudé, 2019: 397), post-2004 research on the theme is quite conclusive on the positivity of this relationship in developed countries. In fact, as Appendix 1 shows, out of 27 post-2004 studies in this review, 19 confirm the positive effect of entrepreneurship on economic growth in developed countries quite categorically even when they have used varied proxies of entrepreneurship as well as of economic growth. In contrast, in five post-2004 works that do not support this, the lack of evidence is rarely categorical (except in Casares & Khan, 2016 and Ferreira *et al.*, 2017). In the remaining three, though Audretsch & Keilbach (2005) find a positive effect of only risk oriented measures of entrepreneurial capital on growth, they do report a significant positive effect of entrepreneurship on labor productivity. Similarly, Dejardin (2011), while reporting a negative relationship between net entry and growth in manufacturing, also finds it to be positive in services. Moreover, the lack of confirmatory evidence on this relationship reported by Conroy & Weiler (2016) could be attributed to their use of an unconventional proxy for entrepreneurship (densities of male-owned / female-owned firms).

Taking all the above evidence together, one conclusion is, therefore, inescapable. Post-2004 empirical research on the impact of entrepreneurship on economic growth fairly conclusively establishes the positivity of this relationship in the developed world. There are two reasons for this outcome. One, the improved methodological finesse in the recent studies and two, stronger conceptual underpinnings, particularly from KSTE. In one such effort, Braunerhjelm *et al.* (2010) refine the process at two levels. First, they introduce knowledge spillovers and entrepreneurship in the conventional endogenous growth model and they then use longitudinal data from 17 OECD countries that tests causality and direction of effect and show quite emphatically that entrepreneurship measured by non-agricultural self-employment, positively and significantly affects economic growth. They also show that the effect of entrepreneurship on economic growth has increased in the post-1990 period as the knowledge economy took roots and spread across countries. Block, Thurik &

Zhou (2013) advance this understanding further within the knowledge spillover framework and show that entrepreneurship measured by business ownership rates influences economic growth through new-to-the-market innovations. They argue that entrepreneurship entails risk taking and ambiguity tolerance, two key requisites for growth causing new-to-the-market innovations. Galindo & Méndez (2014) propose and test the circularity of the relationship amongst entrepreneurship, innovation and economic growth and show the mutually reinforcing nature of this relationship where higher levels of entrepreneurship manifest in more innovation and consequently more growth. Ghio, Guerini, Lehmann & Rossi-Lamastra (2015) advancing the knowledge spillover theory of entrepreneurship, argue that knowledge that gives rise to growth-enhancing entrepreneurial opportunities, spills over because of its non-excludability and imperfect appropriability. The intrinsic ability of entrepreneurs, the external knowledge non-creators, in penetrating knowledge filters and their amenability – or lack of it– to such penetration, accelerates or hampers the process. The virtue of this postulation is that it explains why some – and not all – spilled over knowledge has growth consequences, why some – and not all – individuals commercialise it successfully and why in certain contexts, entrepreneurship-enabled growth is possible and rewarding and not in others. Taken together these three planks of the knowledge spillover process explain very well the heterogeneity of national and regional growth performance in the developed world.

Memili, Fang, Chrisman & De Massis (2015: 772) based on the argument “that a certain degree of heterogeneity and variety of organizational forms is beneficial to the productive potential of a regional economy” theorise that very low or very high proportions of family firms in the business population is not conducive to economic growth. They show that a rising share of family firms causes economic growth until about 43%. Beyond this threshold, a further rise in the share of family firms negatively affects economic growth.

Castañó, Méndez & Galindo (2016) using GEM entrepreneurship measures and deploying Partial Least Squares estimation and Fuzzy-Set Qualitative Comparative Analysis, report a significant positive effect of entrepreneurship on economic growth in 13 EU countries, whereas Antony *et al.* (2017) on the back of Schumpeterian theory of creative destruction, argue that vertical innovations, that usher in better technologies, force closure of businesses that rely on older technologies and increase total factor productivity. The subsequent employment and production losses are more than made up by increased productivity in the industries in which this new technology is first used as well as in other sectors to which its use spreads.

