

Exploring the Relationship Between Entrepreneurship, Innovation and Economic Progress: A Case of India with Evidences from GEM Data and World Bank Enterprise Surveys

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Abstract

Nations all across the globe are engaged in identifying the factors deterministic of economic surge, which is reflective of contemporary domain of economics. Entrepreneurial ventures using technological innovations have emerged as a pivotal growth indicator in developing nations like India, though there has been a dearth of extensive studies on the impact of technology-based innovations in new venture creation and its subsequent contribution to economic growth and progress of a nation. This paper used the Global Entrepreneurship Monitor (GEM) data alongwith World Bank Enterprise surveys (2006) to explore the probable link between entrepreneurship, innovation and economic progress pertaining to Indian context. The entrepreneurship measures were concentrated on Total Entrepreneurship Activity (TEA) data and its subcomponents. The findings were in line with the literature reviewed as both overall and necessity driven TEA accounted for growth in GDP as a mark of economic progress. Technological innovation was found to be a significant input to economic growth.

Keyword: Economic Progress, Venture

Introduction

The entrepreneur has been a fundamental agent in most production, distribution and growth theories. The role of entrepreneurship as the driving force of economic growth found its most explicit foundation in Joseph Schumpeter's

theory of long waves. According to Schumpeter, an entrepreneur is someone who carries out new combinations of products, services, technologies, concepts etc. Considerable advances, even breakthroughs, have undoubtedly been made during the last decades in our understanding of the relationship between knowledge and growth on one hand, and entrepreneurship and growth on the other. Empirical evidence did confirm contribution of technology-driven innovation to the economic growth (Nadiri, 1993). Gabr and Hoffman (2006) and Hoffman (2005) observed causal link between the drivers of entrepreneurship (opportunity, capabilities, and capital), economic growth (innovation, entrepreneurship, human resources) and innovation (knowledge building and management and interactive communication technologies). Further to this, researchers emphasized on the fact that rate of entrepreneurial innovation amplifies with the proximity of knowledge generation sources (Breschi and Lissoni, 2001). Arrow (1962) and Nelson (1959), with their concept of 'knowledge spillover effect', explained distant-locus-generation of knowledge as an exhaustive input to innovation. In spite of these discrete studies, there has been a dearth of substantial literature support explaining the nomological network between knowledge, innovation, entrepreneurship and growth, although it is apprehended that there exists a cause-&-effect relationship between the constructs, whereby entrepreneurship has been considered as a recombinant growth (Olsson and Frey, 2002), also considered to be a resultant vector of technological innovation.

The relationship between microeconomic indices of growth and vis-à-vis macro-economic manifestations of

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a nation is still at a nascent stage to understand the complexities of interaction between these constructs, though, theoretical and empirical studies have hinted towards intervening role of these constructs to bridge micro and macro realms. Empirical evidences seem to support the view that the spatial dimensions of knowledge generation tend to operate in geographically-bounded zones resulting in territorially concentrated 'knowledge spillover effect' which stimulate down-the-line technological and process innovation and localized entrepreneurship. While analyzing the geographic penetration of 'knowledge spillover effect' to boost innovation and entrepreneurship, Glaeser *et al.* (1992) referred to Marshall-Arrow-Romer externality, which suggested homogenous industry pattern triggered intra-industrial knowledge spillover, thereby, fostering innovation and entrepreneurship growth. The entrepreneurial-choice model refined by Holmes and Schmitz Jr. (1990) and Jovanovic (1999) elaborated the probability of localized entrepreneurial activity to undergo geographical stretch as a choice over income through employment and was represented as:

$X_r = f(Y - R)$, where X_r = probability to start a new firm, Y = expectation of accrued profit from new start-up venture and R = expected income through employment. It was observed that entrepreneurial decision would depend on specific geographical location on the basis of expected returns from new start-ups (Y) which is further dependent on knowledge resources. The concept of 'knowledge spillover effect' hinted that ' Y ' will increase as access to localized tacit knowledge repository is greater in spatial clusters. Therefore 'entrepreneurship spillover' is characterized by the capacity of the firm to ensure homogenous knowledge spillover resulting in innovation fit. This notion has received support from cross-nation spread of concentric start-up ventures with maximum knowledge and innovation fit. The problem of lateral shift in knowledge generation, innovation and entrepreneurship activities lie in the heterogeneity of industry structures, country-specific cultures and varying degree of infrastructural support. Reynolds *et al.* (1994) and Storey (1999) portrayed in their survey outcomes that spread of entrepreneurial start-ups across regions depend on population density, growth, quality of human capital available and are negatively influenced by establishment size.

