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178.899 Master Thesis

The Economic Determinants of Entrepreneurial Activity: Evidence from a Bayesian Approach

A thesis presented in partial fulfilment of the requirements for the degree of Master of Business Studies in Financial Economics at Massey University

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ABSTRACT

In this paper we investigate the economic, political, institutional, and societal factors that encourage entrepreneurial activity. We do so by applying Bayesian Model Averaging, which controls for model uncertainty, to a panel data set for 33 countries. Our results indicate that the general state of macroeconomic activity, the availability of financing, the level of human capital, fiscal policies implemented and the type of economic system are the main determinants of the level of entrepreneurship. We also document a non-linear, U-shaped relation between distortionary taxation and entrepreneurial activity.

Keywords: *Entrepreneurship, Entrepreneurial Activity, Total Early-Stage Activity (TEA), Global Entrepreneurial Monitor (GEM), Bayesian Model Averaging (BMA), Panel Estimation.*

JEL Classification: B30, B53, C11, C23, J20, M13, O10, O40

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1. INTRODUCTION

There is very little consensus with respect to different aspects of entrepreneurship. Whether it comes to defining, or measuring entrepreneurship, scholars have proposed a broad array of definitions and measures (Herbert and Link, 1989; van Praag, 1999). Similarly, according to numerous studies[1], the most recent being Bjørnskov and Foss (2008), the origins and determinants of entrepreneurship are indeed manifold and span a wide spectrum of theories and explanations. Despite this lack of consensus regarding entrepreneurship, there is evidence that the level of entrepreneurial activity varies systematically both across countries, and over time[2].

Interest in entrepreneurship studies has been escalating during recent years. Lundstrom and Stevenson (2005, p.6) found that the driving forces behind this interest are the growing body of research on the relation between entrepreneurship and economic growth (Kirzner, 1982; OECD, 2001; Carree and Thurik, 2003), the essential contribution of new firms to employment growth and economic renewal (Kirchhoff, 1994; Audretsch and Thurik, 2001; Friis et al., 2002), and influences regarding the differing rates of business ownership and entrepreneurial activity across nations (Carree et al., 2002; Reynolds et al., 2004). These bodies of research point to the critical contribution of entrepreneurship to job creation, innovation, productivity, and economic growth in an economy.

Since entrepreneurship has long been seen as a relevant instrument to stimulate and generate economic growth, identifying the factors that determine entrepreneurial activity allows us to design appropriate policies to boost productivity and economic growth in an economy. Correspondingly, in this paper, we empirically investigate the factors influencing the level of entrepreneurial activity. A multitude of factors have been identified and reported in the previous literature as being associated with the level of entrepreneurial activity. These include social, cultural, and attitudinal factors, as well as taxation and the

[1] See, for instance, Brock and Evans (1989), Carree (1997), Gavron, Cowling, Holtham and Westall (1998), OECD (1998), Reynolds, Hay, Bygrave and Camp (1999), and Carree, van Stel, Thurik and Wennekers (2001).
[2] See Rees and Shah (1986), de Wit and van Winden, (1989), Blanchflower and Meyer (1994), and Blanchflower (2000).

ease of business entry and exit, population, GDP growth, and other regulatory factors, just to mention a few. These factors will be discussed in detail in Section 2.

This paper contributes to the entrepreneurship literature on several levels. In using three different measures for entrepreneurship from the Global Entrepreneurship Monitor (GEM) data base in our empirical study, we address measurement issues with respect to the level of entrepreneurship. The contrast between different types of entrepreneurial activity is measured using the GEM data on Total Early-Stage Entrepreneurial Activity (TEA): Overall TEA; Necessity TEA; and Opportunity TEA. The potentially endogenous relation between many of the standard explanatory variables in entrepreneurship regressions and our measures of entrepreneurship is addressed by using lagged values of the independent variables. Moreover, the issue of model uncertainty, due to the large number of potential factors that could have a significant effect on the level of entrepreneurial activity, is resolved by using appropriate Bayesian techniques.

The paper is organised as follows. Section 2 reviews the existing theoretical and empirical entrepreneurship literature. Section 3 explains the sample selection, data collection, and the methodology used in this study. Section 4 presents the empirical findings. Section 5 reports the robustness results. Finally, section 6 summarises and concludes.

2. LITERATURE REVIEW

The analysis of entrepreneurship is a perennial issue in economic analysis. Research on entrepreneurship goes back some time and, to date, there has been no consensus on the definition of entrepreneurship. Entrepreneurship means different things to different researchers, which is nicely captured by Peter Kilby's (1971, p.1) observation:

> *The entrepreneur is like the Heffalump*[3]*. It has been hunted by many entrepreneurial researchers, using various trapping devices, but no one so far has succeeded in capturing him. All who claim to have caught sight of him report that he is enormous, but they disagree on his particularities. Not having explored his current habitat with sufficient care, some hunters have used as bait their own favourite dishes and then tried to persuade people that what they caught was the Heffalump.*

2.1. L'entrepreneur

The concept of entrepreneurship is not new. Entrepreneur is a loanword from the French verb *entreprendre* which can be literally translated as to undertake, to embark upon, and to launch upon something. The *Dictionnaire de la Langue Francaise (*1437) defines an entrepreneur as, "*celui qui entreprende quelque chose*", meaning someone who is active and/or achieves something. This person could be a manufacturer, or a master builder.

During the 17th century the term entrepreneur was extended. Entrepreneur was defined as "*qui entreprende un batiment pour un certain prix"* (Landström, 2005), which refers to a person who has been contracted by the state to perform specific services, or to supply the state with certain goods at a fixed price. This person could be a building, civil engineering, or a transportation contractor, as well as a funeral director.

[3] Heffalump – a fictitious animal that competed for honey in A.A Milne's *Winnie-the-Pooh*.

For some time, there was no equivalent to the French entrepreneurial concept in the English language. The words *undertaker* and *adventurer* were used interchangeably with the term *entrepreneur* in the sense of an adventurer being someone who seeks occasions of hazard and puts himself in the hands of chance[4]. As time went by, entrepreneurship became more broadly defined. The 2006 American Heritage Dictionary of English Language describes an entrepreneur as someone who organises, operates, and assumes the risk for a business venture.

2.1.1. Historical Roots

The concept of entrepreneurship is as old as human civilisation. Entrepreneurship can be traced back to the medieval period of 12th century Europe. In this period, the term entrepreneur was linked with brutal, war-like activities. According to the French author Lemaire de Belges, Hector and other Trojan warriors were entrepreneurs in the sense that they were individuals who were tough and prepared to risk their lives and fortunes for the sake of winning the Trojan War.

By the end of the 1500s, the term entrepreneurship was associated with a group of men who bore the risks of undertaking such projects as the building of castles, churches, fortresses, harbours, roads, drainage work, and supplying armies with equipment. These men entered into a fixed price contract and assumed the risk of making a profit, or a loss.

From the 17th century onwards, several schools of thought emerged. The following categorises these schools according to the country of origin. The concept of entrepreneurship originates in 15th century France. Until the turn of the 20th century, the British contributed little to this definition. At best they ignored the entrepreneur and, at worst, they confused his role with that of the capitalist. Austrians and Americans added to the debate, with the Austrian school holding sway on present day thinking, whilst the Germans school has made a sustained contribution to our understanding of

[4] Definition of Adventurer according to Dictionary of the English Language (1755).

entrepreneurship. This German contribution has been, in particular, in the form of the seminal works of some notable émigrés – Schumpeter being arguably the most well-known of these[5].

2.1.2. Historical Economics Perspective

Our discussions in relation to the historical overview of the entrepreneur are based on the seminal work of Herbert and Link (1988), *The Entrepreneur: Mainstream Views and Radical Critiques.*

2.1.2.1. The French School

One of the earliest uses of the term *entrepreneur* was by the Irish-born banker and economist Richard Cantillon (1680-1734), during the first half of the 18th century. He recognized that risk is not just about the uncertainty of a speculative venture, but also about the unknown returns that will be received at the end of an activity. Cantillon defined an entrepreneur as someone who buys at certain prices, but sells at uncertain prices (Cantillon, 1755, 1931). This differed from the undertakers of public works a couple of centuries earlier, in which undertakers knew the price of the contract, but took a risk as to the costs of fulfilling the contract.

According to Schumpeter (1934), Richard Cantillon developed a hierarchical theory of social classes. In his *Essai sur la Nature du Commerce en Général*, Cantillon (1755, translation 1931) wrote :

> *il n'y a que le Prince and les propriétaires des Terres, qui vivent dans l'indépendance; tous les autres Ordres and tous les Habitants sont à gages ou sont Entrepreneurs*. (In

[5] See Chell, E. (2008). *The entrepreneurial personality: A social construction.* New York: Routledge. p.17.

translation: There are none but the Prince and the Proprietors of Land who live independent; all other Classes and Inhabitants are hired or are Undertakers.)[6]

The landed aristocracy, which occupied the top of the economic and social order, was financially independent by virtue of its property rights over natural resources. The rest of the inhabitants could be categorized into two financially independent classes; the hirelings, and the entrepreneurs.

Cantillon's contribution lies in the fact that he emphasized the existence of entrepreneurs, who occupied the last group in the hierarchical society classes. Entrepreneurs could be either those who set up with capital to conduct their activity[7], or those who sold their own labour[8].

Nicholas Baudeau (1730-1792) argued that an entrepreneur is an innovator in the sense that a farmer inventing and applying new techniques to increase his harvest may reduce his costs and, thereby, increase his profit. He also argued that, with certain qualities such as individual energy, knowledge, ability, and intelligence, the entrepreneur is able to exert a degree of control over some aspects of the economic process. This implies that entrepreneurship is concerned with the management and coordination of business activities.

Similar to Cantillon, the entrepreneurial vision of Francois Quesnay (1694-1774) was restricted to agriculture. Quesnay divided economic actors into three groups: (1) The landowner, or the proprietary, class with property rights in land; (2) The farmer, or the productive, class who is capable of making profits; and (3) Artisans who manufacture goods and for whom the productive class produces materials.

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[6] Richard Cantillon, *Essai sur la nature du Commerce en General*, Higgs, H. (Ed.), London: Macmillan, 1931, p.42-43.

[7] Such entrepreneurs include those in charge of mines, theatres, building projects, merchants by land and sea, cook-shop keepers, pastry cooks, and innkeepers

[8] Such entrepreneurs include journeymen, artisans, copper smiths, needlewomen, chimney-sweeps, shoemakers, tailors, carpenters and wigmakers, painters, physicians, and lawyers.

Anne Robert Jacques Turgot (1727-1781), a French government administrator and economist extended Cantillon's idea of entrepreneurship. He viewed an entrepreneur as a capitalist-entrepreneur who seeks to earn interest on the capital invested and to obtain remuneration for his manpower. According to Turgot, once economic agents accumulate money, they become capitalists who can make investment decisions, as they are in a position to choose whether to buy land, invest in a business, or simply lend the capital to others. Turgot's entrepreneur is in the first place a capitalist, and may opt to become a landowner, to continue being a capitalist as a pure lender, or to become an entrepreneur.

The French philosopher, Jean-Baptise Say (1767-1832) thought of the entrepreneur as a rare phenomenon who is able to combine and co-ordinate the factors of production. The entrepreneur was viewed by Say as someone who creates value in an economy by shifting economic resources (labour, skills, education, and capital) from areas of low productivity to areas of higher productivity, which offer a greater yield.

In his work, *A Treatise on Political Economy (1803*), Say emphasized the functional role of the entrepreneur as a coordinator, as well as his active role within the economic process. Therefore, Say's entrepreneur is unequivocally distinguishable from the capitalists, landowners, and workmen. He argued that the entrepreneur does not have to be rich. In Say's words, an entrepreneur may be characterised as follows:

> *For he may work upon borrowed capital; but he must at least be solvent, and have reputation of intelligence, prudence, probity and regularity…. [He must have] a combination of moral qualities, that are not so often found together. Judgments, perseverance, and a knowledge of the world, as well as of business. He is called upon to estimate, with tolerable accuracy, the importance of specific product, the probable amount of the demand , and the means of its production: at one time he must employ a great number of hands; at another, buy or order the raw material, collect labourers, find consumers, and give at all times a rigid attention to order and economy; in a word, he must possess the art of superintendence and administration.…Thus the requisite capacity and talent limit the number of competitors for the business of adventurers. Nor*

> *is this all: there is always a degree of risk attending such undertakings; however well they may be conducted, there is a chance of failure; the adventurer may, without any fault of his own, sink his fortune, and in some measure his character; which is another check to the number of competitors, that also tends to make their agency so much dearer.*[9]

Say expanded Cantillon's functions of the entrepreneur to include managerial characteristics. According to Herbert and Link (1988), Say in fact considered entrepreneurial activity as being virtually synonymous with management, in which the entrepreneur coordinated the factors of production, administered business, supervised staff, ordered raw materials, estimated demand, and acted as an intermediary between the producers and consumers.

2.1.2.2. The British School

Entrepreneurship did not feature prominently in the writings of British economists during the early 18th century. When discussing the entrepreneurial function, the British classical economists did not use the term entrepreneur, but instead used such terms as adventurer, projector, or undertaker.

Adam Smith (1723-1790) focused on capital as the decisive element in economic development. He argued that the function of the entrepreneur was conflated with that of the capitalist. Correspondingly, he viewed the profit that accrues to the entrepreneur not as a form of wage arising from the execution of directorial duties, but as the consequence of the level of investment made. According to Herbert and Link (1988, pg.37), due to a lack of clarity in regards to the separation of the role of entrepreneur and capitalist, Adam Smith saw the entrepreneur as either a menace or a boon, thus leaving the concept of entrepreneurship rather muddled.

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[9] Say, Jean-Baptise, (1821, translated). *A Treatise on Political Economy or The Production, Distribution and Consumption of Wealth*, Prinsep, C.R., (transl.). Philadelphia: Claxton, Remser and Haffelfinger. p.331.

David Ricardo (1772-1823) ignored the notion of an entrepreneurial element in his writings. He expounded the basic tenants of the capitalist system, describing the effect of market forces on capital. In *The Principles of Political Economy and Taxation*, Ricardo (1962 pg. 49) states that:

> *The role of [a] manufacturer is to invest his capital in the business according to the demand for his products. If demand falls off then he may dismiss some of his workman and cease to borrow from the bankers and moneyed men. The reverse will be the case where demand increases*.

This implies that the manufacturer is, in fact, a capitalist who is not motivated by the pursuit of progress. Ricardo (1962, pg. 112-4) argued that the role of a capitalist is prominent in the workings of the economy, in the sense that a capitalist moves his capital to new source of production in response to external changes in the environment, such as trade opportunities, shifts in market demand, or the distress produced in an economy after a protracted period of war. Hence, the role of entrepreneur was, in effect, *squeezed out* of Ricardo's analysis.

In contrast to Smith, Jeremy Bentham (1748-1832) conceptualised entrepreneurship in his work. Bentham viewed the entrepreneur as a talented individual whose imagination and inventiveness were responsible for the progress of nations. He believed that innovation was the driving force behind the development of human kind and saw the projector; his term for what we now refer to as an entrepreneur; as an innovator. With its emphasis on innovation, Bentham's view of entrepreneurship appears to have a close affinity with that of the German economist Joseph Schumpeter (see the later section on the German School).

John Stuart Mill (1806-1873) expanded Bentham's work and developed his view of entrepreneurship in his book *Principles of Political Economy* in which he gave the impression of the entrepreneur as a passive capitalist:

> *A manufacturer, for example, has one part of his capital in the form of buildings, fitted and destined for carrying on his branch of manufacture. Another part in the form of machinery. A third consists, if he be a spinner, of raw cotton, flax or wool…. Each capitalist has money, which he pays to his workpeople, and so enables them to supply themselves; he has also finished goods in his warehouses, by the sale of which he obtains more money, to employ in the same manner, as well as to replenish his stock if raw materials, to keep buildings and machinery in repair, and to replace them when worn out. His money and finished good, however, are not wholly capital… he employs part of the one, and of the proceeds of the other, in supplying his personal consumption and that of his family* (Mill, 1965, pg. 55-56).

According to Chell (2008, pg.25), Marshall identified two types of business owner[10]. They were those who will open new and improved methods of business and who are risk-loving, and those who follow beaten tracks and are given wages of superintendence. To Marshall, business development requires more than superintendence of labour, it requires a thorough knowledge of the trade:

> *He must have the power of forecasting…. Of seeing where there is an opportunity for supplying a new commodity that will meet a real want or improving the plan of producing an old commodity. He must be able to judge cautiously and undertake risks boldly; and he must…. Understand the materials and machinery used in his trade. [In addition, he must be] a natural leader of men (*Marshall, 1920, pg. 248).

Marshall argued that business ability is not a scarce resource because everyone has a natural aptitude for it in the conduct of his life. It is non-specialised and is identified with the qualities of judgment, promptness, resourcefulness, carefulness, and steadfastness of purpose (Marshall, 1920, pg. 503). Further, Marshall appears to consider the abilities of a

[10] In his seminal book the *Principles of Economics*, Marshall used a number of terms to describe the person in charge of a business and he uses these words synonymously; manufacturer, producers, employers, the head of the business, management, coordinator, uncertainty-bearer, adventurer, and undertaker (Marshall, 1910, p. 620).

successful businessman to be rare. In his book, *Principles of Economics*, Marshall stated that:

> …. *It would be as wasteful if society were to give their work to inferior people who would undertake to do it more cheaply, as it would be to give a valuable diamond to be cut by a low waged but unskilled cutter* (Marshall, 1920, p. 553).