Stuetzer *et al.* (2018) coalesce three views of entrepreneurship identified by Audretsch, Kuratko & Link (2015) as the *organisational view* related to age, size and governance of firms, the *behavioural view* related to behaviour of individuals or groups in terms of discovery, creation and exploitation of opportunities and the

performance view linked to innovation and growth. To reconcile these three, they propose an overarching notion of entrepreneurial culture based on the Big Five approach to entrepreneurial personality (Schmitt, Allik, McCrae & Benet-Martinez, 2007). Deriving personality data from the Gosling–Potter Project in the USA and using Rentfrow (2010) mapping they report that “The empirical evidence supports the idea that those regions bestowed with a greater amount of entrepreneurship culture enjoy a higher employment growth” (Stuetzer *et al.*, 2018: 616).

Bosma *et al.* (2018) highlight the role of institutions in shaping growth-enhancing entrepreneurship. They argue that the appropriate regulation of economic activities including credit, labour and business, concurrent with small size of government has a positive effect on entrepreneurship. At the same time, a positive institutional influence on shaping cognitive elements of entrepreneurship such as awareness of entrepreneurial opportunities and abilities to pursue them also contributes to a culture that causes economic momentum and growth.

A key contribution to this discourse has come most recently from Hessels & Naudé (2019).⁸ They position this scrutiny on the intersection of the fields of development economics and entrepreneurship. The former conceptualises and investigates the myriad determinants of economic growth and often posits entrepreneurship’s key role in it. Entrepreneurship scholars, in turn, in search of consequences of entrepreneurship, postulate its contribution to economic prosperity of individuals and societies. It is obvious that the paths of these two independent scholarly quests cross, and as Hessels & Naudé (2019) highlight, often these journeys are traversed oblivious to the sights that travellers taking the other route have seen. Their most noteworthy contribution, however, is a comprehensive definition of entrepreneurship which, from our perspective, makes a key correction in this debate and points out that individuals in pursuit of entrepreneurship do not necessarily aspire to achieve pure economic goals. Given this, it is not necessary that a rise in the number of entrepreneurs and their increasing success will translate in advancement of societies if measured purely in economic terms. They also point out that development economics has long gone past measuring success in GDP terms and have embraced more qualitative measures of progress such as human development, something that entrepreneurship needs to recognise and adopt. From this vantage point, our present review includes only the work that looks at both the entrepreneurial aspirations as well as their outcomes from a much narrower perspective. However, given that entrepreneurs aspire for far more than mere personal financial success, as argued by Hessels & Naudé (2019), our finding that post-

8. It should be noted that though our conclusions are in direct contrast with their claim that “...macro-evidence still very often does not find a relationship between entrepreneurship indicators and indicators of economic and productivity growth...” (Hessels & Naudé, 2019: 397), we do believe that their definition of entrepreneurship addresses a number of shortcomings of prevalent articulation of entrepreneurship and represents a watershed advance in our understanding of the entrepreneurial phenomenon.

2004 empirical works undertaken with a pure economic quest perspective confirms fairly conclusively that entrepreneurship's impact is unequivocally positive on national economic wellbeing in the developed world suggests that there is significant uncaptured and unexamined positive para-economic impact of entrepreneurship in these countries. We will discuss its implications later.

8. Conclusion and Synthesis

The potential causes of early conflicting evidence on the relationship between entrepreneurship and economic growth could be attributed to economic transformation in the developed world from the 'managed economies' to the 'entrepreneurial economies' (Audretsch & Thurik, 2001) marking a watershed decline in the dominance of large corporations and the rise of small innovative firms. It is noteworthy that as all OECD countries are now in an entrepreneurial phase (OECD, 2010), recent studies are more consistently confirming the existence of a positive relationship between entrepreneurship and economic growth in these countries (for instance, Carree & Thurik, 2008; Bruce *et al.*, 2009; Méndez-Picazo *et al.*, 2012; Castaño *et al.*, 2016; Stuetzer *et al.*, 2018; Ivanovi-Djuki *et al.*, 2018).