Entrepreneurship serving as a change agent and a mechanism for knowledge spillover, should not be

theoretically constrained within the entrepreneurial choice model, rather, researchers are delving into its role in trans-border economic performance in knowledge-based economy.

Entrepreneurship, in India, is growing at a rapid pace as economic reforms initiated by Govt. of India in the early 1990s broke the shackle of licensing and allied bureaucratic clutches to initiate start-up ventures. A survey report submitted by Goldman Sachs and Pricewaterhouse Coopers in the year 2007 revealed India's potentiality to attain pinnacle position in world economy by 2050 based on favourable growth drivers namely technology integration, vibrant capital markets, an upsurge in youth population expanding domestic market. This pro-entrepreneurial environment has ensured India's captive potentiality to maximize wealth pool through effective and efficient knowledge harnessing and dissemination. Entrepreneurship and innovation have evolved as key driving forces to foster knowledge and generate wealth by optimal usage of available skilled human resources. One of the major antecedents of growth of entrepreneurship in India has been identified as the ever-expanding usage of technology. In a survey conducted by the Deloitte group (2007), India ranked 2nd as global-hub of technology-growth and the report substantiated this inference by revealing the fact that 82 Indian companies included in the Deloitte Technology Fast 500 list, contributed for 489% revenue growth (average three years).

The Indian entrepreneurial market is multilayered and multi-hierarchical, segregated on the basis of specific sectors and engagement of manpower. The first layer consists of agriculture and allied activities spanning over crop production, plantation, forestry, livestock, farming, pisciculture, mining etc. The second layer comprise of wholesale and retail trade business and the booming hospitality sector. The third layer encompasses the conventional infrastructural sectors namely manufacturing, generation and distribution of electricity, gas and water supply. The fourth and final layer incorporate the knowledge-intensive emerging sectors namely ITES, supply chain, transportation and warehousing, financial services including insurance services and other value-added business processes. The intra-layer migration of sectors, spillover and merging of the same may be observed as last ten years data reveal that maximum start-up ventures have cropped up in layer 4 with layer 2 and 3 rapidly changing its demography.

Entrepreneurship in modern India is witnessing sweeping changes in the cross-section of psychogeodemographic distribution of society. The national and the state governments are boosting up their roles as facilitating agencies as they have initialized a number of strategies pertaining to dissemination of relevant information to aspiring entrepreneurs and linking them to agencies namely SIDBI, MSME, NABARD etc. to enter into quasi-PPP (people-private-partnership) model to maneuver fund and other technical support for young entrepreneurs, setting up business incubation hubs, infrastructural support, networking with industrial associations, chambers of commerce and R&D laboratories, exploring the possibility to ensure social security for entrepreneurs, acquisition and integration of technology and encourage banks to support entrepreneurship and devise systematic risk management system.

This paper, exploratory in nature, tries to correlate entrepreneurship with innovation and economic progress in Indian context. The next section of this paper takes into consideration a brief review of literature linking entrepreneurship, innovation and economic progress, the subsequent section deals with formulation of hypothesis, the latter section highlights the data analysis and interpretation and the last section makes the concluding remarks.

Review of literature

The traditional neoclassical theory of economics attributes economic development and growth of a nation to the supply of labour, availability of capital and level of technology harnessed (Todaro and Smith, 2008). Empirical evidences were found to correlate entrepreneurship with economic growth of a nation (Karlsson *et al.*, 2009). Schumpeter (1911), in his initial studies established conceptually that 'entrepreneur as an innovator' plays a critical role in the growth and development of a nation's economy. The traditional neoclassical theory of economic growth was first developed by Robert Solow (1956) and economic growth was identified as a function of two inputs- the levels of capital and labour in a given geographic area. Bednarzick (2000) illustrated a seven-factor paradigm as determinant of nation's entrepreneurship development: (a) opportunities for entrepreneurial ventures, (b) the demographic distribution pattern, (c) level of education, (d) capacity to initiate entrepreneurial activities,