Marshall, who was influenced by Charles Darwin's theory of evolution, views entrepreneurs as businessmen who emerge through the evolutionary process of survival of the fittest. Loasby (1991) reveals that Marshall is more concerned with the efficiency and organization as a fourth factor of production. Whilst Marshall's entrepreneurs are innovative in the sense of devising new methods to reduce costs and to produce goods more efficiently, it was Schumpeter who enhanced and developed the innovation theory.

To summarise, although the British classical economists touched on the role of entrepreneurship in their writings, they did not explicitly develop a theory on entrepreneurship. Pittaway (2000) stated that there are three reasons why the British classical school of economics was so limited in its contribution to entrepreneurship and so different from the French classical economists' view. First, *entrepreneur* is a French word that has no real English equivalent. Second, French law distinguished between the ownership of capital and the ownership of business. Last, the French approach was micro-economic, whilst the British conducted a macro-economic analysis.

2.1.2.3. The German Classics and the German Historic School

The German school is represented by the work of, in particular, Gottlieb Hufeland (1760-1817), Friedrich Hermann (1785-1868), Adolph Riedel (1809-1872), Johann von Thuenen (1785-1850), and H.K. von Mangoldt (1824-1858). These authors' entrepreneurial concept built on the work of the French School.

Hufeland (1815) and Hermann (1832) focused on income distribution and suggested that the entrepreneur receives remuneration for his special capabilities. Riedel (1838-43) linked his view of entrepreneurs to Cantillon's. He argued that the entrepreneur is an uncertainty reducer for other risk-averse economic actors and, in doing this, increases his own risk.

Johann von Thuenen distinguished between the return to the entrepreneur from that of the capitalist, by emphasizing a residual, which is the return to entrepreneurial risk. Von Thuenen also distinguished between the entrepreneur and the manager of a business by suggesting that the entrepreneur might be, but does not need to be, the manager. Even though the capabilities and qualifications of a manager may be equal to those of the entrepreneur, it is the entrepreneur who takes the problems of the firm home with himself and is the one who spends sleepless nights because of the risk he takes. From von Thuenen's perspective, entrepreneurs are more engaged and also more innovative in ensuring a successful business venture. Hence, the residual entrepreneurial income contains a recompensation for the risk he takes and it contains a return to ingenuity.

Mangoldt also extended the issue of risk. In his work on the relation between the nature of production and the degree of risk, Mangoldt differentiated between the risk entailed in producing goods to order, and the risk entailed in producing goods for the general market. According to Mangoldt, where a firm produces goods to order, it reduces the risk entailed, whereas, given the twin market conditions of uncertainty in demand and an unknown price, producing goods for the market is more speculative. Mangoldt also suggested that the longer the time to final sale, the greater the uncertainty and, conversely, the shorter the time, the less the uncertainty and, by definition, the less entrepreneurial the venture.

The most popular view of entrepreneurship was been developed by Joseph A. Schumpeter (1883-1950). Schumpeter's greatest contribution to the understanding of entrepreneurship lies in the effect of innovation on an economic system. Schumpeter saw an entrepreneur as the prime mover in economic development, with his role being to disturb the economic status quo through innovations, or the carrying out of new combinations of factors of production.

Schumpeter (1934, pg. 66) distinguished five types of innovation. These were: (1) The introduction of a new product, or a new product quality; (2) The introduction of a new method of production; (3) The opening of a new market; (4) The use of a new source of supply of raw materials, or half-manufactured goods; and (5) The creation of a new industry organisation. He suggested that anyone who performs any of these functions is an entrepreneur, regardless whether they are independent businessmen, or the dependent employees of a company, such as managers, or directors.

In his seminal book *The Theory of Economic Development*, Schumpeter argued that not all businessmen are entrepreneurs:

> *Everyone is an entrepreneur only when he actually carries out new combinations and loses that character as soon as he has built up his business, when he settles down to running it as other people run their businesses* (Schumpeter, 1934, pg. 78).

This implies that the entrepreneur is an innovator and a catalyst of change through the introduction of new technological products and processes. He is someone special who possesses deep understanding of an industry (including the technological and product market knowledge), leadership ability, and a willingness to break through traditional structures, or constraints. The innovator is only an entrepreneur when he engages in the change, or the creative destruction process. When the productions become routine the innovator ceases to be an entrepreneur and becomes a manager.

Schumpeter also argued that the entrepreneur is not a risk bearer. Risk bearing is the function of the capitalist who lends his funds to entrepreneurs. From his perspective, the capitalist and the entrepreneur may, at times, be one and the same person, but capital was not a prerequisite to entrepreneurial activity. In contrast to Knight, who argued that profit is a return to risk, Schumpeter viewed profit as a residual, or a surplus, that arises from the innovative acts of an entrepreneur, with such innovative activities being carried out under conditions of uncertainty[11].

Schumpeter stated that entrepreneurs are talented individuals and are also a very scarce breed. He argued that their scarcity lies not in the entrepreneurs' alertness, in their professionalism, or even in their psychology. Although entrepreneurs are rational economic men who weigh marginal cost and benefits to perform efficiently, their objective is not the pursuit of greater profits. Entrepreneurs are defined by a unique set of motivational factors such as:

> *(…..) The dream and the will to found a private kingdom, usually through not necessarily, also a dynasty. (…..) Then there is the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake, not of the fruits of success, but of success itself. (….) Finally, there is the joy of creating, of getting things done, or simply of exercising one's energy and ingenuity* (Schumpeter, 1934, pg. 93-94).

The German Classical School contributed to the understanding of entrepreneurship by distinguishing the entrepreneur, whose role it is to estimate the demand from the entrepreneur, whose role is that of the innovator, or inventor, who creates the demand.

The German Historic School was led by Wilhelm Georg F. Roscher (1817-1894), Bruno Hildebrand (1812- 1878), Karl Knies (1821-1898), and Gustav Schmoeller (1838-1917). In his *Die Grundlagen der Nationalokonomie*, Roscher argued that the laws of economic development are contingent upon their historical, social, and institutional aspects, also

[11] The risk taken by the entrepreneur is not calculable. The entrepreneur invests his time, effort, and funds in the new venture and, if the venture fails, the entrepreneur will not only lose face, but will also lose the opportunity cost of investing time and effort.

involving looking at economic life through the eyes of a historian and sociologist. Within the German Historic School, Gustav Schmoeller discussed entrepreneurship. Using a vast quantity of historical data, he found that entrepreneurship serves as a crucial element in the economy and that the entrepreneur is an energetic and active person, such as a coordinator, manager, or innovator.

2.1.2.4. The American School

Among other American economists, Herbert and Link (1988) mention Amasa Walker (1799-1875), Francis A. Walker (1840-1897), Frederick Barnard Hawley (1843-1929), John Bates Clark (1847- 1938), and Frank Hyneman Knight (1885-1972) as representatives of the American School.

The American School began to emerge after the American Civil War of 1861-1865. It is deeply rooted in the Austrian tradition and was led by Amasa Walker and his son Francis A. Walker. Amasa Walker contributed to the differentiation of the roles of the entrepreneur and the capitalist, disassociating from what he described as confusion by the English classical economists. In addition, his son, Francis A. Walker, reinforced the ideas of the French school in suggesting that the successful conduct of business requires exceptional abilities and opportunities, such as the power of foresight and a facility for organisation and administration, as well as unusual energy and leadership qualities.

Frederick. B. Hawley reflected on uncertainty. He suggested that profit is the reward to the entrepreneur for assuming risk. Hawley‘s distributive theory was challenged by John Bates Clark, who developed the distinction between insurable and non-insurable risk, foreshadowing Frank H. Knight’s work. Frank H. Knight reconciled Clark and Hawley’s theory of profit on the grounds that uncertainty is fundamental to understanding profit, which is bound up with economic change and is the result of uncertainty, which cannot be measured. Frank Knight contributed to the understanding of entrepreneurship in several ways. In his famous work, *Risk, Uncertainty and Profit*, Knight wrote:

> *Without change of some sort there would, it is true, be no profits, for if everything moved along in an absolutely uniform way, the future would be completely foreknown in the present and competition would certainly adjust things to the ideal state where all prices would equal costs* (Knight, 1921, pg. 37).

Hence, Knight (1921) implied that, without uncertainty, the economic outcome would simply be the result of a purely mechanistic process, because the economic actors would not differ in terms of their individual knowledge and their intellectual capacity. The primary function of the entrepreneur in Knight's conceptual framework is deciding what to do and how to do it without being certain about possible future states (Ricketts, 1987, pg.48).

2.1.2.5. The Austrian School

Carl Menger is identified as the founder of the Austrian School of economics. In his work *Principles of Economics*, Menger (1981 transl.) introduced the *theory of the good,* in which he classifies goods into two different orders; the lower order, and the higher order. He suggested that lower order (first order) goods are consumer goods; for instance, bread; which have a direct causal relation to the satisfaction of human need. Second order goods, however, are complementary goods to the production of a first order good; for instance, flour that can be made into bread; and have an indirect causal relation to the satisfaction of human need.

Menger isolated the entrepreneur as an economic good in his own right and a particular class of labour. He viewed the entrepreneur as not being synonymous with the capitalist. According to Menger, although entrepreneurs require access to capital, capital was not the distinguishing characteristic of the entrepreneur. Neither was their willingness to bear risk a distinguishing characteristic. Instead, Menger pointed to the entrepreneur's decision making ability as the distinguishing characteristic.

According to Menger, the roles of the entrepreneur include the collection of information about economic situations, making economic calculations in order to ensure efficiency of the productive process, and acting by will to assign goods to a productive process and supervising the productive process[12].

Eugen von Boehm-Bawerk (1851-1914) and Friedrich Freiherr von Wieser (1851-1926), followers of Menger, made a contribution to the entrepreneurship theory by joining his theories together to build the edifice of the Austrian school. They describe the entrepreneur as a:

> *(…) director by legal right and at the same time by virtue of his active participation in the economic management of his enterprise. He is a leader in his own right. He is the legal representative of the operation, the owner of the material productive goods, creditor for all accounts receivable and debtor for all accounts payable. As a lessor or lessee he is obligated or privileged. He is the employer under all contracts for work and labor… His economic leadership commences with the establishment of the entrerprise, he supplies not only the necessary capital but originates the idea, elaborates and puts into operation the plan, and engages collaborators. When the enterprise is established, he becomes its manager technically as well as commercially (von Wieser, 1927, p. 324).*

Ludwing von Mises (1881-1972) argued that Schumpeter had confused entrepreneurial activity with technological innovation. von Mises's entrepreneur is a decision taker, with the making of decisions concerning innovative practices being only part of his sphere of activity. Furthermore, von Mises contended that profitability of the enterprise was a consequence of innovative practices, which he saw as entrepreneurial acts, and having nothing to do with capitalism.

[12] Menger, C. (1981 translation). *Principles of Economics*, Dinwall, J. and Hoselitz, B. F. (transl.), New York: New York University Press. See pg. 160

Unlike Mises, who focused on the human or entrepreneurial action, Friedrich August von Hayek focused on the concepts of information and knowledge. According to Hayek (1937), the availability of information and the capacity to process information [13] constitute the constraints on individual decision making. He argued that, with partial information, individuals rely upon the institutions (formations) for the transmission and sharing of information:

> *The price system is just one of these formations which man has learned to use (though he is still very far from having learned to make the best use of it) after he had stumbled upon it without understanding it. Through it not only a division of labour but also a coordinated utilization of resources based on an equally divided knowledge has become possible* (Hayek, 1948, p.88).

Hayek visualises a world in which there is a continuous process of discovery; not major discoveries such as technological breakthroughs, but mostly minor ones about individual wants at particular times and place. He argued that, with the combination of minor discoveries [14] and the partial and localised access to information [15], entrepreneurs are individuals who acquire information and knowledge and pursue the equilibrium price.

According to Gloria-Palermo (1998) Israel Kirzner's theory is founded upon the ideas developed by Mises (human action) and Hayek (information and knowledge). Kirzner's theory of the market process accepts imperfect knowledge and describes the market as a process of discovery and learning. Kirzner argued that, with information advantages, the entrepreneur makes his own profit and starts the market process. Kirzner (1979) stated that learning is a central part of the market process and that the market is a communication tool

[13] According to Tansey (2002), the capacity to process information demands an individual's time, physical endurance, wakefulness, mental capability, and the sense of entrepreneurship.
[14] Hayek stated that the process of entrepreneurial discovery depends on individual's perceptions and understanding of situations. He pointed out that those perceptions are shaped by an individual's own experience.
[15] Hayek argued that different people have access to different information; in particular, most people know much more about themselves than they do about others.

for the transmission of new knowledge[16]. He also held that experience is integral to the entrepreneur and that the individual cognitive learning ability of human beings is the main part of the process that brings market prices from an imbalance to the direction of, and closer to, equilibrium (Ripsas, 1998).

In his seminal works *Competition and Entrepreneurship* and *Perception, Opportunity and Profit*, Kirzner proposed the idea that:

> *Natural alertness to possible profit opportunities constitutes the defining attribute of practicing entrepreneurs.* (*……) opportunities are created by earlier entrepreneurial error, which have resulted in shortages, surplus and misallocated resources. The daring, alert entrepreneur discovers these earlier errors, buys where prices are "too low" and sells where prices are "too high"* (Kirzner, 1997, p.70).

Further, Kirzner argued that the combination of previous entrepreneurial errors and the continuous change in tastes, preferences, and resources, as well as technological developments presents opportunities for entrepreneurial profit in the market. With that, he implied that entrepreneurship has a double meaning. It is an alertness to new opportunities and it is also the arbitrage that follows the alert discovery of an opportunity[17].

2.1.2.6. Intellectual Traditions

Chell (2008) documented that, during the past four centuries, different economists have defined the role of entrepreneurship in different ways. Herbert and Link (1988, 2006) identified 12 main roles of entrepreneurship, with these roles separated into two different theories; the dynamic, and the static, theories of economic systems. Herbert and Link argued that only within dynamic systems does the role of entrepreneur make sense, as the

[16] Markets help people to communicate their discoveries to others and to learn of discoveries that other people have made (Casson, 1982).

[17] Unlike the proponents of the British Classical School, who view the entrepreneur as either a capitalist or a coordinator of production factors, Kirzner emphasizes the role of the entrepreneur as an arbitrageur.

function of the entrepreneur is that of an agent of change and development in the market economy.

Table 1: *Role of the Entrepreneur in the History of Economic Theory According to Herbert and Link* (1988, p.152)

Dynamic Theories

- The entrepreneur is the person who assumes the risk associated with uncertainty (e.g. Cantillon, Thunen, Mangoldt, Mill, Hawley, Knight, von Mises, Cole, and Shackle).
- The entrepreneur is an innovator (e.g. Baudeau, Bentham, von Thuenen, and Schumpeter).
- The entrepreneur is a decision maker (e.g. Cantillon, Menger, Marshall, A. Walker, F. Walker, Keynes, von Mises, Shackle, Cole, Schultz, Hayek, and Casson).
- The entrepreneur is an industrial leader (Say, Saint-Simon, A. Walker, F. Walker, Marshall, and Schumpeter).
- The entrepreneur is an organiser and coordinator of economic resources (e.g., Say, Walras, Clark, Davenport, Schumpeter, and Coase).
- The entrepreneur is a contractor (e.g., Bentham).
- The entrepreneur is an arbitrageur (Cantillon, Walras, and Kirzner).
- The entrepreneur is an allocator of resources among alternative uses (e.g., Cantillon, Kirzner, and Schultz).

Static Theories

- The entrepreneur is the person who supplies financial capital (e.g., Smith, Turgot, Pigou, and von Mises).
- The entrepreneur is a manager, or superintendent (e.g., Say, Mill, Marshall, and Menger).
- The entrepreneur is the owner of an enterprise (e.g., Quesnay, Pigou, and Hawley).
- The entrepreneur is an employer of factors of production (e.g., A. Walker, F. Walker, and Keynes).

Within the dynamic group, Herbert and Link (1988) identified three major intellectual traditions with roots in Cantillon's work. These traditions are referred to as: (1) The Chicago Tradition, which is based on the work of Knight and Schultz; (2) The German Tradition, which is based on the work of von Thuenen and Schumpeter; and (3) The Austrian Tradition, which is based on the work of von Mises, Kirzner, and Shackle. All of these traditions hold different views in regards to what defines entrepreneurship.

Table 2: *Summary Comparison of Intellectual Traditions of Entrepreneurship*

	American Tradition	Austrian Tradition	German Tradition
Theory	Uncertainty-Bearing Theory	Market Process Theory	Innovation Theory
Tradition based on works of	Knight and Schultz	von Mises, Hayek, and Kirzner	von Thuenen and Schumpeter
Entrepreneur is	a recipient of pure profit	a middleman who provides a price quotation	an innovator
Required to possess	calculated risk taking (speculative ability)	alertness to opportunity (spotting ability)	innovative technical ability
Entrepreneur is a process of	Process of speculation	Process of discovery (arbitrage)	Process of creative destruction
Entrepreneurship towards market equilibrium	An equilibrating force in an economy; natural force leading to an equilibrium (end point of equilibrium)	An equilibrating force in an economy; market adjusts in response to factors which create disequilibrium (adjusting process)	A disruptive; does not adjust market; makes and destroys market (adjusting process)

The Chicago tradition, which is also known as the uncertainty bearing theory, is based on Knight (1921) and defines an entrepreneur as being someone who calculates and takes risks, and who manages the uncertainties inherent in whatever decision is taken by himself. Knight sees the entrepreneur as being a producer who makes a prediction concerning the consumers' needs and, accordingly, coordinates production factors to produce tradable goods. Thus, Knight's entrepreneur is a recipient of pure profit that is a reward for bearing the cost of uncertainty.