The second issue has been the divergence in measures of entrepreneurship deployed in empirical research. Until GEM developed TEA as a measure of entrepreneurship and until significant multi-country data on this measure became available, the self-employment rate was often used in research as an indicator of entrepreneurship (Fritsch & Wyrwich, 2017). Self-employment data, due to the preponderance of farmers and one-person, life-style businesses in it, masks the effect of entrepreneurial small firms on the growth process (Acs, 2006) and so studies using self-employment as a measure of entrepreneurship often returned negative or inconclusive evidence. Following Acs (2006), a key modification has been to exclude farming from self-employment as a proxy for entrepreneurship (see Van Stel, 2005, for an implementation). When this is done, a positive link between entrepreneurship and economic growth becomes visible (for instance, Braunerhjelm *et al.*, 2010), although some studies also find evidence for the possibility that non-agricultural self-employment rates can rise above an economic optimum, indicating a lack of scale economies being exploited (Carree *et al.*, 2002). Further, recent studies using TEA, particularly its sub-construct, HEA show it to be the single most important growth-influencing measure of entrepreneurship (Autio, 2005; Wong *et al.*, 2005). The other measures that successfully link entrepreneurship to economic growth include the number of business owners (Carree & Thurik, 2008), net small business birth rate (Bruce *et al.*, 2009), new business formation rate (Hessels & van Stel, 2011), entrepreneurship culture (Stuetzer *et al.*, 2018), and business ownership rates (Block *et al.*, 2013).

The third reason relates to the difference in the nature of this relationship in the developed and the developing countries. Particularly critical is the fact that in developing countries, high and rising levels of entrepreneurship often coexist with a lack of growth. Here again, GEM's measures of entrepreneurship have played a pivotal role in useful insights on this issue to emerge. It is now understood that the dominant form of entrepreneurship in the poorest countries is 'necessity entrepreneurship'. High levels of necessity entrepreneurship pushing up the overall level of TEA in a country reflect a lack of employment opportunities in the country which forces individuals to resort to subsistence level independent economic activity often involving back-breaking labour. A rise in such 'entrepreneurship' does not and cannot imply more growth. An important ramification of this is that policy initiatives pulling individuals out of necessity entrepreneurship and bringing them in paid employment and subsequently some of them in opportunity entrepreneurship are more likely to improve economic prospects of developing countries than those that support necessity entrepreneurship (Acs, 2006). It is also obvious in this context that HEA, by far the best predictor of economic growth (Autio, 2005; Wong *et al.*, 2005) is relevant only for developed countries. In developing countries high-expectation entrepreneurial activity is virtually non-existent and a rise in the ratio of opportunity entrepreneurship to necessity entrepreneurship is the best indicator of economic growth (Acs, 2006).

Finally and most importantly, one cause of continued debate on this contentious issue is not as much a lack of conclusive evidence but a lack of its awareness. For instance, when Jiang *et al.* (2010: 522) questioned the existence of "... a robust base to hypothesized entrepreneurship-driven growth in the process of economic advancement...", research had already been published that establishes such a base conclusively and when Salgado-Banda (2007) claimed a lack of 'strong statistical evidence' on the influence of entrepreneurship on economic growth, such evidence was already in the public domain (for instance, Autio, 2005; Wong *et al.*, 2005). Further, when as recently as in 2018, Bosma *et al.* (2018: 484) claimed that "...there is very little evidence on the impact of entrepreneurship on growth...", significant such evidence had already been delivered (for developed countries) as we show above.

A key conceptual advancement in understanding the relation of entrepreneurship with economic growth has been the KSTE (Audretsch *et al.*, 2005; Carlsson *et al.*, 2009; Acs *et al.*, 2013). A significant part of recent empirical research that consistently establishes the positivity of the entrepreneurship-growth nexus is based on this theory. Adding to the role of commercialisation of knowledge by large corporations, the theory provides a crucial complementary mechanism and highlights the role of entrepreneurs in utilising the spilled over knowledge—that they have not created themselves—in the economic growth process. The recent evidence on the theme highlights the role of a number of key processes and capabilities that drive the entrepreneurship-

led economic growth within a KSTE construct. These include incumbent organisations' inability to commercialise all new knowledge that they create, the spillover of the rest of it in the wider society and the role of entrepreneurial individuals who can recognise its value and can successfully commercialise it. Equally important is the presence of knowledge filters that hinder the knowledge spillovers, prevent entrepreneurs from accessing it and impede the formation of enterprises that could commercialise it. The process in which entrepreneurs use their "skills, aptitudes, insights" to scoop up the spilled knowledge and get their way round the filtering mechanisms (Braunerhjelm *et al.*, 2010: 107) culminates in new-to-the-market (Block *et al.*, 2013) or vertical innovations (Antony *et al.*, 2017). At the core of the process is the non-excludable and imperfectly appropriable knowledge created by incumbents which renders it amenable to use by entrepreneurs due to their intrinsic ability to understand its value, penetrate knowledge filters and commercialise it (Ghio *et al.*, 2015), a process that differs from industry to industry (Dejardin, 2011). The societies with a preponderance of such individuals reflecting an entrepreneurial culture (Stuetzer *et al.*, 2018) achieve economic growth which is moderated by institutional influences (Bosma *et al.*, 2018). Agglomeration which increases proximity to spilled over knowledge to a large number of potential entrepreneurs strengthens the link (Acs & Varga, 2005) and lower taxes and lack of bureaucratic restrictions also strengthen the link by minimising the rigidity of knowledge filters (Bruce *et al.*, 2009).