(e) availability of supportive infrastructure, (f) pro-entrepreneurial cultural integration and (g) involvement of banks towards control of capital. Davidsson (2003) explored various pertinent issues linked to entrepreneurship from different perspectives and drew support from Kirzner's (1973) views of entrepreneurship as a driving force behind the market process. Smith *et al.* (2010) observed that entrepreneurship is instrumental in fostering technology innovation, a precursor to economic growth of a nation. Researchers also emphasized on knowledge-based endogenous growth of national economy whereby the 'knowledge spillover effect' was characterized as major inputs for a number of venture creation. The second generation endogenous growth models (Segerstrom *et al.*, 1990; Segerstrom, 1995; Cheng and Dinopoulos, 1992) predominantly focused on R&D growth as a spillover effect and catalyst to foster new ventures. Studies conducted by Acs *et al.* (2004) and Braunerhjelm *et al.* (2009) did confirm a positive relationship between entrepreneurship and pattern of growth, specific to a nation. Supportive evidences were found by Salgado-Banda (2005) as they positively correlated innovation-driven entrepreneurship with economic growth of a nation. The neo-Schumpeterian growth model supports the view that innovative entrepreneurship triggers growth in developed economies, while the developing economies rely on diffusion of former innovation for their growths (Acemoglu *et al.*, 2006). Technological symbiosis between nations facilitate diffusion of technology from developed to developing nation, thereby, providing technology spillover for the latter one as a major tool for encouraging entrepreneurship and growth (Ertur and Koch, 2008). Versloot and Prag (2007) observed that investments in research and development towards new business establishment shared a positive relationship with economic prosperity of a nation. Investment in research and development is synonymous to practice of innovation. Technology inclusion as a process of innovation-integration is responsible for recombinant entrepreneurship growth as identified by Olsson and Frey (2002), by proposing a mathematical model and graphical representations thereof. While linking innovations to economic growth, researchers used varying input measures namely R&D expenditures (Mansfield, 1972), number of patents obtained (Griliches, 1990) and rate of technology acquisition (Ertur and Koch, 2008). Researchers have also focused on economic growth which has been endogenously determined as a result of technology and

innovation proliferation and came out with R&D based endogenous growth models (Verspagen, 1992, Ruttan, 1997). Van Ark and Hulten (2007) concluded that practice of innovation is highly essential as the standard sources of growth model acknowledge the systematic investments behind research and development.

Numerous studies have confirmed that relationship between creation of new ventures and employment generation and it hinted towards overall economic development of a nation. The start-up ventures provided opportunities to create job, according to Fritsch and Muellers, 2007, and they went on to argue that job creation is highest at the earliest stage of firm's life cycle. Acs and Armington (2002) concluded that new start-up ventures play a critical role in the development of economy by generating employment opportunities. Supportive results were found in studies conducted by van Stel and Storey (2004), Baptista *et al.* (2008), van Stel and Suddle (2008), and Glaeser and Kerr (2009). On the other hand researchers had also attributed new venture creation to severe unemployment resulting into self-employment (Storey, 1991). This phenomenon was described by Evans and Leighton (1989) and Reynolds *et al.* (1994) as 'refugee' and 'shopkeeper effect'. Van Stel and Storey (2004) further emphasized that this refugee push effect is responsible for the initiation of start-up ventures.

Recent research works have focused on the development of empirical models to determine the economic growth of a nation on the basis of GDP (Wong, Ho and Autio, 2005). Carree *et al.* (2002) developed a model to determine the equilibrium rate of entrepreneurship as a function of the stage of the development of an economy. Audretsch *et al.* (2002) applied the same formulation to study the impact of small and medium scale businesses and observed the same outcome.

Model estimation for entrepreneurship, innovation and economic progress

The objective of this study is to assess the impact of technological innovation and entrepreneurship on the economic growth.