In the market process theory, which is also known as the Austrian tradition, Kirzner (1973) describes the entrepreneur as being a middleman who provides price quotations as an invitation to trade. He suggests that, in a world where knowledge is unevenly dispersed between the market participants and where there exists genuine ignorance on the part of some individuals, entrepreneurship is a process of discovery. That is, in an imperfect knowledge world, some individuals are better informed than others and can, therefore, exploit their superior knowledge in the pursuit of their own self interest.

Possessing the ability to spot a new opportunity is what makes the entrepreneur in the Austrian tradition different from the entrepreneur in the American tradition. The latter tradition stresses the importance of speculative ability in its characterisation of an entrepreneur.

In contrast to the Austrian and American traditions, the German tradition, which is also known as the innovation theory, views an entrepreneur as being someone who creates new industries and precipitates major structural changes in the economy. Schumpeter (1934) argued that entrepreneurship is a process of *creative destruction*, in which the entrepreneur introduces new combinations and/or innovations, making current technologies and products obsolete.

The differences between Schumpeterian entrepreneurship and Kirznerian entrepreneurship lie in whether entrepreneurship is an equilibrating, or a disequilibrating, phenomenon, and whether it involves a high level, or a low level, of entrepreneurial activity. Schumpeterian

entrepreneurship is a disequilibrating phenomenon, which assumes that market equilibrium is a necessary starting point. Schumpeter (1934) argued that the entrepreneur creates and destroys the market by introducing a high level of entrepreneurial activity, in which it involves technologically based products with extensive scientific research and development. On the other hand, Kirznerian entrepreneurship is an equilibrating phenomenon and involves a low level of entrepreneurial activity, in which this activity does not require special technical skills, however, the foresight and the ability to spot market opportunities are vital. Furthermore, Kirznerian entrepreneurship restores the market to equilibrium through the process of price adjustment (Kirzner, 1973).

Although the three traditions differ in some points, they share the same themes; perception, uncertainty, and innovation. All of the traditions emphasize the function of the entrepreneur in the economy, as opposed to his personality, and the role of the entrepreneur as a dynamic force, an agent of change in a market economy. The entrepreneur bears uncertainty for the sake of profit and has the ability to perceive opportunities that others cannot perceive. He acts on his perception. It is this perception and judgment that distinguishes the entrepreneur from others[18].

Long-term debates have been documented in regards to what defines an entrepreneur. The terms *self employed*, *small business owner*, and *small business owner/manager* have been used interchangeably with that of entrepreneur. Lundström and Stevenson (2005) pointed out that these debates arise and persist because there is no clarity and no unified definition of an entrepreneur. In other words, there is no consensus as to whether every business owner is an entrepreneur, or whether only innovative and growth oriented business owners merit the label entrepreneur.

It is interesting to note that most writers, after having reviewed, discussed, criticised, and rejected the many definitions that have been proposed in the literature, cannot refrain from proposing a new one. For example, Steyaert (1995, pg. 34), after having reviewed and criticised other studies over several pages wrote, “We shall…‘capture’ the core difference

[18] See: Chell, E. (2008). *The Entrepreneurial Personality: A Social Construction.* New York: Routledge.

of entrepreneurship by stressing creativity as its essence". Furthermore, it is also fascinating that this debate is never likely to come to a conclusion in summarising, discussing, and criticising the definition of entrepreneur, because entrepreneurship is a multidimensional subject and spans a wide spectrum of disciplines. Morris (1998) reported 77 different definitions of entrepreneurship in a review of journal articles and textbooks over a 5-year period, while Gartner (1990) reviewed the concept of entrepreneurship and listed 90 different attributes associated with the entrepreneur.

For the sake of simplicity, this thesis follows Lundström and Stevenson's (2001, 2005) definition of entrepreneurship. That is, we define entrepreneurship, first and foremost, as individuals in the pre-start-up, start-up, and early phases of business (Lundström and Stevenson, 2001, p.19). Therefore, this definition has a tilt toward nascent entrepreneurs and start-ups, which is in line with the Global Entrepreneurial Monitor's (GEM) definition of Total Early Stage Activity (TEA).

2.2. Macroeconomic Effects of Entrepreneurship

It has long been recognised that entrepreneurship plays a central role in economic development and that entrepreneurs are essential agents of change in the market economy. As previously mentioned, interest in entrepreneurship has been growing exponentially, in particular among economists and public policy makers, but also in the wider academic community due to the fact that entrepreneurship is widely seen as stimulating and generating growth (Jovanovic, 1982; Lambson, 1991; Hopenhayn, 1992; Audretsch, 1995; Klepper, 1996).

Evidence of the suggested positive relation between entrepreneurship and growth is, for example, provided by the Global Entrepreneurship Monitor (GEM), which conducts a comparative international study of the importance of entrepreneurship to economies worldwide. In particular, GEM concludes that nations with a high level of entrepreneurial activity have an above average rate of economic growth.[19] Other research findings also confirm the importance of entrepreneurship for aggregate economic performance: (1) Birch (1979) argued that small business is important to an economy in that it creates job opportunities. He revealed that most jobs in the US are generated by small firms, and by new and rapidly growing young firms. (2) Entrepreneurship has been seen as a means of combating unemployment and poverty (OECD, 1998). (3) Entrepreneurship also raises the degree of competition in a given market, fuelling the drive for new economic opportunities and helping to meet the challenges of rapid changes in globalising economies (Hitt, Ireland, Camp and Sexton, 2001; Acs, 2006).

Nowadays entrepreneurship is acknowledged as the main cause of economic development. This underlines the importance of identifying the factors affecting entrepreneurial activity, because it would allow us to design appropriate policies to stimulate economic growth and welfare.

[19] The correlation between the level of entrepreneurial activity and economic growth is found to be greater than 70%.

2.3. Determinants of Entrepreneurship

The possible determinants of entrepreneurship are numerous and span a wide spectrum of theories and explanations[20]. There are different approaches to entrepreneurship, which have their roots in different disciplines. Also, as an interdisciplinary study, entrepreneurship combines aspects from economic, historical, psychological, political, social, and cultural studies. All of these studies view entrepreneurship differently and focus on differing aspects of entrepreneurship. For example, studies in the field of psychology focus on the individual. That is, they focus on the motives and characteristic traits that determine the psychological make-up of individuals and cause these individuals to behave in particular ways. The field of sociology, in contrast, focuses on the collective background of entrepreneurs. Economic studies on this subject are concerned with the decisions that are relevant to resource allocation and the performance of firms, industries, and countries' economies.

The determinants of entrepreneurship are also studied according to the level of analysis. The literature differentiates between micro, meso, and macro studies of entrepreneurship. Studies of the determinants of entrepreneurship at the micro level focus on the decision making process by individuals and individuals' motivation to become self employed[21]. For instance, personal factors such as psychological traits, formal education and other skills, as well as financial assets, family background, and previous work experience are considered to be aspects that affect individuals' decisions to become self-employed. Carree and Thurik (1996) and Bosma, Zwinkels and Carree (1999) find that sectors of industry and market specific factors, such as profit opportunities and opportunities for entry and exit, are important determinants of entrepreneurship at the meso level. In contrast to studies at the micro and meso levels, studies at the macro level try to aggregate the micro and meso

[20] See, for example, Brock and Evans, 1989; Carree, 1997; Gavron, Cowling, Holtham and Westall, 1998; OECD, 1998; Carree et al., 2001; Bjørnskov and Foss, 2008.
[21] See Blanchflower and Meyer, 1994; Reynolds, Miller and Maki, 1995; Blanchflower and Oswald, 1998; Evans and Leighton, 1989b; de Wit and van Winden, 1991; van Praag, 1996.

levels and focus on a range of environmental factors, such as technological, economic, and cultural variables, as well as government regulations[22].

Determinants of entrepreneurship can also be understood from the so called push (i.e., product market), and pull (i.e., labour market) factor perspectives[23]. Push factors, or the demand side of entrepreneurship, represent opportunities to engage in entrepreneurial activity, and are influenced by such factors as technological developments, diversity in consumer demand, the industrial structure of the economy, government regulation, and the stage of economic development. The pull factors, or the supply side of entrepreneurship, are determined by the characteristics of the population (i.e., demographic characteristics), incomes levels, educational attainment, the degree of unemployment, cultural norms, and the institutional environment (i.e., access to finance, administrative burdens, and the degree of taxation).

This thesis, similar to Vivarelli (1991), Verheul et al. (2001), and Hart (2003), explores the determinants of entrepreneurship from the push and pull factor perspectives. We do so because, according to Thornton (1999), by considering both the supply and demand perspectives, we advance problematic questions about which explanatory variables are universal across time and context and which factors are particular to time and context.

2.3.1. Demand side

As has been previously mentioned, the demand for entrepreneurship is determined by a combination of factors, including the stage of economic development, globalisation, and the stage of technological development. These factors influence the industrial structure and the diversity in consumer demand leading to opportunities for entrepreneurship.

[22] OECD, 1998; Carree, van Stel, Thurik and Wennekers, 2001; Hofstede et al., 2004; Noorderhaven, Thurik, van Stel, and Wennekers 2004; Uhlaner and Thurik, 2004.
[23] Push and pull factors are also referred to as the eclectic framework in explaining entrepreneurship.

It has been found that a two way relation exists between technological development and entrepreneurship. On the one hand, technological developments are considered to be one of the driving forces in the demand for entrepreneurship, with small firms playing an important role in the development and spread of innovation (see, Casson, 1995; OECD, 1996; Wennekers and Thurik, 1999; Wennekers et al., 2002). Technological developments have also been found to increase the competitiveness of small and new businesses (creative destruction). On the other hand, it has also been argued that technological developments retard the level of entrepreneurship. Technological developments can, or may, create barriers to entry for new firms due to high research and development (R&D) costs (EIM/ENSR, 1993, 1996). In this paper, we measure technological development using the measures of computers per capita, internet access per capita, and the expenditure on R&D.

With respect to the relation between globalisation and entrepreneurship, it has been found that there is no clear relation in that it can be either positive, or negative. Globalisation, which is characterised as the integration of world markets, offers opportunities for exploiting economies of scale. As globalisation involves the disappearance of trade barriers, it creates new opportunities for all firms. Increases in competition in the international market may, however, have a negative impact on the survival rates of small businesses. Additionally, according to Caves (1996), Davidsson and Henrekson (2000), Fitzsimons et al. (2001), and Fogel et al. (2005) product market openness, as captured by trade openness, expands markets, constrains local monopolies, and introduces new ideas, which in turn will stimulate competition and entrepreneurial activity. We measure product openness using exports, imports, and the trade of goods and services.

Chesnais (1993) suggested that, in recent years, foreign direct investment has had an immense impact on the world economy. Blomstrom and Kokko (1997) argued that the effect of a flow of incoming investment depends on the characteristics of a country's industries and its policy environment. According to Blomstrom and Kokko (1997), foreign direct investment inflows provide economic benefits to a country in numerous ways. First, one can argue that greater labour productivity in a country can be attained through additional capital flows into the country. Second, foreign direct investment inflows imply

new technology transfers and an increase in managerial experience and training in the recipient country (Jones, 2006). Third, foreign direct investment creates supplementary business opportunities for local entrepreneurs and is likely to lead to an increase in local competition. Thus, in this paper we use both net inflows and outflows of foreign direct investments as the proxy of capital market openness.

Mixed evidence has been reported in regards to the relation between the stage of economic development and entrepreneurship. It appears that economic growth can either have a positive, or a negative impact on the level of entrepreneurship, depending on the stage of economic development. Kuznetz (1966), Schultz (1990), and Bregger (1996) argued that economic development can be expected when there is a decrease in the self employment rate. Carree et al. (2001) pointed out that economic development is usually accompanied by an increase in wage levels and an improved system of social security. Rising real wages increase the opportunity costs of self employment and, thus, make wage employment more attractive (Lucas, 1978; EIM/ENSR, 1996; Iyigun and Owen, 1988). The stage of economic development will be proxied using the log of real GDP per capita.

Moreover, Storey (1999) and van Stel, Carree and Thurik (2005) found that the affect of entrepreneurial activity on economic growth depends upon the level of per capita income. They found that economic growth has a positive impact on the self employment rate in most developed countries.

Financial development has been found to have a positive effect on the level of entrepreneurship. Klapper et al (2007) found that financial development as measured by the ratio of domestic credit to the private sector as a percentage of GDP is positively and correlated with entry rates and business density, suggesting that greater business opportunity and better access to finance are related to a more robust private sector. Similar to Klapper et al (2007), we use the ratio of domestic credit to private sectors (as a percentage of GDP) as the proxy of financial development.

2.3.2. Supply side

A large number of empirical studies have found that demographic characteristics, such as the level of education, population, experience, gender, origin/immigration, religion, age structure, income levels and disparity, as well as employment status, have an important impact on the decision to become an entrepreneur[24].

Reynolds, Hay, and Camp (1999) pointed out that there are several reasons why education is important for stimulating entrepreneurship. First, education provides individuals with the necessary skills and qualities for starting a business. Second, education creates people with an awareness of entrepreneurship as an alternative career choice. Third, education broadens the horizons of individuals, thereby making people better equipped to perceive opportunities. Last, education provides knowledge that can be used by individuals to develop new entrepreneurial opportunities.

Despite the positive attributes of education towards stimulating entrepreneurship, the evidence regarding the relation between the level of education and the level of entrepreneurship are mixed. Bates (1990) found that start-ups initiated by highly educated people are more likely to survive, and that the owners' educational background is a significant determinant of the financial capital structure of small business start-ups. Furthermore, in a sample of Swedish data, Wärneryd et al. (1987) find that more highly educated individuals are more likely to be involved in entrepreneurial activities. A positive affect of education on self employment has also been documented by Rees and Shah (1986), Blanchflower and Meyer (1994), Taylor (1996), and Blanchflower (2000).

In more recent studies, this positive association between education and entrepreneurship has been challenged by the research findings of Blanchflower et al. (2001) and van der Sluis et al. (2005). Blanchflower et al. (2001) found that the level of education has a negative effect on the probability of an individual selecting self-employment. They stated

[24] Blau, 1987; Evans and Leighton, 1989a, 1989b, 1990; Blanchflower and Oswald, 1990; Chell, Haworth and Brearly, 1991; Evans and Siegfried, 1994; Reynolds et al., 1994; Storey, 1994; Blanchflower and Meyer, 1994; Audretsch, Carree and Thurik, 2001.

that highly educated people may not be willing to take the risk associated with entrepreneurship. This argument is supported by the finding of van der Sluis et al. (2005), who conducted a meta analysis and found that highly educated workers are more likely to become salaried employees. Education level will be measured using the secondary and tertiary school enrolment rate.

Bais, van der Hoeven and Verhoeven (1995) argued that population growth has a significant and positive long-term impact on the level of self-employment in a country. In particular, countries with a rapidly expanding population and work force are found to have a growing share of self employed people in the labour force, whereas countries that are experiencing slow population growth tend to have a diminishing share of entrepreneurs in the labour force (ILO, 1990). Reynolds et al. (1999) pointed out that a higher population growth rate will increase the expectation of future demand for goods and services and future entrepreneurial opportunities, which in turn will increase the level of entrepreneurial activities. We measure the population growth using the annual percentage growth rate of population.

The evidence regarding the influence of population density on the level of entrepreneurship is mixed. Storey (1994) and Brüderl and Preisendörfer (1998) found that urban areas with high population densities provide appropriate infrastructure for business start-ups and development. Moreover, due to the spillover effect, the signalling effect, and opportunity cooperation, the establishment of a firm in a certain area is likely to attract other businesses (OECD, 1998; Audretsch and Fritsch, 2002). On the other hand, a high population density might be inversely related to the level of entrepreneurship. A dense population in an urban area has been argued to provide an opportunity to take advantage of economies of scale and leaves little room for small businesses. In this paper, the urbanisation rate is used as the proxy of population density.

Evans and Leighton (1989a) argued that capital assets or wealth is one of the determinants of the level of entrepreneurship, with lottery winnings significantly increasing the probability of an individual becoming an entrepreneur. They found that individuals with a

greater level of assets or wealth were more likely to enter into self employment. Similar results have been documented by Holtz-Eakin et al. (1994) and Lindh and Ohlsson (1996), in that wealth in the form of an inheritance or winnings increases the probability of an individual becoming an entrepreneur. This argument is, however, challenged by Hurst and Lusardi's (2004) findings. Using a panel study of income dynamics in the US, they found that the relation between wealth and the probability of becoming an entrepreneur is weak and only holds for households in the top deciles of wealth distribution. Capital assets or wealth will be measured using the growth rate of real per capita GDP.

Three contradicting hypotheses have been found in regard to the influence of the level of income on the level of entrepreneurship. The first hypothesis argues that a high level of income raises the opportunity costs of self employment, whereas the second hypothesis assumes that a high level of income indicates a flourishing economy with an above average survival rate for small businesses. Therefore, an increase in a high rate of self employment is expected. The third hypothesis argues that, with a high income level, business founders are able to raise start-up capital easily and at a low cost.