It should be noted that notwithstanding significant consistency in findings of recent research and a fairly harmonious fit of their underlying theoretical constructs with one another, attempts to use poor proxies for entrepreneurship continue to return counterintuitive outcomes. For instance, when Conroy & Weiler (2016) use densities of male and female-owned firms as a proxy for entrepreneurship they find that it has a negative relationship with employment growth.

9. Future Research Directions

Despite significant strides that have been made in conceptualisation of the entrepreneurship-growth nexus and in generation of substantial empirical evidence supporting it, the research on the theme continues to be deficient on one count and a key question remains unanswered. We do not yet know, barring some sketchy evidence, how this relationship pans out in the less developed parts of the world. The evidence on a strong positive effect of entrepreneurship on economic growth has come exclusively from the developed countries. Given that much of recent economic growth has occurred in emerging economies and that this trend is likely to continue for some time (IMF, 2018) and given recent evidence suggesting that the effect of entrepreneurship on growth in developing countries

may be weak (Ivanovi-Djuki *et al.*, 2018), what drives economic growth in developing countries is a vital unresolved issue.

Probably the biggest challenge to the current scholarly approach to this enquiry comes from the work of Hessels & Naudé (2019) who highlight, at the individual level, the existence of widely reported non-pecuniary goals declared by entrepreneurs along with the emergence of more appropriate measures of societal progress such as the human development index. One obvious future research agenda, therefore, is the examination of the influence that the social value created by entrepreneurs at the individual level has on human and social development of nations and regions. Further, the above synthesis of recent research highlights the consistency of findings from research deploying a wide variety of measures and theoretical constructs, most of which can be positioned within a broad KSTE narrative hinging on creation, spillover, and commercialisation of knowledge, in face of knowledge filters, within an overarching entrepreneurial culture. However, novel approaches, fresh insights and new evidence still defy such neat conceptual arrangements. For instance, the strong evidence of a U-shaped relationship of the ratio of family firms in SMEs with economic growth (Memili *et al.*, 2015) strikes a discordant note. An interesting question to answer is therefore, in what ways small family firms differ in their approach to commercialisation of knowledge spillovers and in dealing with knowledge filters.

10. Implications for Practice

Our analysis points to a number of practical clues for organisations and national governments. The empirical works aligned with KSTE provides many of these clues. That external individuals are able to successfully commercialise the spilled-over knowledge that established organisations generate, raises issues on their own inability to do it. Despite their ownership and proximity to it and the abundance and versatility of their resource base, what prevents them from recognising its commercial value is a question that they need to answer. Maybe the clues are in the realm of corporate entrepreneurship (Kazanjian, Drazin, & Glynn, 2002) and in the organisational systems and processes that encourage and support internal individual initiatives (Amabile, & Pratt, 2016). At the regional and national level, encouraging heterogeneity and variety in organizational forms (Memili *et al.* 2015), bolstering institutions that optimise regulation as well as those that shape cognitive elements of entrepreneurship, concurrent with small governments are some of the promising avenues of these findings for public policy (Bosma *et al.*, 2018). Fostering agglomeration which increases the proximity of a larger cohort of prospective commercialisers to the spilled over knowledge (Acs & Varga, 2005), lower taxes and lack of bureaucratic restrictions (Bruce *et al.*, 2009) are some other clues of significant potential value that emerge from our analysis.

Finally, given the positive link in developed countries between entrepreneurship and economic growth as established in the present review, the recent decline in entrepreneurship in the United States as measured by declining entry rates (Casares and Khan, 2016) is a cause for concern. Future research should focus on the causes of this decline.