Income dispersion has also been found to be one of the possible factors affecting the level of entrepreneurship. It has been argued that income disparity can affect the level of entrepreneurship, through both the demand and supply sides of entrepreneurship. From the demand side, a high level of income disparity is more likely to cause more highly differentiated demand for goods and services. High level income earners will pursue more luxurious products in addition to the basic need products, whereas low level income earners tend to pursue less luxurious goods and services. From the supply side, high income disparity serves as a push factor for low income earners and the recipients of social security benefits into self employment, because the opportunity costs of entrepreneurship are relatively low for those at the low end of the income scale. Furthermore, high income disparity may also provide people at the high end of the income distribution with the financial capability to cover the risks associated with self employment and the risks of starting a new business. Additionally, empirical studies by Ilmakunnas, Kanniainen and Lammi (1999) and Bosma, Wennekers, de Wit and Zwinkels (2000) provide evidence that

income disparity positively influences the rate of self employment. Income disparity could not be included in our study, however, as the data are not available for all countries in our sample.

Societal factors, such as religion, have been documented to have an influence on the level of entrepreneurship. According to Casson (1993), La Porta et al. (1997), and Stulz and Williamson (2003), dominance by hierarchical organisations and respect for status and ladder climbing discourage the valuing of entrepreneurship. They also point out that such societies encourage theological orthodoxy and rhetorical elegance, rather than commercially oriented innovation, thereby discouraging entrepreneurship. On the other hand, societies that emphasize meritocracy and reward self-made success encourage entrepreneurship. Thus, societies which are more highly dominated by hierarchical religions are shown to have a lower level of trust and less developed capital markets. Societal factors will be estimated by introducing a dummy for religion.

Immigration can have both a direct and an indirect effect on the level of entrepreneurship. The indirect effect of immigration influences the level of entrepreneurship through both population growth and age structure, whereas, according to Bates (1997) and Borooah and Hart (1999), the differences in native peoples' and immigrants' tendencies and/or abilities to be self-employed directly affects the level of entrepreneurship. Clark and Drinkwater (2000) found that individuals who have difficulty with the language of the host country, as well as recent immigrants, are less likely to be self-employed. In contrast to Bates (1997), Borooah and Hart (1999) and Veciana (1999) argued that, due to the margination theory[25], immigration serves as one of the push factors to entrepreneurship. Veciana (1999) stated that ethnic minorities are more likely to become entrepreneurs than are native peoples, due to their dissatisfaction (i.e., the difficulty of immigrants to adjust to the values and habits of the host country, or the qualitative and quantitative discrimination they experience in the labour market) in their life as immigrants. Veciana (1999) also clarified that self

[25] According to the margination theory, the creation of a new venture is not always the result of a deliberate and intentional act, or as an act of the result of rational decision making. For most immigrants, starting a new business begins with the shattering of a previous life pattern (negative events) (Grilo and Thurik, 2004, pg. 7 footnotes 9).

employment is, in this case, not only a means of earning a living, but also a way to obtain recognition and social acceptance. Unfortunately, data on immigration were not available for all 46 countries in our sample, so we have discarded this variable.

Storey (1991) found that the relation between unemployment and the decision to start a new firm is ambiguous. This ambiguity arises from the methodology used in the studies on this topic. He also found a positive relation between unemployment and the decision to start a new firm in time series studies, whereas the reverse of this relation is found in cross-sectional, or pooled cross-sectional studies. Evans and Leighton (1990) and Foti and Vivarelli (1994) found that the probability of starting a new firm tends to rise as a worker loses his job. The unemployment rate is used as a proxy for unemployment.

Fogel, Hawk, Morck and Yeung (2005) and Bjørnskov and Foss (2008) argued that institutional features, such as the size of the government, the degree of administrative complexity/bureaucracy, the tax environment, the intellectual property rights regime, the level of trust, corruption, crime, and availability to finance capital can affect the level of entrepreneurship in a country. It has been argued that complex and opaque administrative procedures can discourage potential entrepreneurs and distract incumbent entrepreneurs from their basic activities, negatively influencing both the number of new ventures and the growth of established businesses[26]. Bureaucracy costs and regulations have also been shown to have a significant effect on the level of entrepreneurial activity. Fonseca et al. (2001), in the study of OECD countries, showed that fewer individuals become entrepreneurs when the start-up costs are higher. Klapper et al. (2004) found, for a sample of European countries, that bureaucratic regulation inhibits entry. Related empirical studies find that well-defined rules and regulations, well-protected property rights, sound government, less corruption, and an efficient judicial system promote entrepreneurship[27]. The degree of administrative and bureaucratic complexity will be measured using the administrative requirement index and the bureaucracy cost. The corruption level will be

[26] For example, see, OECD, 1998; EZ, 1999; Niehof, 1999; Nijsen, 2000; Krauss and Stahlecker, 2001.
[27] For example, see, Ilmakunnas, Kamiainen and Lammi, 1999; Bosma, Wennekers, de Wit and Zwinkels, 2000; Morck, Yeung and Yu, 2000; Johnson, McMillan and Woodruff, 2000, 2002; Desai, Gompers and Lerner, 2003).

measured using the corruption perception index. The lending interest rate will be used to gauge the availability of financing, while the protection property rights index will be used as the proxy of the security of property rights.

According to Verheul, Wennekers, Audretsch and Thurik (2001), the impact of taxes on the level of entrepreneurship is complex and even paradoxical. Henriquez, Verheul, van der Knaap and Bischoff (2001) stated that the level of taxes and the complexity of the tax system negatively affects the level of entrepreneurship. It is argued that high tax rates erode the income of small businesses, while complex and opaque tax systems can discourage (potential) entrepreneurs and keep them from their basic activities. In addition, Carroll et al. (2000), Cullen and Gordon (2002), and Schuetze and Bruce (2004), using US data, study the effect of taxes on the decision of an individual to become self-employed. They find that more individuals choose to become self-employed, and entrepreneurial companies grow faster, when personal income is relatively more heavily taxed than is corporate income. In this paper, we use different tax rates, such as the distortionary and non-distortionary taxation rates and the top corporate and individual marginal taxation rates.

OECD (1998) found that rigid labour market regulation can constrain new entrepreneurial activity, through the difficulty experienced by business owners when they attempt to adjust their workforce to market demand. Furthermore, the availability of adequate personnel and labour costs influences the likelihood of individuals starting a business, as well as the development of established businesses. OECD (2000) documented that, in recent years, the deregulation of the labour market (contributing to the general wage moderation and exemptions from social contributions for people with wages close to the minimum wage level) has made wage-employment more insecure and has stimulated entrepreneurial activity in many countries.

In his book *Entrepreneurship at Country Level: Economic and Non-economic Determinants*, Wennekers (2006) argued that the culture and institutions in the formerly communist countries have an unfavourable, or hostile, relation to self-employment over many decades of the 20th century. According to Smallbone and Welter (2001) the formerly

communist countries tend to be characterised by a relatively unstable economic environment, which leads to a low domestic purchasing power and uncertainty with respect to property rights. Thus, we control the negative impact on entrepreneurship by introducing a dummy variable for the formerly communist countries.

Macroeconomic volatility discourages entrepreneurship. Fogel et al. (2005) argued that volatility in macroeconomic policies causes financial backing to become more expensive and raises the risks of using financial hedging instruments[28]. McMillan and Woodruff (2002) suggest that volatility in macroeconomic policies discourage long term contracts and relations necessary for successful entrepreneurship, as it is hard to distinguish whether or not the transaction partner is behaving honestly. Thus, volatile macroeconomic policy may be negatively related to entrepreneurship. In this paper, we use the average inflation rate to capture the volatility of monetary policies.

[28] An increase in the risks associated with financial hedging instruments impedes transactional trust.

3. DATA AND METHODOLOGY

3.1. Data

As discussed previously, measuring entrepreneurship is not an easy task, as people perceive entrepreneurship differently. To date, numerous measurement methods have been employed by researchers. Audretsch, Carree, van Stel and Thurik (2002) used the business ownership rate as a proxy for the level of entrepreneurship. Audretsch (1995) employed a measure of entrepreneurship that includes an indicator of R&D activity, the number of patented inventions, and new product innovations introduced into the market. Birch et al. (1999), on other hand, estimated the level of entrepreneurship using an indicator of those firms exhibiting exceptionally high growth (gazelles) over a prolonged duration.

Similar to Reynolds et al. (2000) and Lundström and Stevenson (2001), this research uses Global Entrepreneurship Monitor (GEM) data – Total Early-Stage Entrepreneurial Activity (TEA) – as a proxy of the dependent variable; that is, the level of entrepreneurship. Three different kinds of TEA variables will be employed in this research. First, Overall TEA, being the percentage of the adult population (18-64 years old) that is either actively involved in starting a new venture, or is the owner/manager of a business that is less than 42 months old. Second, Necessity TEA, which is similar to overall TEA, except that it reflects the individuals' perception that the action presented is the best option available for employment. Third, Opportunity TEA, which is parallel to overall TEA, with the exception that it represents the voluntary nature of participation[29]. Hessels et al. (2007) pointed out that, in opportunity-based entrepreneurship, people become an entrepreneur because they want to be their own boss, to realise their dream, or even to try new ideas and earn more money than in waged employment[30]. In necessity-based entrepreneurship, however, people

[29] People mainly start a new business to exploit a perceived business opportunity.

[30] An example of opportunity-based entrepreneurship is a designer. Fresh graduated designers usually work temporarily in one, or several, fashion houses to gain understanding, experiences, knowledge advancement in creativity and business, and later they create their own individual label.

are pushed into entrepreneurship because all other options for work are either absent, or unsatisfactory, and entrepreneurial activity is then the last resort to work and income[31].

According to Bosma et al. (2007) the definition of Total Early-Stage Entrepreneurial Activity incorporates both nascent entrepreneurs and owner/managers of new firms. They argued that an individual is considered a nascent entrepreneur if he satisfies the following three conditions: (1) Having started a business and having been active for the past twelve months; (2) expecting full or part ownership of the new firm; and (3) the firm has not yet paid salaries, wages, or any other payments to the owners for more than three months. On the other hand, an individual can be classified as an owner/manager according to the new firm category if he owns and manages a running business that has paid salaries, wages, or any other payments to the owners for more than three months, but not more than forty-two months.

The TEA data in this paper are obtained from two sources: (1) The Global Entrepreneurship Monitor Database (available dataset from 1999-2002); and (2) the Entrepreneurship-SME Dataset (available dataset from 2000-2005)[32].

Data for the independent variables are collated from various sources. Variables such as the education level, capital assets or wealth, unemployment, population density and population growth, technological development, the depth of the financial sector, female labour force participation, volatility of economic policy, product market and capital market openness, and whether an economy is a well-functioning decentralised market economy are gathered from the World Development Indicator (WDI) database.

The data for the degree of administrative/bureaucratic complexity and the security of property rights is collected from the Fraser Institute's Economic Freedom Database, while the data for corruption is collected from the Transparency International Database. The data for religion is gathered from the CIA World Factbook. Data for the lending interest rate is

[31] An example of necessity-based entrepreneurship is immigrants. Due to the language and cultural differences it is very difficult for an immigrant to find a job.
[32] The Small to Medium Enterprise (SME) data are available online.

compiled from the International Monetary Fund – International Financial Statistics Database.

Table 3: *Variable Description*

Variable	Description	Source
Dependent Variable		
Entrepreneurship Rate	Overall Total Entrepreneurial Activity	Global Entrepreneurship Monitor Database
	Necessity Total Entrepreneurial Activity	Entrepreneurship-SME Dataset
	Opportunity Total Entrepreneurial Activity	
Independent Variables		
Level of Economic Development	Log of Real GDP Per Capita	World Development Indicators
Population Growth	Annual percentage Growth Rate of Population	World Development Indicators
Population Density	Urbanisation Rate	World Development Indicators
Standard of Living or Capital Assets or Wealth	Growth in Real Per Capita GDP	World Development Indicators
Well-functioning & Decentralised Market Economy	Trade (I+E) as a percentage of GDP	World Development Indicators
	Imports as a percentage of GDP	
	Exports as a percentage of GDP	
Education Level of Population	Secondary School Enrolment Rate	World Development Indicators
	Tertiary School Enrolment Rate	
Unemployment	Unemployment Rate	World Development Indicators
Societal Factor (Religion)	Religion Dummy 1 if country's dominant religion is Roman Catholic, Muslim or Eastern Orthodox, 0 otherwise	CIA World Fact Book Online
Culture	Communist Country Dummy The variable has value 1 for Russia, Hungary, Poland, China, Croatia and Slovenia and Latvia, 0 otherwise	Authors' own computation

Corruption	Corruption Perception Index	Transparency International Database
Degree of Admin or Bureaucracy Complexity	Administrative Requirements Index	Freedom House Database
	Bureaucracy Costs	
Technological Developments	Research and Development as percentage of GDP	World Development Indicators
	Internet per capita	World Telecommunication Indicators
	Computers per capita	
Taxation	Distortionary Taxation (tax on income, profit and capital gain) as a percentage of GDP	World Development Indicators
	Non-Distortionary Taxation (tax on goods and services) as a percentage of GDP	
	Top Corporate Marginal Taxation	
	Top Individual Marginal Taxation	
Capital Market Openness	Net Foreign Direct Investment inflows as a percentage of GDP	World Development Indicators
	Net Foreign Direct Investment outflows as a percentage of GDP	
Volatility of Economic Policies	Annual Inflation	World Development Indicators
Depth of Financial Sector	Log of (Domestic Credit to Private Sector as a percentage of GDP)	World Development Indicators
Availability of Financing	Lending Interest Rate	International Financial Statistic Database
Security of Property Rights	Protection of Property Rights Index	Freedom House Database
Woman Participation	Female Labour Share	World Development Indicators

3.2. Sample selection

Several steps are employed in the selection of the sample used in the empirical analysis. As the first step, all TEA variables are downloaded from the Global Entrepreneurship Monitor (GEM) database and the Entrepreneurship-SME Dataset Website. In step two, we eliminate all those observations for which either the dependent, or an explanatory, variable features a missing entry. This is necessary for the implementation of the BMA analysis. After these adjustments, the final sample used in the empirical analysis consists of 74 observations for the benchmark model. Please refer also to Table 4 for the details of the sample selection procedures.

Table 4: *Sample Selection and Elimination Process of the Benchmark Model*

		No. of Observations
	Base Sample (46 countries within the period of 2001-2005 (balanced panel))	230
	Sample Elimination	
1	Missing values in dependent variables	70
2	Missing values in explanatory variables	86
	Final Sample ((33 countries within the period of 2001-2005 (unbalanced panel))	74

3.3. Countries Included

We include the following 33 countries, which participated in the Global Entrepreneurship Monitor (GEM) Programme from 2001 to 2005; Argentina, Australia, Austria, Belgium, Canada, Chile, China, Croatia, Denmark, Finland, France, Greece, Hungary, India, Ireland, Israel, Italy, South Korea, Latvia, the Netherlands, Peru, Poland, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Uganda, United Kingdom, United States, and Venezuela.

3.4. Summary Statistics

The summary statistics for all of the variables used in the study are presented in Table 5.

Table 5: *Summary Statistics*

	Mean	Std. Error	Std. Dev	Minimum	Maximum	Obs.
Overall TEA	9.17	0.76	6.51	1.90 (Hungary)	40.30 (Peru)	74
Opportunity TEA	2.30	0.32	2.73	0.20 (Belgium)	14.40 (Uganda)	74
Necessity TEA	6.50	0.50	4.29	1.11 (Hungary)	26.90 (Peru)	74
log of GDP per capita	4.27	0.03	0.29	3.12 (Uganda)	4.60 (U.S.)	74
GDP per capita growth	2.73	0.38	3.29	-11.77 (Argentina)	16.24 (Venezuela)	74
expenditure on R&D	1.62	0.13	1.09	0.10 (Peru)	4.77 (Israel)	74
internet per capita	16.25	1.29	11.13	0.03 (Uganda)	47.98 (Denmark)	74
computers per capita	33.59	2.60	22.37	0.38 (Uganda)	82.62 (Switzerland)	74
Exports	37.60	2.08	17.89	10.11 (U.S.)	84.06 (Ireland)	74
Imports	36.16	1.93	16.57	12.80 (Argentina)	79.39 (Belgium)	74
Trade	73.76	3.94	33.89	24.14 (U.S)	162.84 (Belgium)	74
secondary school enrolment rate	104.43	2.78	23.88	18.61 (Uganda)	161.66 (Australia)	74
tertiary school enrolment rate	56.12	2.31	19.83	3.02 (Uganda)	89.63 (Finland)	74
FDI inflows	3.20	0.35	3.00	-6.00 (Ireland)	14.29 (Ireland)	74
FDI outflows	2.58	0.39	3.35	-2.97 (South Africa)	17.07 (U.K.)	74
population growth	0.83	0.08	0.70	-0.54 (Latvia)	3.20 (Uganda)	74
unemployment rate	8.66	0.72	6.21	1.50 (Thailand)	31.20 (South Africa)	74
urbanization rate	73.74	1.97	16.95	12.34 (Uganda)	97.26 (Belgium)	74
log of domestic credit to private sector	1.90	0.04	0.32	0.84 (Uganda)	2.28 (U.S.)	74
non-distortionary taxation	9.27	0.45	3.91	0.61 (U.S.)	20.05 (Croatia)	74

non-distortionary taxation^2	100.97	8.99	77.30	0.37 (U.S)	401.97 (Croatia)	74
distortionary taxation	9.36	0.59	5.04	0.93 (China)	18.97 (New Zealand)	74
distortionary taxation^2	112.58	11.78	101.35	0.86 (China)	359.89 (New Zealand)	74
top corporate marginal taxation	29.49	0.80	6.84	8.50 (Switzerland)	39.60 (India)	74
top corporate marginal taxation^2	915.80	41.30	355.28	72.25 (Switzerland)	1568.16 (India)	74
top individual marginal taxation	39.06	0.99	8.48	11.50 (Switzerland)	59.00 (Denmark)	74
top individual marginal taxation^2	1596.47	75.65	650.79	132.25 (Switzerland)	3481.00 (Denmark)	74
protection of intellectual property	6.47	0.23	1.98	2.29 (Venezuela)	9.05 (US)	74
administrative requirements	3.81	0.17	1.47	1.67 (Argentina)	8.18 (Israel)	74
bureaucracy cost	6.54	0.16	1.39	1.43 (Venezuela)	9.74 (Hungary)	74
lending interest rate	9.24	0.75	6.45	3.20 (Switzerland)	51.68 (Argentina)	74
corruption index	6.66	0.28	2.38	2.20 (Uganda)	9.70 (Finland)	74
communist dummy	0.15	0.04	0.36	0.00 (N/A)	1.00 (N/A)	74
religion dummy	0.45	0.06	0.50	0.00 (N/A)	1.00 (N/A)	74
female share labor force	43.32	0.41	3.53	27.67 (India)	48.16 (Uganda)	74
annual inflation	3.64	0.48	4.13	-0.77 (China)	25.87 (Argentina)	74

The statistics show that, within the sample of 33 countries, Peru holds both the maximum overall TEA and opportunity TEA, whereas Hungary and Belgium hold both the minimum overall TEA and opportunity TEA. Additionally, Peruvians are found to be *necessity entrepreneurs*, in the sense that they become entrepreneurs and engage in an activity, as they perceive that it is necessary in order to uphold a decent standard of living, or to be able to support their family, while Hungarians are found to be less likely to become necessity entrepreneurs.

As shown in Figures 1, 2, and 3, we also report the average of the TEA rates for the 33 countries over the period from 2001 to 2005. Peru occupied the top position for both overall and necessity TEA, whereas Uganda scored highest with regard to opportunist entrepreneurial activity.

Figure 1: *Average Overall TEA of 33 countries for the period 2001- 2005*

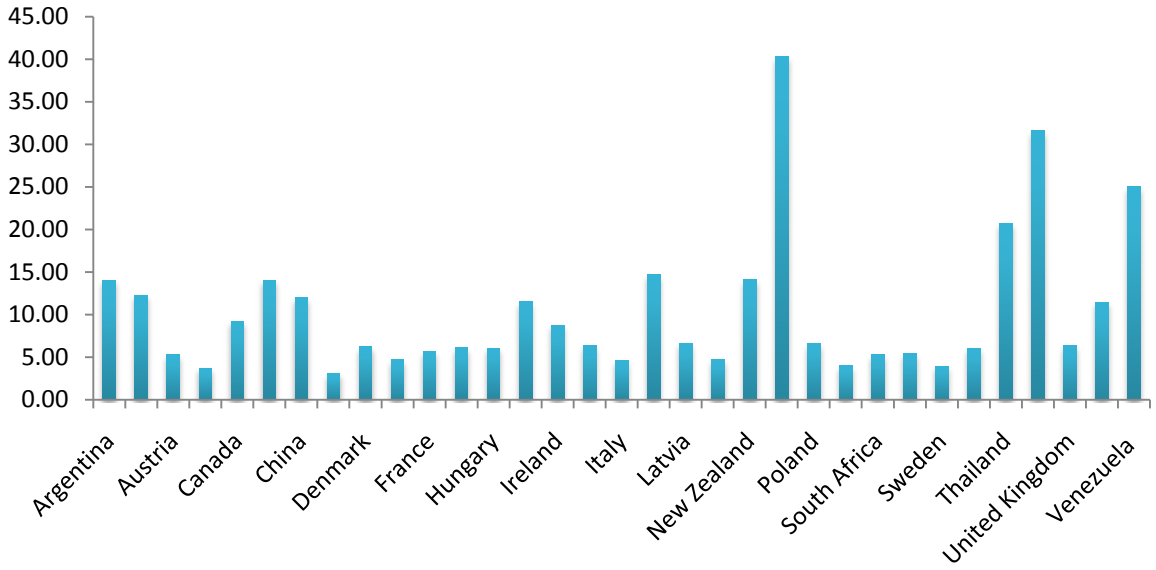


Figure 2: *Average Opportunity TEA of 33 countries for the period 2001- 2005*

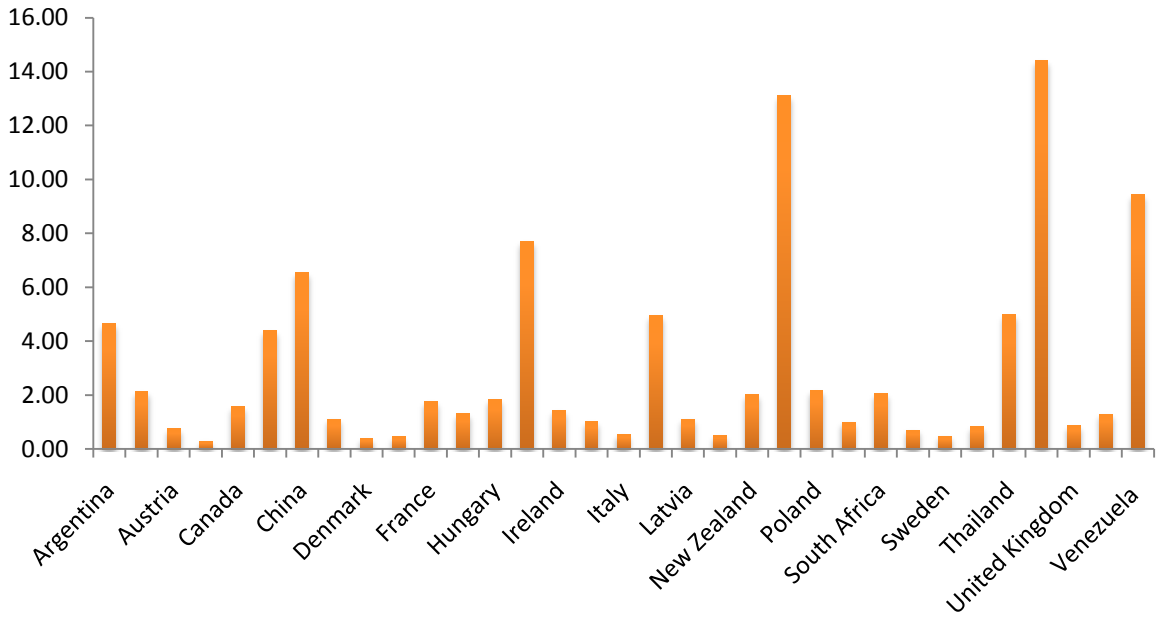
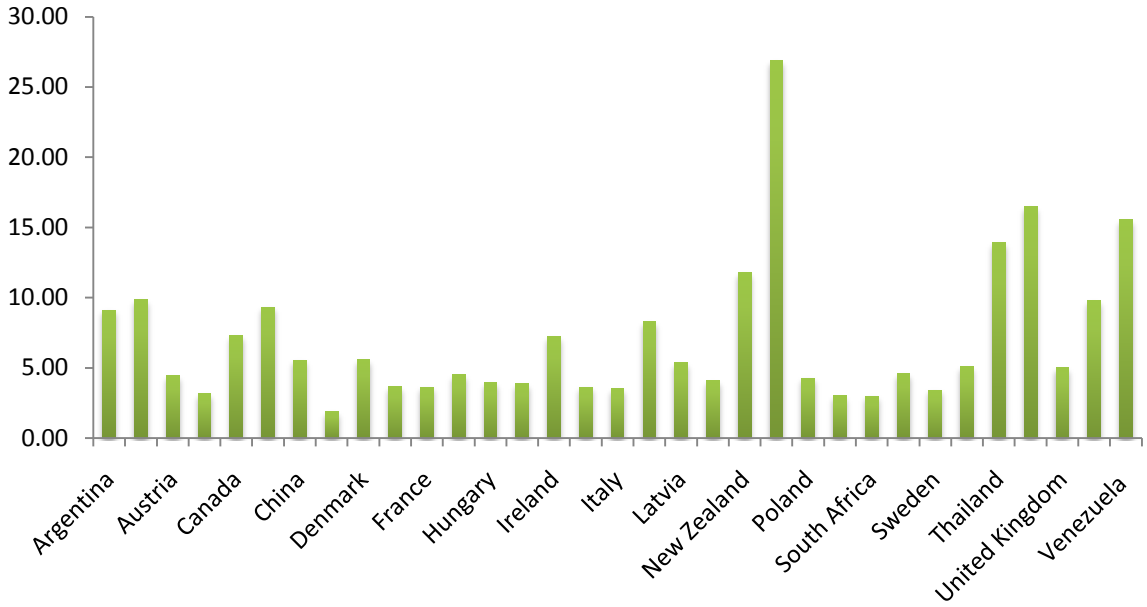


Figure 3: *Average Necessity TEA of 33 countries for the period 2001- 2005*



3.5. Methodology

3.5.1. Endogeneity Issue

Endogeneity, or two-way causality, poses a pervasive problem in research analysis, because it creates bias in estimations. It arises when a factor that is supposed to affect a particular outcome itself depends on that outcome, or other factors in a model[33]. That is, either Xs, which is the explanatory variable, affects Y, which is the dependent variable, or Y affects Xs. In this paper, we control for endogeneity by using the lagged value of the independent variables X_{t-1} and regressing it to the dependent variables Y_t (i.e., the TEA measures).

3.5.2. Bayesian Model Averaging (BMA)

The theory of Bayesian Model Averaging, also known as Inferring Pooling Estimation, was first introduced by Leamer (1978). It is a technique that came to prominence in the statistics literature[34] in the mid 1990s, and, since then, has been applied in a variety fields, such as economics[35] (Fernandez, Ley and Steel, 2001a, 2001b), biology (Yeung, Bumgarner and Raftery, 2005), ecology (Wintle et al., 2003), public health (Morales et al., 2006), toxicology (Koop and Tole, 2004), and political science (Bartels and Zaller, 2001; Adams, Bishin and Dow, 2004; Geer and Lau, 2006), amongst others.

The determinants of entrepreneurial activity in this study will initially be analyzed using Bayesian Model Averaging. Hoeting, Madigan, Raftery and Volinsky (1999) argued that Bayesian Model Averaging is a technique designed to help account for the uncertainty inherent in the model selection process, which traditional statistical analysis often

[33] An example of the endogeneity problem: Trade causes economic growth or economic growth causes trade.
[34] See, for instance, Madigan and Raftery, 1994; Draper, 1995; Raftery, 1995; Hoeting, Madigan, Raftery and Volinsky, 1999.
[35] Economic applications of the model averaging technique include, forecasting output growth (Min and Zellner, 1993; Koop and Potter, 2003), studying cross country growth (Sala-i-Martin, Doppelhofer and Miller, 2004; Fernandez, Ley and Steel, 2001a), predicting stock return (Avramov, 2002; Cremers, 2002), policy evaluation (Brock, Durlauf and West, 2003; Levin and Williams, 2003), and macroeconomic forecasting (Garratt, Lee, Pesaran and Shin, 2003).

neglects[36]. By averaging the data over many of the competing models, Bayesian Model Averaging incorporates model uncertainty into any conclusions regarding parameters and predictions.

The case of model uncertainty arises due to the lack of clear theoretical guidance on the choice of the regressors, which results in a wide set of possible empirical specifications and often leads to contradictory conclusions. Raftery (1995) suggested that researchers have three possible options to remedy this issue in the model selection process. The first is to arbitrarily select one model as the true model, which is not a desirable strategy since it risks overconfidence inferences. The second is to present the results based on all models without selecting between different specifications. Although unsystematic, this is preferable to the first option, but poses substantial logistical criticisms. The third is to explicitly account for model uncertainty, which is where Bayesian Model Averaging (BMA) comes in[37].

According to Savage, Finnetti, Lindley, Kiefer, and many others, the Bayesian approach claims several advantages over the classical approach. That is, the Bayesian approach provides remedies for certain deficiencies in the classical approach. These advantages[38] are listed below:

1. Bayesian analysis uses both sources of information, being the prior information we have about the data generating process, as well as the information about the process contained in the data. In the classical approach, prior information is more likely to be ignored, which could translate into a waste of information, or a loss of money;

2. Since Bayesian analysis is conditioned on the actual data and does not involve maximisation and minimisation we do not need to derive small sample corrections and worry about whether the optimisation of the algorithm will converge;

3. The Bayesian approach computes the probabilities of the model/hypothesis and uses these probabilities to compare, rather than test, the model/hypothesis; and

[36] The classical approach conditions on a single model and, thus, leads to underestimation of uncertainty when making inferences about the quantity of interest.

[37] Chen, S. and Ravallion, M. (1997). What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty. *The World Bank Economic Review*, 11, pp. 357-382.

[38] This list of the advantages of Bayesian Analysis are summarised from Bolstad (2007) and Kennedy (2008).

4. Bayesian analysis provides a better performance in terms of predictive accuracy and constantly outperforms other variable selection methods.

Following Fernandez, Ley and Steel (2001a) and Clyde (2003), we review the basic theory of Bayesian Model Averaging in the linear context[39]. Consider a linear regression model, where entrepreneurship (TEA) rates for n countries are grouped in a vector y, and are regressed on a $n \times 1$ vector of ones ι_n and a $n \times k$ matrix X of k potential independent variables. The full k dimensional vector of the slope coefficients is denoted by β. We assume that every model includes a constant term. Otherwise, however, any subset of regressors can be included in regression modelM_j. If every possible combination of the explanatory variables is considered, we have 2^k possible linear models[40].

The model with the regressors grouped in matrix X_j defines model M_j:

$$y = \alpha\iota_N + \mathrm{X}_j\beta_j + \sigma\varepsilon \tag{1}$$

where $\beta_j \epsilon \Re^{kj}$ $\left(0 \leq k_j \leq k\right)$is a $k_j \times 1$ vector collecting the regression coefficients and $\alpha\epsilon\Re_+$ is a scale parameter. Furthermore, ε is assumed to follow an n-dimensional normal distribution with zero mean and identity covariance matrix $\left(N(0_N, h^{-1,}I_N)\right)$. Similar to Mitchell and Beauchamp (1988) and Raftery, Madigan and Hoeting (1997), we set the slope coefficient of excluded variables in β equal to zero, thus generating β_j.

Kass and Raftery (1995) and George (1999) argue that, in the context of model uncertainty, the choice of prior distributions for the parameters and alternative models can have a substantial impact on the model and parameter posterior distributions. A careful and considered selection of prior distributions is, therefore, of the utmost importance. Following

[39] For the purpose of this article, we make two assumptions before employing the BMA technique; (1) the functional form is known, and (2) the standard linear regression assumption is satisfied.

[40]In our research, we consider 33 possible indicator variables. Therefore, we can estimate 8,589,934,592 possible linear regression models.

Fernandez et al. (2001b), this study uses a benchmark prior distribution that has minimal impact on posterior inference. We then use improper uninformative priors for the parameters that are common to all of the models, namely α and σ, and a g-prior structure for β_j, which is expressed as the product of Equations (2) and (3) below;

$$p(\alpha, \sigma) \propto \sigma^{-1} \tag{2}$$

and

$$p(\beta_j \,|\, \alpha, \sigma, M_j) = f_N^{k_j}(\beta_j \,|\, 0, \sigma^2 (g \mathrm{X}_j' \mathrm{X}_j)^{-1}) \tag{3}$$

where $f_N^q(w \,|\, m, V)$ is the density function of a q-dimensional normal distribution on *w*, with mean *m* and covariance matrix *V*. Fernandez et al. (2001a) investigated many possible choices for g in Equation (3) and concluded that taking g = 1/ max {n, k^2} will lead to robust results.

As already mentioned, the fundamental feature behind Bayesian Model Averaging is the uncertainty regarding the choice of the regressors (i.e., model uncertainty). It is, therefore, necessary that we also specify a prior distribution over the space *M* of all 2^k possible models:

$$P(M_j) = p_j, \;\; j = 1,2, \ldots\ldots, 2^k, \text{with } p_j > 0, and \; \sum_{j=1}^{2^k} p_j = 1 \tag{4}$$

In the absence of prior information, it is intuitive to assume a uniform distribution[41] over this space; that is, $p_j = 2^{-k}$. This implies that the prior probability of a regressor being included in the model is equal to ½, independently of any other regressors.

[41] With 33 potential independent variables, the prior probability of each model is equal to 0.1164e-07%.

The posterior distribution $P_{\Delta|y}$ of any quantity of interest Δ is an average of the posterior distributions under each model $P_{\Delta|y,M_j}$ with weights $P(M_j \mid y)$ assigned by the posterior model probabilities. Therefore:

$$P_{\Delta|y} = \sum_{j=1}^{2^k} P_{\Delta|y,M_j} P(M_j \mid y) \tag{5}$$

By making an appropriate choice of Δ, Equation (5) above will give the posterior distribution of the regression coefficients and/or the predictive distribution that allows for the forecasting of future, or missing, observations. The marginal posterior probability for the inclusion of a certain variable is the weighted sum of the posterior probabilities of all of the models that include that particular variable. Equation (5) basically illustrates the procedure of Bayesian Model Averaging (also see Leamer, 1978).

We now turn to the issue of how to compute the posterior distribution $P_{\Delta|y}$ of any quantity of interest Δ. As can be clearly seen, there are two parts constituting Equation (5); being the posterior distribution $P_{\Delta|y,M_j}$ of Δ under model M_j, which is a standard form, and the posterior model probabilities $P(M_j|y)$, which are given by:

$$P(M_j|y) = \frac{l_y(M_j)p_j}{\sum_{h=1}^{2^k} l_y(M_h)p_h} \tag{6}$$

where $l_y(M_j)$, the marginal likelihood of model M_j, is calculated as:

$$l_y = \int p(y|\alpha, \beta_j, \sigma, M_j)p(\alpha, \sigma)p(\beta_j|\alpha, \sigma, M_j)\, d\alpha\, d\beta_j\, d\sigma \tag{7}$$

where $p(y|\alpha, \beta_j, \sigma, M_j)$ is the sampling model described in Equation (1), and $p(\alpha, \sigma)$ and $p(\beta_j|\alpha, \sigma, M_j)$ are the priors defined in Equations (2) and (3).