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Appendix 1: Empirical studies included in our review

Source	Geography	Period	Entrepreneurship measures	Economic growth measures	Relevant findings	Conclusive evidence? ^a
Reynolds, 1994	Labour market areas, USA	1986–1990	Autonomous Firm Dynamics	Net job growth rate	"...new firm births may be a necessary but not sufficient factor in creating regional economic growth..." (p 429)	NO
Fritsch, 1996	W. German planning regions	1986–1989	New firm entry rates	Employment change	"While we found a positive statistical relationship between entry rates and employment change for manufacturing in the longer run, this relationship proves to be negative for the service sector as well as for all sectors together" (p 247)	NO
Fritsch, 1997	W. German planning regions	1986–1989	Start-up rates of firms with at least one employee	Regional employment change	"...somewhat positive impact of new firm formation on regional employment in the year where the new businesses are set up, but ...in subsequent periods (it) is negative..." (p 445)	NO
Blanchflower, 2000	23 OECD countries	1966–1996	Self-employment rate	Real GDP growth rate	"...no evidence that increases in the self-employment rate increased the real growth rate of the economy." (p 502)	NO
Carree <i>et al.</i> , 2002	23 OECD Countries	1976–1996	Non-agricultural Business Ownership rate	Gross domestic product per capita	"... economies can have both too few or too many business owners and both situations can lead to a growth penalty..." (p 285)	NO
Audretsch & Fritsch, 2002	74 W. German planning regions	1983–89 & 1993–98	entrepreneurial regime (start-up rate and growth rate > their median values)	Employment growth	"some regions achieve relatively high growth rates by concentrating on established, large enterprises, other regions achieve the same goal by focusing on new firm start-ups and a more turbulent enterprise structure." (p 121)	NO
Braunerhjelm & Borgman, 2004	70 Swedish labour market regions	1975–99	Share of zero employee firms	Labour productivity	"regional entrepreneurship...seems to... influence regional growth" (p 941)	Yes
Acs & Armington, 2004	Labour Market Areas, USA	1991–1996	New firm birth rate	Employment growth	"...higher rates of entrepreneurial activity were strongly associated with faster growth of local economies..." (p 924)	Yes
Fritsch & Mueller, 2004a	German districts	1983–2002	Start-up rate	Employment change	"new firm formation and entrepreneurship play a significant role for regional development...however, ...there are considerable time lags before new firm formation leads to increased employment" (p 17)	Yes

Audretsch & Keilbach, 2004a	440 German counties	1992-2000	Entrepreneurship capital (No. of start-ups relative to regional population)	GDP growth	"...entrepreneurship capital exerts a significant and strongly positive impact on regional economic performance ... " (p 19)	Yes
Acs & Varga, 2005	9 EU countries	2002	TEA	Technological change	"The effect of entrepreneurship on technological change is positive and highly significant." (p 332)	Yes
Wong <i>et al.</i> , 2005	37 GEM countries	2002	TEA	Change in GDP/worker	"only high growth potential entrepreneurship is found to have a significant impact on economic growth." (p 335)	Yes ^b
Wennekers <i>et al.</i> , 2005	36 GEM countries	2002	Nascent entrepreneurship	Per capita income	"support for a U-shaped relationship between nascent entrepreneurship and per capita income." (p 306)	Yes ^c
Van Stel <i>et al.</i> , 2005	36 GEM countries	1999-2003	TEA	GDP growth	"The effect of TEA is found to be significantly positive for the relatively rich countries, while it is found to be significantly negative for the relatively poor countries." (p 317)	Yes
Audretsch & Keilbach, 2005	327 W. German regions	1992	Per capita start-ups	Labour productivity	"entrepreneurship capital has a positive and large impact on region's labor productivity. However, for growth, this result holds only for risk-oriented measures of entrepreneurship capital and for densely populated regions." (p 457)	NO
Acs, 2006	GEM countries	2002, 2004	Opportunity-Necessity Entrepreneurship Ratio	GDP per capita	"we find a positive relationship between the opportunity ratio and GDP per capita" (p 98)	Yes
Carree <i>et al.</i> , 2007	23 OECD countries	4 yearly, from 1980 to 2004	Business ownership rate	Gross domestic product per capita	"there may not be a growth penalty for the business ownership rate being in excess of the 'equilibrium' rate. (However)... (f)or the business ownership being below its 'equilibrium' rate, there appears to be a significant negative effect on economic growth" (p 288)	Yes
Beugelsdijk, 2007	54 European regions in 7 EU countries	1950-1998	Value patterns of entrepreneurs versus non-entrepreneurs	Change in Gross Regional Product	"entrepreneurial culture is positively and significantly related to regional economic growth" (p 202)	Yes
Carree & Thurik, 2008	21 OECD countries	1972-2002	Number of business owners	Employment, GDP and productivity growth	"The impact of changes in the number of business owners (is) an initial direct positive effect, followed by a negative effect... and finally a ...positive supply-side effects. The net effect is positive for employment and GDP growth." (p 101)	Yes