Equations (1) to (7) summarise the major components used in Bayesian Model Averaging. Researchers need to specify the set of models, the model priors $P(M_j)$, and the parameter priors $p(\beta_j | \alpha, \sigma, M_j)$. The rest of the process is computation.

3.5.3. Panel Estimation

The best models chosen using the Bayesian Model Averaging technique are estimated using panel data estimation techniques. Panel data sets possess several major advantages over conventional time series and cross-sectional data (Hsiao, 1985, 1995, 2000). According to Gujarati (2003, pg.638):

> *"The combination of time series with cross sections can enhance the quality and quantity of data in ways that would be impossible using only one of these dimensions."*

Panel data sets allow the researcher to control the unobserved heterogeneity in both spatial and temporal dimensions. Moreover, it gives the researcher a large number of observations, increasing the degree of freedom and reducing the collinearity among the explanatory variables, thus improving the efficiency of the analysis.

Assuming that the slope coefficients are constant and the intercept varies over individuals, our panel data model is expressed in the matrix form as follows:

$$y_{it} = \alpha + \sum_k^K \beta_k x_{kit} + \mu_{it} \quad (8)$$

and

$$\mu_{it} = \mu_i + \upsilon_{it} \quad (9)$$

where i = 1,……, with i referring to a cross sectional unit and t = 1,……., with t referring to a given time period. y_{it} records the value of dependent variable i at time t. α is a constant term and $\beta_k x_{kit}$ records the value of the kth independent variables i at time t. μ_i denotes the unobserved individual effect and v_{it} represents the stochastic disturbance term.

4. RESULTS

4.1. Bayesian Model Averaging (BMA) Results

4.1.1. Overall TEA

The results reported are based on the Bayesian model outline in Equations (1) to (7). Following Fernandez, Ley and Steel (2001a), we set a uniform prior on the model probabilities, i.e. $p_j = 2^{-k}$ in Equation (4) and, given that n (number of observations) in our model is less than k^2 (regressors ^2), we set g= 1/ k^2 in Equation (3).

We run 500,000 recorded drawings, after a burn-in of 100,000 discarded drawings. As noted in the output[42], the correlation coefficient between visit frequencies and posterior probabilities is quite high, at 0.9555. Thus, we can conclude that the model performance is satisfactory. The Markov Chain Monte Carlo Model Composition (hereafter MC^3) sampler visited 14,600 unique models. The best model obtained a posterior probability of 1.78%, with the cumulative posterior probability of the best 43 models, having posterior probabilities greater than 0.25%, accounting for 25.76% of the posterior mass. Table 6A below presents the posterior probabilities of the best five models, with the top model including a constant, the log of GDP per capita, GDP per capita growth, computers per capita, the tertiary school enrolment rate, the unemployment rate, non-distortionary taxation, distortionary taxation, top corporate marginal taxation^2, bureaucracy cost, the lending interest rate, communist and religion dummies, and annual inflation.

[42] The outputs are based on a run with FLS Fortran G77 code and are available from the authors upon request.

Table 6A: *Best Five Models of Overall TEA*

No	Model	Post. Prob
1	Constant, log of GDP per capita, GDP per capita growth, computers per capita, tertiary school enrolment rate, unemployment rate, non-distortionary taxation, distortionary taxation, top corporate marginal taxation^2, bureaucracy cost, lending interest rate, communist dummy, religion dummy, annual inflation	1.78%
2	Constant, log of GDP per capita, expenditure on R&D, unemployment rate, urbanisation rate, non-distortionary taxation, top corporate marginal taxation^2, communist dummy, female labour share	1.40%
3	Constant, log of GDP per capita, GDP per capita growth, internet per capita, computers per capita, tertiary school enrolment rate, unemployment rate, non-distortionary taxation, distortionary taxation, top corporate marginal taxation^2, bureaucracy cost, lending interest rate, communist dummy, religion dummy, annual inflation	1.33%
4	Constant, log of GDP per capita, expenditure on R&D, FDI outflows, unemployment rate, urbanisation rate, non-distortionary taxation, top corporate marginal taxation^2, communist dummy, female labour share	1.29%
5	Constant, log of GDP per capita, expenditure on R&D, unemployment rate, urbanisation rate, communist dummy, female labour share	1.07%

The marginal posterior probabilities of the individual regressors' inclusion range from as low as 1.85%, to as high as 99.24%. The top three regressors have inclusion probabilities over 97.81%, with the unemployment rate featuring the highest inclusion probability. The second and third most important variables are the log of GDP per capita (98.08%) and the country dummy for former communist countries (97.81%), respectively. Table 6B below presents the marginal posterior probabilities of the individual regressors.

Table 6B: *Marginal Posterior Probabilities*

No	Regressor	Post. Prob	Impact
1	unemployment rate	99.24%	Negative
2	log of GDP per capita	98.08%	Negative
3	communist dummy	97.81%	Negative
4	female labour share	76.46%	Positive
5	non-distortionary taxation	68.36%	Negative
6	lending interest rate	65.52%	Positive
7	top corporate marginal taxation^2	63.19%	Negative
8	urbanisation rate	53.54%	Positive
9	expenditure on R&D	52.42%	Negative
10	GDP per capita growth	42.89%	Positive
11	annual inflation	40.61%	Negative
12	bureaucracy cost	35.08%	Negative
13	distortionary taxation	31.75%	Positive
14	computers per capita	26.58%	Positive
15	tertiary school enrolment rate	24.95%	Positive
16	religion dummy	24.46%	Positive
17	top corporate marginal taxation	22.49%	Positive
18	FDI outflows	17.69%	Negative
19	protection of intellectual property	16.67%	Positive
20	distortionary taxation^2	14.09%	Negative
21	internet per capita	12.65%	Negative
22	non-distortionary taxation^2	11.21%	Positive
23	population growth	9.46%	Negative
24	corruption index	3.74%	Positive
25	log of domestic credit to private sector	3.24%	Negative
26	secondary school enrolment rate	3.21%	Negative
27	FDI inflows	2.76%	Negative
28	top individual marginal taxation	2.66%	Positive
29	imports	2.12%	Negative
30	administration requirements	2.06%	Positive
31	trade	1.93%	Positive
32	top individual marginal taxation^2	1.89%	Negative
33	exports	1.85%	Negative

4.1.2. Opportunity TEA

The results reported are based on a run with 500,000 recorded drawings, after a burn-in of 100,000 discarded drawings. As noted from the BMA output, the model performance is satisfactory, in that a high correlation coefficient between visit frequencies and posterior probabilities is reported[43]. The MC^3 sampler visited 11,823 models; the prior probability for a single model is 0.1164E-07%. Moreover, when we estimate the model posterior probabilities, the total posterior mass is widely spread, with 3,451 models accounting for 95% of the posterior mass. Nonetheless, the cumulative posterior probability of the best 54 models (those with posterior probabilities larger than 0.25%) accounts for 34.66% of the total posterior mass. Table 7A below presents the posterior probabilities of the best five models, with the top models containing the following set of independent variables; a constant, the log of GDP per capita, the unemployment rate, non-distortionary taxation, the lending interest rate, and the communism dummy.

Table 7A: *Best Five Models of Opportunity TEA*

No	Model	Post. Prob
1	Constant, log of GDP per capita, unemployment rate, non-distortionary taxation, lending interest rate, communist dummy	2.82%
2	Constant, log of GDP per capita, unemployment rate, non-distortionary taxation^2, lending interest rate, communist dummy	2.68%
3	Constant, log of GDP per capita, internet per capita, computers per capita, unemployment rate, non-distortionary taxation^2, lending interest rate, communist dummy	1.67%
4	Constant, log of GDP per capita, unemployment rate, lending interest rate, communist dummy	1.65%
5	Constant, log of GDP per capita, internet per capita, computers per capita, unemployment rate, non-distortionary taxation^2, lending interest rate, communist dummy, religion dummy	1.63%

[43] The correlation coefficient between visit frequencies and posterior probabilities is 0.9826.

The marginal posterior probabilities of individual regressor inclusion, as documented in Table 7B, range from as low as 1.47%, to as high as 100%. According to the BMA methodology, the three[44] most important variables in explaining opportunity TEA are; the log of GDP per capita (100%), the unemployment rate (99.76%), and the dummy identifying former communist countries (93.40%).

[44] The marginal posterior probabilities of the next explanatory variable, (i.e., lending interest rate) is 88.17%.

Table 7B: *Marginal Posterior Probabilities*

No	Regressor	Post. Prob	Impact
1	log of GDP per capita	100.00%	Negative
2	unemployment rate	99.76%	Negative
3	communist dummy	93.40%	Negative
4	lending interest rate	88.17%	Positive
5	computers per capita	42.99%	Positive
6	non-distortionary taxation	33.63%	Positive
7	non-distortionary taxation^2	33.50%	Negative
8	religion dummy	31.13%	Positive
9	top corporate marginal taxation^2	18.48%	Negative
10	internet per capita	16.61%	Negative
11	GDP per capita growth	15.65%	Positive
12	female labour share	14.69%	Positive
13	log of domestic credit to private sector	13.06%	Negative
14	top corporate marginal taxation	10.38%	Positive
15	bureaucracy cost	9.19%	Negative
16	urbanisation rate	6.80%	Positive
17	annual inflation	6.03%	Negative
18	imports	4.28%	Positive
19	protection of intellectual property	3.91%	Positive
20	population growth	3.37%	Positive
21	trade	3.24%	Negative
22	top individual marginal taxation	3.03%	Positive
23	exports	2.74%	Positive
24	top individual marginal taxation^2	2.41%	Negative
25	corruption index	2.37%	Negative
26	FDI inflows	2.23%	Negative
27	expenditure on R&D	2.10%	Negative
28	distortionary taxation	2.09%	Positive
29	distortionary taxation^2	2.03%	Negative
30	secondary school enrolment rate	1.97%	Positive
31	tertiary school enrolment rate	1.92%	Positive
32	administration requirements	1.86%	Positive
33	FDI outflows	1.47%	Positive

4.1.3. Necessity TEA

The sampling run of 500,000 draws produced 13,159 unique models. The best model obtained a posterior probability of 4.60% and includes the following set of regressors; a constant, the log of GDP per capita, expenditure on R&D, FDI outflows, the unemployment rate, the urbanisation rate, a communist dummy, and the female labur share. Although the posterior mass is widely spread, with 2,945 models accounting for 95% of the posterior mass, the cumulative posterior probability of the 51 best models (those with posterior probability larger than 0.25%) only accounts for 38.73% of the total posterior mass. Table 8A below presents the posterior probabilities of the best five models.

Table 8A: *Best Five Models of Necessity TEA*

No	Model	Post. Prob
1	Constant, log of GDP per capita, expenditure on R&D, FDI outflows , unemployment rate, urbanisation rate, communist dummy, female labour share	4.60%
2	Constant, log of GDP per capita, expenditure on R&D, computers per capita, FDI outflows , unemployment rate, urbanisation rate, communist dummy, female labour share	3.09%
3	Constant, log of GDP per capita, expenditure on R&D, FDI outflows, unemployment rate, urbanisation rate, non-distortionary taxation, top corporate marginal taxation^2, communist dummy, female labour share	2.54%
4	Constant, log of GDP per capita, expenditure on R&D, computers per capita, FDI outflows , population growth, unemployment rate, urbanisation rate, communist dummy, female labour share	2.09%
5	Constant, log of GDP per capita, expenditure on R&D, FDI outflows , unemployment rate, urbanisation, non-distortionary taxation, top corporate marginal taxation, communist dummy, female labour share	2.05%

Looking at the marginal posterior probabilities in Table 8B, according to the BMA methodology, the top five regressors have inclusion probabilities beyond 86.84%. Expenditure on R&D has a marginal posterior probability of 98.03%, followed by other independent variables with the following marginal posterior probabilities; the log of GDP

per capita (92.58%), the urbanisation rate (88.28%), the female labour share (88.20%), and the unemployment rate (86.84%).

Table 8B: *Marginal Posterior Probabilities*

No	Regressor	Post. Prob	Impact
1	expenditure on R&D	98.03%	Negative
2	log of GDP per capita	92.58%	Negative
3	urbanisation rate	88.28%	Positive
4	female labour share	88.20%	Positive
5	unemployment rate	86.84%	Negative
6	communist dummy	78.92%	Negative
7	FDI outflows	62.00%	Negative
8	computers per capita	42.35%	Positive
9	population growth	41.22%	Negative
10	non-distortionary taxation	29.32%	Negative
11	top corporate marginal taxation^2	22.80%	Negative
12	tertiary school enrolment rate	19.00%	Positive
13	top corporate marginal taxation	15.44%	Positive
14	lending interest rate	14.76%	Positive
15	bureaucracy cost	12.18%	Negative
16	annual inflation	9.82%	Negative
17	GDP per capita growth	8.50%	Positive
18	corruption index	7.53%	Positive
19	non-distortionary taxation^2	6.57%	Positive
20	internet per capita	5.21%	Negative
21	distortionary taxation^2	4.70%	Negative
22	distortionary taxation	4.29%	Positive
23	secondary school enrolment rate	4.12%	Negative
24	religion dummy	3.86%	Positive
25	protection of intellectual property	3.85%	Positive
26	log of domestic credit to private sector	3.66%	Negative
27	top individual marginal taxation^2	3.49%	Positive
28	top individual marginal taxation	3.16%	Negative
29	FDI inflows	3.04%	Negative
30	administration requirements	2.95%	Positive
31	exports	2.06%	Negative
32	trade	2.04%	Positive
33	imports	1.98%	Negative

4.2. Panel Data Estimation Results

The results generated from Bayesian Model Averaging (BMA) analysis are based on pooling all of the observations and, thus, unobserved heterogeneity at the country and time levels are not controlled for. In this section, we present additional estimations for the best models (as chosen by the BMA analysis), with panel data estimation techniques that can eliminate some forms of omitted variables' bias.

According to the BMA analysis, the best model for overall TEA contains the following regressors; a constant, the log of GDP per capita, GDP per capita growth, computers per capita, the tertiary school enrolment rate, the unemployment rate, non-distortionary taxation, distortionary taxation, top corporate marginal taxation^2, bureaucracy cost, the lending interest rate, dummies for religion and former communist countries, and annual inflation. For opportunity TEA, the BMA analysis suggests a model with a set of explanatory variables such as; a constant, the log of GDP per capita, the unemployment rate, non-distortionary taxation, the lending interest rate, and the communism dummy. In the case of necessity TEA, the BMA analysis suggests that the best model includes; a constant, the log of GDP per capita, expenditure on R&D, FDI outflows, the unemployment rate, the urbanisation rate, a dummy for formerly communist countries, and the female labour share.

The benchmark regression models for all three TEA measures can be written as:

$$y_{it} = \beta X_{it-1} + \mu_i \qquad (10)$$

where y_{it} records the value of dependent variable i at time t, X_{it-1} is a vector of the lag value of explanatory variables, and μ_i captures the unobserved spatial effect.

Given that the result of the Haussman test constantly favoured random effects estimation over fixed effects estimation for all three TEA measures in our benchmark model, we only report the empirical results for the random effects estimations[45]. The random effects

[45] The empirical results for the fixed effects estimations are available from the authors upon request.

estimator assumes that the constant α_i is the sum of a common constant α and a time-invariant cross-section specific random variable.

4.2.1. Overall TEA

Table 9 presents the panel data estimations for overall TEA as the dependent variable. The panel Ordinary Least Squares (OLS) results show that overall TEA is positively related to GDP per capita growth, computers per capita, the tertiary school enrolment rate, distortionary taxation, the lending interest rate, and the religion dummy; while the log of GDP per capita, the unemployment rate, non-distortionary taxation, top corporate taxation2, bureaucracy cost, the communist dummy, and annual inflation are inversely related to overall TEA (Regression 1). Furthermore, these results are robust to the random effect specifications (Regression 2).

Capital assets or wealth is assumed to be one of the variables affecting entrepreneurial activity. GDP per capita growth is found to have a positive significant effect on overall TEA in all specifications (Regressions 1 and 2). The positive effect of capital assets on the overall entrepreneurial activity rate may be due to the fact that individuals with a greater level of wealth or capital assets are more likely to enter into self-employment (see, Evans and Leighton, 1989a; Holtz-Eakin et al., 1994; Lindh and Ohlsson, 1996).

It has been reported that the evidence of the relation between unemployment and entrepreneurial activity is mixed. According to Storey (1991, p. 177):

> *The broad consensus in the time series analyses points to unemployment being, ceteris paribus, positively associated with indices of new firm formation, whereas cross-sectional or pooled cross sectional studies appear to indicate the reverse.*

In contrast to previous studies by Evans and Leighton (1990), Foti and Vivarelli (1994), and Reynolds, Miller and Makai (1995), we document a negative significant effect of unemployment on entrepreneurial activity (Regressions 1 and 2).

In terms of fiscal policy, we find that non-distortionary taxation is strongly negatively related to overall TEA, while the top corporate marginal taxation^2 is reported to be significant and negatively related to overall TEA. The results are consistent with Henriquez et al. (2001), who argued that high taxation rates and the complexity of the tax system conversely affect the level of entrepreneurial activity.

Bureaucracy cost is found to have a negative significant effect on overall TEA. As more time is spent by firms' senior management in dealing, or negotiating, with government officials, the rate of entrepreneurial activity decreases.

A negative effect for the former communist dummy on the level of entrepreneurial activity is expected, because communist countries tend to be characterised by a relatively unstable economic environment, low domestic purchasing power, and uncertainty with respect to property rights (Smallbone and Welter, 2001).

Annual inflation is found to have a negative significant effect on overall TEA in both the panel Ordinary Least Squares and random effect specifications (Regressions 1 and 2). Friedman (1977) argued that inflation and erratic inflation both jam the signalling effects of relative prices and present a big problem for entrepreneurs who are risk-averse. Furthermore, as suggested by Knight (1921) and Kirzner (1997), a volatile governmental macroeconomic policy, as indicated by an increase in annual inflation, will raise the investment risk and also make it difficult to identify opportunistic transaction behaviour.

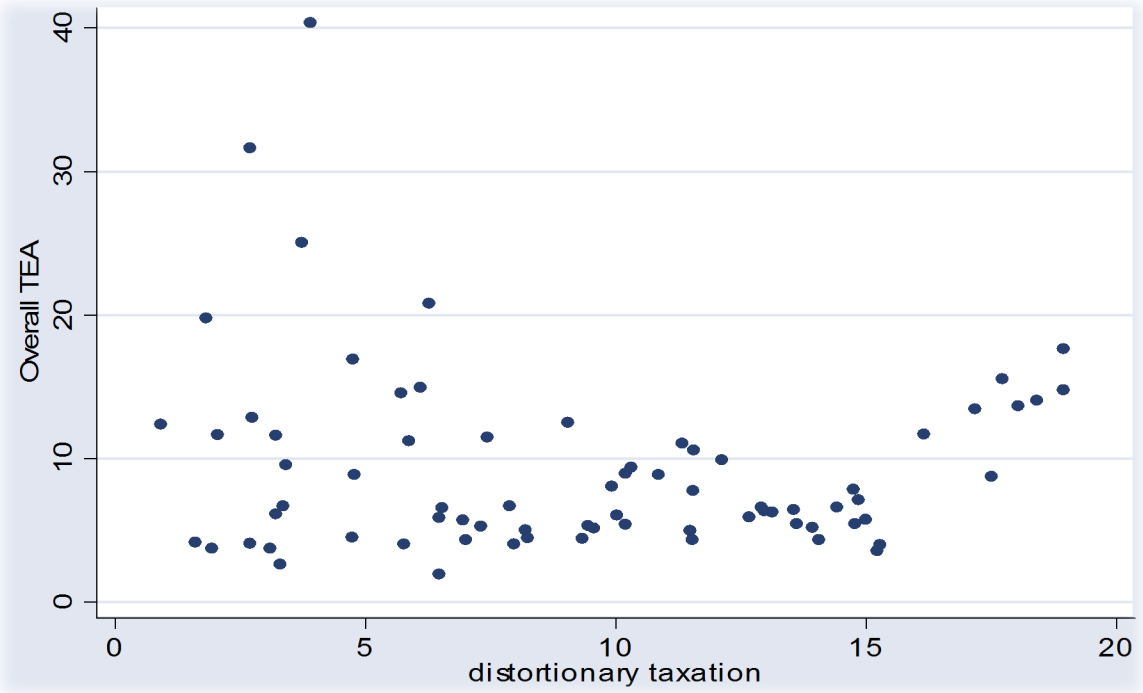
GDP per capita growth is found to have a strong positive effect on entrepreneurial activity in all specifications (Regressions 1 and 2). Individuals in a fast growing economy are more likely to be involved in entrepreneurial activity, as they hope to have access to financial funds in the future to support their entrepreneurial activities.

Computers per capita has been considered to be one of the indicators of technological development. Computers per capita are reported to have a positive significant effect on the overall TEA rate (Regressions 1 and 2). This result is consistent with OECD (1996) and Wennekers and Thurik (1999), who argued that with the emergence of new technological developments, the competitiveness and productivity of small and new business becomes more aggressive and, consequently, leads to an increase in entrepreneurial activity.

Our benchmark Ordinary Least Squares (OLS) regression shows that tertiary school enrolment has a positive and significant effect on the overall TEA measure (Regressions 1 and 2). This result is consistent with Warneryd et al. (1987), who found that more highly educated individuals are more likely to be involved in entrepreneurial activity.

Contrary to non-distortionary taxation, tax on income, profit, and capital gains are reported to have a significant positive effect on entrepreneurial activity. Furthermore, a non-linear relation is also evident for distortionary taxation. The non-linear relation between fiscal policy and entrepreneurship is in line with recent fiscal policy literature that suggested non-linear effects of fiscal policy on the economy (Adam and Bevan, 2002).

Figure 4: *U- Shaped Relation Between Overall TEA and Distortionary Taxation*



According to Cressy (2002) the availability of capital financing is important for entrepreneurship, as it lays the foundation for the business. Availability of capital financing, as gauged by the lending interest rate, is found to have a significant positive effect on overall TEA in both of the regressions' specifications (Regressions 1 and 2). At some point, start-ups or new businesses require capital to finance their projects. Therefore, with an increase in the ease of financing, the level of entrepreneurial activity will also increase.

Social factors, such as religion, have a significant positive effect on entrepreneurial activity. This result is in contrast to the view of Casson (1993), La Porta et al. (1997), and Stulz and Williamson (2003), who argued that such religions as Roman Catholicism, Islam, and Eastern Orthodoxy tend to have their own sets of rules based on the traditions set by their fore fathers. This discourages the value of entrepreneurship because Roman Catholics, Muslims and Eastern Orthodox Christians are unlikely to break away from their traditions.

Table 9: *Panel Regression Results for Best Benchmark Model of Overall TEA*

Dependent Variable: Overall TEA	**(1)**		**(2)**	
Log of GDP per capita	-22.538		-25.039	
	(-6.07)	***	(-5.08)	***
GDP per capita growth	0.634		0.469	
	(2.69)	***	(2.95)	***
Computers per capita	0.111		0.111	
	(3.75)	***	(2.53)	**
Tertiary school enrolment rate	0.130		0.142	
	(3.94)	***	(3.05)	***
Unemployment rate	-0.371		-0.311	
	(-5.17)	***	(-2.59)	***
Non-distortionary taxation	-0.430		-0.388	
	(-4.01)	***	(-2.12)	**
Distortionary taxation	0.487		0.453	
	(7.39)	***	(2.59)	***
Top corporate marginal taxation^2	-0.006		-0.004	
	(-3.44)	***	(-2.56)	***
Bureaucracy cost	-1.577		-1.330	
	(-3.51)	***	(-4.09)	***
Lending interest rate	0.811		0.662	
	(2.61)	***	(4.24)	***
Communist dummy	-7.008		-6.673	
	(-3.61)	***	(-3.17)	***
Religion dummy	3.650		4.016	
	(3.12)	***	(2.72)	***
Annual inflation	-0.670		-0.500	
	(-1.65)		(-2.34)	**
Constant	105.738		112.610	
	(-7.97)	***	(-6.67)	***
F-statistic	35.53	***	n/a	
Wald statistic	n/a		157.77	***
R-square	0.8377		0.8238	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

4.2.2. Opportunity TEA

The panel estimations for opportunity TEA are presented in Table 10. The benchmark Ordinary Least Squares (OLS) results show that the opportunity TEA measure is negatively related to the log of GDP per capita, the unemployment rate, tax on goods and services, and the communist dummy. On the other hand, similar to overall TEA, the lending interest rate is found to have a positive effect on opportunistic entrepreneurial activity (Regressions 1 and 2).

Economic development has been found to have a negative effect on the opportunity TEA. This is consistent with Schultz (1990), Yamada (1996), and Carree et al. (2002), which all noted that business ownership rates tend to decrease as economies become more developed. The result is also consistent with Lucas (1978), who contended that economic development leads to a rise in wages and heightens the attraction of wage employment, thereby increasing the opportunity costs of self-employment.

According to Storey (1991), the empirical evidence linking unemployment to entrepreneurship is ambiguous. While some studies find that greater unemployment serves as a catalyst for start-up activity (see, Highfields and Smiley, 1987; Hamilton, 1989; Reynolds, Storey and Westhead, 1994; Reynolds, Miller and Makai, 1995), others have suggested that unemployment reduces the amount of entrepreneurial activity (Audretsch and Fritsch, 1994; Audretsch, 1995). In line with Lucas (1978) and Jovanovic (1982), we find that high unemployment is associated with a lower degree of opportunistic entrepreneurial activity (Regressions 1 and 2). The negative effect of unemployment on entrepreneurial activity may be due to the fact that unemployed workers tend to possess lower endowments of human capital and entrepreneurial talent. In addition, Audretsch (1995) proposed the idea that a low rate of entrepreneurship may also be a consequence of a low level of economic growth, or a depressed economy, which also leads to higher levels of unemployment.

In contrast to Bruce and Deskins (2006), which documented a favourable impact of indirect taxes on entrepreneurial activity, our empirical results suggest that the tax on goods and services has a significant negative effect on the opportunity TEA in both the panel ordinary Least Squares (OLS) and random effects specifications (Regressions 1 and 2).

As described by Mugler (2000), the impediments to entrepreneurship in communist countries include a shortage of entrepreneurial and management skills, underdevelopment of the regulatory system, bureaucracy and time-consuming registration, limited access to capital, limited knowledge and organisation of market services, and the need for modernisation of infrastructure and communication networks. To summarise, Mugler (2000) acknowledged the idea that communist countries are characterised by a lower level of entrepreneurial activity.

Similar to overall TEA, both the panel Ordinary Least Squares and random effect specification estimation results show that the dummy for formerly communist countries is negatively related to opportunistic entrepreneurial activity.

The lending interest rate is found to have a positive effect on the opportunity TEA rate in all of the specifications (Regressions 1 and 2).

Table 10: *Panel Regression Results for Best Benchmark Model of Opportunity TEA*

Dependent Variable: Opportunity TEA	**(1)**		**(2)**	
Log of GDP per capita	-8.023		-8.339	
	(-7.96)	***	(-10.41)	***
Unemployment rate	-0.132		-0.090	
	(-5.29)	***	(-2.00)	**
Non-distortionary taxation	-0.108		-0.087	
	(-4.60)	***	(-1.26)	
Lending interest rate	0.093		0.086	
	(4.08)	***	(4.16)	***
Communist dummy	-1.562		-1.921	
	(-3.01)	***	(-2.50)	**
Constant	38.058		39.014	
	(8.35)	***	(11.63)	***
Time dummies?	no		no	
F-statistic	28.29	***	n/a	
Wald statistic	n/a		194.19	***
R-square	0.8331		0.8228	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

4.2.3. Necessity TEA

Table 11 presents the panel data estimations with necessity TEA as the dependent variable. Similar to the panel regression for overall TEA, the panel Ordinary Least Squares results show that necessity TEA is inversely related to the log of GDP per capita, expenditure on R&D, outflows of foreign direct investments, the unemployment rate, and the communism dummy. On the other hand, a positive relation on necessity TEA is found for population density and the female labour share.

The level of economic development is found to have a negative significant effect on necessity TEA. This result is consistent with Iyigun and Owen (1988), who argued that, with economic development, the level of safe professional earnings will rise and fewer individuals will be willing to risk becoming a business owner.

Expenditure on R&D has been considered to be an indicator of technological development. Expenditure on R&D is reported to reduce the level of necessity entrepreneurial activity (Regressions 1 and 2). Our results are consistent with the view of EIM/ENSR (1993, 1996), who argued that technological developments can, or may, create barriers to entry for new firms entering specific markets due to high R&D costs.

The outflow of foreign direct investment is found to have a significant negative effect on necessity entrepreneurial activity (Regressions 1 and 2). Our results agree with those of Fogel et al. (2005), Jones (2006), and Clercq et al. (2006) who argued that an inflow of foreign direct investment stimulates entrepreneurship directly by undermining the domestic market power and by introducing foreign technologies and management ideas.

Unemployment is found to have a negative significant effect on necessity TEA in both the panel Ordinary Least Squares' (OLS) and random effects' estimations. Our findings support the findings of Garofoli (1994) and Audretsch and Fritsch (1994), in that unemployment is negatively related to new firm start-ups. The findings also supports the argument of EIM/ENSR (1996), who argued that unemployed people are pushed into self

employment when they face a situation in which there is little chance of finding employment.

Similar to both overall and opportunity TEA, a negative effect of the dummy for formerly communist countries on necessity entrepreneurial activity is both found, and expected, because the culture and institutions in the formerly communist countries are not yet suitable for self-employment.

Population density, as a measure of the urbanisation rate, is found to have a positive effect on necessity entrepreneurial activity. This is consistent with Storey (1994) and Brüderl and Preisendörfer (1998), who found that urban areas with high population density provided appropriate infrastructure for business start-ups and development.

Women's labour market participation, as measured by the female labour share, has a positive influence on entrepreneurial activity. Empirical evidence from the US indicates that the increase in entrepreneurial activity has been fuelled by female entrepreneurship (Mukhtar, 2002). Elam (2008) suggested that around the world, women are more likely to start a business out of necessity and less likely to start a venture in order to pursue opportunities.

Table 11: *Panel Regression Results for Best Benchmark Model of Necessity TEA*

Dependent Variable: Necessity TEA	**(1)**		**(2)**	
Log of GDP per capita	-8.964		-11.721	
	(-3.56)	***	(-4.81)	***
Expenditure on R&D	-2.027		-1.908	
	(-5.68)	***	(-3.02)	***
FDI outflows	-0.342		-0.097	
	(-3.66)	***	(-1.06)	
Unemployment rate	-0.263		-0.162	
	(-7.94)	***	(-1.57)	
Urbanisation rate	0.109		0.132	
	(3.49)	***	(3.30)	***
Communist dummy	-6.535		-6.944	
	(-5.92)	***	(-3.93)	***
Female labour share	0.513		0.554	
	(4.80)	***	(3.49)	***
Constant	21.879		28.752	
	(2.77)	***	(3.00)	***
Time dummies?	no		no	
F-statistic	13.59	***	n/a	
Wald statistic	n/a		55.14	***
R-square	0.6367		0.5904	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

5. ROBUSTNESS CHECKS

5.1. Contemporaneous Model

We run a sensitivity analysis on the contemporaneous model to capture the effects of the macro-economic determinants on entrepreneurial activity. Instead of using the lagged value of the dependent variables applied to the benchmark model, we use the present value of the dependent variables in our contemporaneous variables. Our contemporaneous model comprises of 75 observations and the inclusion of 26 countries[46], over the period of 2001 to 2005. Details of the sample selection procedures of the contemporaneous model are shown in Table 12.

Table 12: *Sample Selection and Elimination Process of the Contemporaneous Model*

		No. of Observations
	Base Sample (46 countries within the period of 2001-2005 (balanced panel))	230
	Sample Elimination	
1	Missing values in dependent variables	70
2	Missing values in explanatory variables	85
	Final Sample ((26 countries within the period of 2001-2005 (unbalanced panel))	75

Similar to the benchmark model, we apply Bayesian Model Averaging to the contemporaneous model. With 500,000 recorded drawings and, after a burn-in of 100,000 discarded drawings, the MC^3 sampler visited 14,405 unique models for overall TEA, 10,613 models for opportunity TEA, and 13,669 models for necessity TEA. The best model

[46]In the contemporaneous model, we include the following 26 countries,m which participated in the Global Entrepreneurship Monitor (GEM) programme from 2001 to 2005; Argentina, Australia, Austria, Belgium Canada, Chile, China, Croatia, Denmark, Finland, France, Greece, Hungary, Ireland, Israel, Italy, Korea, Latvia, the Netherlands, New Zealand, Poland, South Africa, Spain, Sweden, the United Kingdom, and the United States.

obtained a posterior probability of 2.38% for overall TEA, 4.41% for opportunity TEA, and 6.13% for necessity TEA. Table 13 presents the posterior probability of the best model for overall, opportunity, and necessity TEA and the specific regressors selected by Bayesian Model Averaging (BMA).

Table 13A: *Posterior Probability of Best Contemporaneous Model for All TEA Measures*

No	Dependent Variable	Model	Post. Prob
1	Overall TEA	a constant, log of GDP per capita, tertiary school enrolment rate, the unemployment rate, non-distortionary taxation, non-distortionary taxation^2,distortionary taxation^2, top corporate marginal taxation, and a communist dummy	2.38%
2	Opportunity TEA	a constant, log of GDP per capita, internet per capita, computers per capita, exports, trade, unemployment rate, female labour share, and inflation rate	4.41%
3	Necessity TEA	a constant, log of GDP per capita, tertiary school enrolment rate, the unemployment rate, non-distortionary taxation, non distortionary taxation^2,distortionary taxation^2, top corporate marginal taxation, and a communist dummy.	6.13%

Table 13B documents the regressors that have inclusion probabilities beyond 90% for the contemporaneous model[47]. The log of GDP per capita, a measure of the level of economic development and the unemployment rate, has a marginal posterior probability of 100% in both the overall and opportunity TEA measures, implying that all models with a non-zero probability of being the *true* model include that regressors.

[47] The comprehensive details of the marginal posterior probabilities of individual regressor inclusion for the contemporaneous model are available from the authors upon request.