Bruce <i>et al.</i> , 2009	50 US states	1988–2002	Number, birth rates and death rates of small firms	Gross state product,	"small establishment births are the single largest determinant of growth in GSP...and employment...(and) economic growth is faster when the net small firm establishment birth rate is positive " (p 242)	Yes
Valliere & Peterson, 2009	44 GEM countries	2004, 2005	Opp. & necessity entrepreneurship	Per capita GDP growth	"in developed countries, a significant portion of economic growth rates can be attributed to HEA but not in emerging countries"	Yes
Braunerhjelm <i>et al.</i> , 2010	17 OECD countries	1981–2002	Non-agricultural self-employment	GDP growth	" there is a positive relationship between economic growth and the degree of entrepreneurial activity" (p 117)	Yes
Dejardin, 2011	43 Belgian districts	1982 - 1996	Net firm entry rates	Change in gross regional product	"The results for manufacturing suggest negative relationships between firm net entry and economic growth... As for services...net entry may have positive lagged effects on regional economic growth." (p 456)	NO
Hessels & van Stel, 2011	34 GEM countries	2002 - 2005	TEA	4-year average of GDP growth	"both TEA and export orientation of entrepreneurs are significantly positively related to economic growth." " (p 263)	Yes
Méndez-Picazo <i>et al.</i> , 2012	9 from EU, Japan, USA	2002–2007	TEA	GDP growth	"entrepreneurship... is an economic growth-enhancing factor" (p 875)	Yes
Galindo & Méndez, 2014	13 developed countries	2002–2011	TEA	GDP growth	"innovations and entrepreneurship share positive relationships with economic growth." (p 828)	Yes
Memili <i>et al.</i> , 2015	US states	2004–2010	Share of family firms in SMEs	GSP per capita growth	"a balanced combination of family and non-family SMEs can best maximize economic growth" (p 781)	? ^d
Castañó <i>et al.</i> , 2016	13 EU countries	2014	TEA	GDP/capita (World Bank), GNI/capita (UNDP)	"Entrepreneurship has a positive correlation with economic growth" (p 5283) and "economic growth...is a function of... entrepreneurship" (p 5284)	Yes
Casares & Khan, 2016	US states	1987 to 2013	Firm entry rate	GDP/capita	"there is no significant relationship between the rate of business entry and US regional growth." (p 425)	NO
Conroy & Weiler, 2016	USA	2000–2007	Densities of male / female firms	Employment growth	"higher densities of male-owned firms and, to a lesser extent, female-owned firms have a negative effect on future employment growth" (p 411)	NO
Ferreira <i>et al.</i> , 2017	GEM countries	2009–2013	Entrepreneurs driven by opportunity / innovation	GDP Growth	"With regard to innovation-driven economies, neither type of entrepreneurship generates a significant effect on growth" (p 45)	NO

Stuetzer <i>et al.</i> , (2018)	366 MSAs in USA	1990 - 2015	Entrepreneurship culture (Big Five traits)	Employment growth	" regions exhibiting a higher degree of entrepreneurship culture tend to enjoy higher rates of employment growth.." (p 615)	Yes
Bosma <i>et al.</i> (2018)	25 European countries	2003–2014	TEA	GDP growth	"entrepreneurial activity that results from better underlying institutions... is positively associated with economic growth" (p 492)	Yes
Ivanovi-Djuk <i>et al.</i> (2018)	6 upper-middle-income and 15 high income European countries	2003-2014	High-growth expectation entrepreneurship, opportunity entrepreneurship and necessity entrepreneurship	GDP growth	"(In developed European countries)...the contribution of high-growth expectation entrepreneurship (is) relatively strong... (and that) of opportunity entrepreneurship (is) ... bigger than that of necessity entrepreneurship... (However)... the contribution of total early-stage entrepreneurial activity in transition countries of South-East Europe is significantly lower compared to higher developed European countries" (p 273)	Yes

- a. Of positive relationship between entrepreneurship and economic growth in developed countries.
- b. But does not separate the effect of entrepreneurship on economic growth in developed countries from developing countries.
- c. This U-shape does not imply a causal effect of entrepreneurship on economic growth though.
- d. Questionable proxy for entrepreneurship.