Table 13B: *Individual Marginal BMA Posterior Inclusion Probabilities for All TEA Measures with Posterior Probabilities over 90%*

No	Dependent Variable	Regressors	Post. Prob	Impact
1	Overall TEA	log of GDP per capita	100%	Negative
		unemployment rate	100%	Negative
		non-distortionary taxation	97.42%	Negative
2	Opportunity TEA	log of GDP per capita	100%	Negative
		unemployment rate	100%	Negative
		internet per capita	94.63%	Negative
3	Necessity TEA	non-distortionary taxation	99.86%	Negative
		distortionary taxation^2	96.89%	Positive
		tertiary school enrolment rate	94.36%	Positive
		log of GDP per capita	94.25%	Negative
		unemployment rate	94.04%	Negative
		non-distortionary taxation^2	90.25%	Positive

Panel data estimations are also applied in the contemporaneous model for all TEA measures in order to shed more light on the importance of the variables selected by the Bayesian Model Averaging (BMA). Table 14 presents the panel data estimations for the best contemporaneous model of the overall TEA. Consistent with the panel data estimations for the best benchmark model, we find that the log of GDP per capita, the unemployment rate, non-distortionary taxation, and a dummy for former communist countries are all significantly negatively related to overall TEA in both the panel OLS and random effects specifications (Regressions 1 and 2). The effect of tertiary school enrolment remains positive and significant to overall TEA in all specifications. The non-linear relation between tax on goods and services and overall TEA is expected because of the contradictory significance of non-distortionary taxation and non-distortionary taxation^2. In contrast to the benchmark model, which includes both distortionary and top corporate marginal taxation^2, the contemporaneous model includes the squared term of distortionary taxation and top corporate marginal taxation. We report a strong negative effect of top corporate marginal taxation on the overall TEA in the sense that the negative significance is persistent in both the top corporate marginal taxation and top corporate marginal taxation^2 (Regressions 1 and 2 in both Tables 9 and 14). This result is consistent with Gemmell,

Kneller and Sanz (2008), who argued that high corporate taxation is associated with lower economic growth and consequently affecting the level of entrepreneurial activity. The positive effect of distortionary taxation on overall TEA remains positive and significant, given that the distortionary taxation^2 in the contemporaneous model is significantly positively related to overall TEA (Regressions 1 and 2 in both Tables 9 and 14).

Table 14: *Panel Regression Results for Best Contemporaneous Model of The Overall TEA*

Dependent Variable: Overall TEA	**(1)**		**(2)**	
Log of GDP per capita	-24.089		-23.077	
	(-10.53)	***	(-7.59)	***
Tertiary school enrolment rate	0.106		0.077	
	(5.14)	***	(2.90)	***
Unemployment rate	-0.305		-0.324	
	(-5.16)	***	(-4.31)	***
Non-distortionary taxation	-1.211		-1.167	
	(-6.55)	***	(-3.63)	***
Non-distortionary taxation^2	0.036		0.035	
	(3.64)	***	(2.19)	**
Distortionary taxation^2	0.020		0.019	
	(7.04)	***	(4.16)	***
Top corporate marginal taxation	-0.214		-0.177	
	(-4.42)	***	(-2.88)	***
Communist dummy	-5.588		-5.774	
	(-3.88)	***	(-3.84)	***
Constant	121.487		117.744	
	(12.15)	***	(8.96)	***
Time dummies?	no		no	
F-statistic	30.31	***	n/a	
Wald statistic	n/a		102.6	***
R-square	0.7615		0.7518	
No. of observations	75		75	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

The panel data estimations for the best contemporaneous model of the opportunity TEA are presented in Table 15. Similar to our benchmark model, the log of GDP per capita and the unemployment rate are significant and negatively related to opportunity TEA in both the panel OLS and random effects specifications in the contemporaneous model (Regressions 1 and 2). Additional explanatory variables, such as internet per capita, computers per capita, exports, trade, the inflation rate, and female labour share participation are included in the contemporaneous model, while the lending interest rate, a dummy for the formerly communist countries, and non-distortionary taxation are omitted from the contemporaneous model.

The availability of computers, which is considered to be one of the measures of technological development, has a positive and significant effect on opportunity TEA in all specifications (Regressions 1 and 2).

Internet per capita is found to have an inverse significant effect on opportunity TEA. The internet provides a gateway to a wide range of information and may reduce the level of opportunistic entrepreneurial activity by intensifying competition. With publicly available information, entrepreneurs are barely able to identify and exploit novel opportunities.

Product market openness, as captured by trade openness, has a significant negative effect on opportunity TEA in both the panel OLS and random effects specifications (Regressions 1 and 2). The result is consistent with the idea that intense competition from abroad may pose a threat to domestic entrepreneurs, given that domestic entrepreneurs are required to obtain additional capabilities for entrepreneurship (Fogel et al., 2005).

We find that women's participation in labour share has a negative significant effect on opportunity TEA in all specifications (Regressions 1 and 2). This result is in line with Elam (2008), who supported the idea that women are less likely to start, or be involved in, a venture in order to pursue opportunities.

Annual inflation is found to have a positive significant effect on opportunity TEA in both the panel OLS and random effects specifications (Regressions 1 and 2). The result is in contrast to Knight (1921) and Kirzner (1997), who suggested that investment risk rises with a volatile governmental macroeconomic policy and, thus, makes it difficult to identify opportunistic transaction behaviour.

Table 15: *Panel Regression Results for Best Contemporaneous Model of the Opportunity TEA*

Dependent Variable: Opportunity TEA	**(1)**		**(2)**	
Log of GDP per capita	-6.724		-6.943	
	(-10.28)	***	(-8.05)	***
Internet per capita	-0.088		-0.080	
	(-5.89)	***	(-4.13)	***
Computers per capita	0.032		0.032	
	(4.28)	***	(3.39)	***
Exports	0.233		0.220	
	(7.27)	***	(5.14)	***
Trade	-0.131		-0.125	
	(-7.54)	***	(-5.49)	***
Unemployment rate	-0.145		-0.147	
	(-7.72)	***	(-6.42)	***
Female labour share	-0.107		-0.115	
	(-2.72)	***	(-2.78)	***
Inflation rate	0.108		0.117	
	(3.64)	***	(3.78)	***
Constant	37.969		39.094	
	(10.96)	***	(9.76)	***
Time dummies?	no		no	
F-statistic	48.98	***	n/a	
Wald statistic	n/a		283.65	***
R-square	0.8629		0.8621	
No. of observations	75		75	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table 16 presents the panel data estimations for the best contemporaneous model of necessity TEA. Similar to the best contemporaneous model of overall TEA, the log of GDP per capita, the unemployment rate, non-distortionary taxation, the top corporate marginal taxation, and a dummy for former communist countries are inversely related to necessity TEA, with the result being significant in both the panel OLS and random effect specifications (Regressions 1 and 2 in both Tables 14 and 16), while the tertiary school enrolment rate, non-distortionary taxation, and distortionary taxation^2 have a positive significant effect on the necessity TEA (Regressions 1 and 2 in both Tables 14 and 16).

In comparison to the benchmark model, additional variables such as the tertiary school enrolment rate, non-distortionary taxation, non-distortionary taxation^2, distortionary taxation^2, and the top corporate marginal taxation are included in the contemporaneous model, while the expenditure on R&D, outflows of foreign direct investment, the urbanisation rate, and female labour share participation are excluded from the contemporaneous model of necessity TEA.

Table 16: *Panel Regression Results for Best Contemporaneous Model of the Necessity TEA*

Dependent Variable: Necessity TEA	**(1)**		**(2)**	
Log of GDP per capita	-13.236		-12.193	
	(-7.19)	***	(-5.50)	***
Tertiary school enrolment rate	0.088		0.069	
	(5.57)	***	(3.54)	***
Unemployment rate	-0.194		-0.205	
	(-4.99)	***	(-3.74)	***
Non-distortionary taxation	-1.052		-1.000	
	(-8.32)	***	(-4.28)	***
Non-distortionary taxation^2	0.036		0.034	
	(5.31)	***	(2.88)	***
Distortionary taxation^2	0.020		0.019	
	(7.50)	***	(5.79)	***
Top corporate marginal taxation	-0.168		-0.146	
	(-4.75)	***	(-3.17)	***
Communist dummy	-3.264		-3.206	
	(-3.31)	***	(-2.92)	***
Constant	69.039		64.965	
	(8.71)	***	(6.77)	***
Time dummies?	no		no	
F-statistic	23.8	***	n/a	
Wald statistic	n/a		92.59	***
R-square	0.741		0.7354	
No. of observations	75		75	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

5.2. Benchmark Model *(with the exclusion of squared tax regressors)*

We run a robustness check on the benchmark model with the exclusion of the squared tax regressors to identify the relation of macro-economic determinants to the level of entrepreneurial activity. In our sensitivity analysis, we apply Bayesian Model Averaging (BMA) and panel data estimation, using 74 observations and 29 possible regressors. Details of the sample selection procedures of the benchmark model (with the exclusion of squared tax regressors) are outlined in Table 4 above.

We run 500,000 MC3 draws after an initial 100,000 discarded draws. The MC3 sample visited 12,411 unique models for overall TEA, 9,512 models for opportunity TEA, and 9,890 models for necessity TEA. Bayesian Model Averaging (BMA) analysis of the benchmark model (with the exclusion of squared tax regressors) selected the regressors that were similar to those obtained for the benchmark model for the opportunity and necessity TEA measures. The posterior probability and the regressors contained in the best linear model for all TEA measures are summarised in Table 17A.

Table 17A: *Posterior Probability of Best Benchmark Model for All TEA Measures (with the exclusion of squared tax regressors)*

No	Dependent Variable	Model	Post. Prob
1	Overall TEA	a constant, log of GDP per capita, expenditure on R&D, FDI outflows, unemployment rate, urbanisation rate, non-distortionary taxation, top corporate marginal taxation, communist dummy, and female labour share	2.37%
2	Opportunity TEA	a constant, log of GDP per capita, unemployment rate, non-distortionary taxation, lending interest rate, and communist dummy	4.09%
3	Necessity TEA	a constant, log of GDP per capita, expenditure on R&D, FDI outflows, unemployment rate, urbanisation rate, communist dummy, and female labour share	5.32%

Table 17B presents the marginal posterior probabilities of individual regressor inclusion for all TEA measures with posterior probabilities beyond 90%. Given that the posterior probability for the log of GDP per capita in all TEA measures ranges from 97.15% to 100%, we could conclude that the inclusion of the log of GDP per capita in all TEA measures' models is prominent. Consistent with the previous BMA and panel data estimation for the benchmark model, the impact of the unemployment rate is negative on both overall and opportunity TEA, implying that Schumpeter effect is considerably stronger than the refugee effect.

Table 17B: *Individual Marginal BMA Posterior Inclusion Probabilities for All TEA Measures with Posterior Probabilities over 90%*

No	Dependent Variable	Regressors	Post. Prob	Impact
1	Overall TEA	Log of GDP per capita	99.74%	Negative
		Unemployment rate	98.31%	Negative
		Communist dummy	94.38%	Negative
2	Opportunity TEA	Log of GDP per capita	100%	Negative
		Unemployment rate	99.84%	Negative
		Communist dummy	96.98%	Negative
3	Necessity TEA	Expenditure on R&D	99.44%	Negative
		Log of GDP per capita	97.15%	Negative
		Urbanisation rate	92.90%	Positive

Table 18 presents the panel data estimations for the best benchmark model (with the exclusion of squared tax regressors) of overall TEA. Bayesian Model Averaging (BMA) suggests that the best model includes the following set of independent variables; a constant, the log of GDP per capita, expenditure on R&D, FDI outflows, the unemployment rate, the urbanisation rate, non-distortionary taxation, top corporate marginal taxation, a dummy of the formerly communist countries, as well as the female labour share. Similar to the previous benchmark model, the log of GDP per capita, the unemployment rate, non-distortionary taxation, and a dummy for the formerly communist countries have significant inverse relations to the level of entrepreneurial activity in both the panel OLS and random

effects specifications (Regressions 1 and 2 in both Tables 9 and 18)[48]. Controlling the squared tax variables, we also find that outflows of foreign direct investments and the top corporate marginal taxation rate conversely affect the level of entrepreneurial activity in both the panel OLS and random effects specifications.[49] Table 18 reports a significant positive effect of the urbanisation rate and female labour share to overall TEA in all specifications (Regressions 1 and 2).

[48] One exception is that the unemployment rate is no longer significant in the random effects specification.
[49] FDI outflows is no longer significant in the random effect specification.

Table 18: *Panel Regression Results for Best Benchmark Model of Overall TEA (with the exclusion of squared tax regressors)*

Dependent Variable: Overall TEA	**(1)**		**(2)**	
Log of GDP per capita	-19.601		-23.010	
	(-5.80)	***	(-6.97)	***
Expenditure on R&D	-1.883		-1.866	
	(-3.95)	***	(-2.21)	**
FDI outflows	-0.368		-0.054	
	(-3.38)	***	(-0.44)	
Unemployment rate	-0.327		-0.176	
	(-6.39)	***	(-1.28)	
Urbanisation rate	0.145		0.173	
	(3.52)	***	(3.28)	***
Non-distortionary taxation	-0.391		-0.382	
	(-3.88)	***	(-1.81)	*
Top corporate marginal taxation	-0.201		-0.143	
	(-2.44)	**	(-1.66)	*
Communist dummy	-9.459		-9.945	
	(-4.79)	***	(-3.90)	***
Female labour share	0.703		0.734	
	(4.51)	***	(3.49)	***
Constant	69.433		76.919	
	-5.9300	***	(5.74)	***
Time dummies?	no		no	
F-statistic	15.06	***	n/a	
Wald statistic	n/a		100.4	***
R-square	0.7568		0.7156	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Similar to the panel estimations result for the best benchmark model of opportunity TEA, we find that the log of GDP per capita, the unemployment rate, non-distortionary taxation, and the communism dummy have a negative significant effect on opportunity TEA in the panel OLS specification. The availability of financing, as measured by the lending interest rate, has a positive significant influence on the level of opportunistic entrepreneurial activity in all specifications (Regressions 1 and 2).

Table 19: *Panel Regression Results for Best Benchmark Model of Opportunity TEA (with the exclusion of squared tax regressors)*

Dependent Variable: Opportunity TEA	**(1)**		**(2)**	
Log of GDP per capita	-8.023		-8.339	
	(-7.96)	***	(-10.41)	***
Unemployment rate	-0.132		-0.090	
	(-5.29)	***	(-2.00)	**
Non-distortionary taxation	-0.108		-0.087	
	(-4.60)	***	(-1.26)	
Lending interest rate	0.093		0.086	
	(4.08)	***	(4.16)	***
Communist dummy	-1.562		-1.921	
	(-3.01)	***	(-2.50)	**
Constant	38.058		39.014	
	(8.35)	***	(11.63)	***
Time dummies?	no		no	
F-statistic	28.29	***	n/a	
Wald statistic	n/a		194.19	***
R-square	0.8331		0.8228	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Controlling the taxes squared regressors, we find a panel estimation result that resembles our previous benchmark model. The level of necessity entrepreneurial activity is negatively dependent on the log of GDP per capita, expenditure on R&D, FDI outflows, the unemployment rate, and a communism dummy, whereas the urbanisation rate and the female labour share positively influence the level of necessity entrepreneurial activity.

Table 20: *Panel Regression Results for Best Benchmark Model of Necessity TEA (with the exclusion of squared tax regressors)*

Dependent Variable: Necessity TEA	**(1)**		**(2)**	
Log of GDP per capita	-8.964		-11.721	
	(-3.56)	***	(-4.81)	***
Expenditure on R&D	-2.027		-1.908	
	(-5.68)	***	(-3.02)	***
FDI outflows	-0.342		-0.097	
	(-3.66)	***	(-1.06)	
Unemployment rate	-0.263		-0.162	
	(-7.94)	***	(-1.57)	
Urbanisation rate	0.109		0.132	
	(3.49)	***	(3.30)	***
Communist dummy	-6.535		-6.944	
	(-5.92)	***	(-3.93)	***
Female labour share	0.513		0.554	
	(4.80)	***	(3.49)	***
Constant	21.879		28.752	
	(2.77)	***	(3.00)	***
Time dummies?	no		no	
F-statistic	13.59	***	n/a	
Wald statistic	n/a		55.14	***
R-square	0.6367		0.5904	
No. of observations	74		74	
Estimation Methods	**Panel OLS**		**Random Effects**	

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

6. CONCLUSION

Entrepreneurship is a multi-faceted subject, since it is covered by, and is drawn from, various disciplines, including economics, history, psychology, politics, and social and cultural studies. It has been the subject of important and ongoing debate in the economic literature, due to its function in stimulating and generating economic growth. Uncountable theoretical and empirical studies have been documented in regards to different aspects of entrepreneurship. To date, however, there has been no strong consensus on the factors that determine entrepreneurial activities.

This paper contributes to the existing literature in the following ways. First, it utilises Global Entrepreneurial Monitor (GEM) - Total Entrepreneurial Activity (TEA) Rates as the measure of entrepreneurial engagement activity. Second, we explicitly account for model uncertainty by using Bayesian Model Averaging (BMA). Our results confirm the presence of model uncertainty, with the posterior probabilities spread over a large number of models. Furthermore, out of 33 independent variables tested, only a few explanatory variables have been found to affect entrepreneurial activity. Our results show that the general state of macroeconomic activity, the availability of financing, the level of human capital, fiscal policies implemented and the type of economic system are the most important determinants of entrepreneurship. In addition, we document a non-linear, U-shaped relation between taxation and the level of entrepreneurship.

Given that our paper only outlines general macro-economic determinants of entrepreneurship for which we have data availability, our results also withstand various robustness checks, addressing other possible problems associated with sample selection and unobserved heterogeneity.

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