Review of literatures revealed that the concept of entrepreneurship and innovation had been linked and the subsequent economic growth has been attributed to

technological innovation although substantial evidence pertaining to link between total entrepreneurship activity and economic progress is absent. Research works have implicitly hinted towards entrepreneurship as an underlying cause of innovation. Studies conducted by Wennekers and Thurik (1999) pointed out to the fact that the role of entrepreneur has expanded beyond the limits of innovation in the areas of risk ventures and managerial responsibilities. The researchers have supported the views of Wong, Ho and Autio (2005) that initiation of start-up ventures and technological innovation are two major inputs of entrepreneurship and do not overlap in determining the overall economic growth. Technological innovation, which has ensured enhancement in productivity and cost optimization, has obviously been considered as antecedent to economic growth and the notion was supported by both neo-classical approach (Solow, 1956) and endogenous growth model (Romer, 1986). One of the significant aspects of GEM (Global Entrepreneurship Monitor) data is its consistency and comparability in measuring entrepreneurship initiatives in terms of Total Entrepreneurship Activity (TEA) and its sub-components namely international orientation early-stage entrepreneurial activity (TEAyyint), new product early-stage entrepreneurial activity (TEAyynewp), growth expectation early-stage entrepreneurial activity: relative prevalence (TEAyyjg5), total early-stage entrepreneurial activity for female working age population (YEAyyfem), total early-stage entrepreneurial activity for male working age population (TEAyyymal), improvement-driven opportunity entrepreneurial activity: relative prevalence (TEAyyido), and necessity-driven entrepreneurial activity: relative prevalence (TEAyynec_p). Studies conducted by Reynolds *et al.* (2000, 2001, 2002) confirmed that the overall TEA rate was positively correlated with economic growth of a nation. The World Bank Enterprise surveys (2006) did provide data pertaining to India's venture creation and its correspondence contribution to GDP of the nation. This paper used the relationship between TEA and economic growth as identified by Reynolds *et al.* (200, 2001, and 2002) with a special reference to differential impact of opportunity and necessity TEA on economic growth. It was evident from empirical studies that new ventures contribute differentially to economic growth thereby nullifying any homogeneity and linear effects. Kirchoff, (1994), Storey, (1994) and Birch *et al.*, (1997) were of the opinion that fast growing farms generate more employment. It was thus identified (as per

GEM dataset criteria) that high potential TEA would be associated with (a) higher rate of potential employment generation, (b) higher degree of market impact, (c) globalised customer base and (d) faster rate of adoption of new technology. Naturally, it is hypothesized that higher rates of high potential TEA would be associated with higher economic growth (Wong, Ho and Autio, 2005).

Formulation of Hypothesis

On the basis of the literature studied, our hypotheses posit that:

H_1 : Higher degree of technological innovation will stimulate higher degree of growth (GDP)

H_2 : Higher degree of overall TEA will ensure higher degree of growth (GDP)

H_3 : Higher degree of opportunity TEA will stimulate higher degree of growth (GDP)

H_4 : Higher degree of necessity TEA will stimulate a lower degree of growth (GDP)

H_5 : Higher degree of high potential TEA will have higher degree of growth (GDP)

Methodology

The researchers have used the Global Entrepreneurship Monitor (GEM) dataset of 2008 pertaining to the entrepreneurial statistics and its different measures and constructs of India and it was collated with the dataset provided by World Bank Enterprise Surveys (2006). The Prowess database for 2007-2008 was also used to collect data on national GDP, patent data and other relevant economic data. The data provided by the source were normalized to a per capita basis to be consistent with the TEA rates and to test the hypothesis.

Cobb-Douglas production function with a variation was used as a model to test the hypothesis (Wong, Ho and Autio, 2005) which has been widely accepted as an extension of the neo-classical growth model and can be generally represented with the following equation:

$$X = P^{\alpha} Q^{\alpha} R^{\beta}$$

where X =output, P^{α} = disembodied factor productivity, K = physical capital, R = labour

Dividing both sides by R :

$$X/R = P^{\alpha} Q^{\alpha} R^{\beta-1}$$

Multiplying right-hand-side by R^{α}/R^{α} :

$$X/R = P^{\alpha} (Q/R)^{\alpha} R^{\alpha+\beta-1}$$

Assuming constant returns to scale, $\alpha+\beta = 1$. Hence

$$X/R = P^{\alpha} (Q/R)^{\alpha} \quad (1)$$

Taking natural logs on both sides:

$$\ln(X/R) = \ln P^{\alpha} + \alpha \ln(Q/R) \quad (2)$$

taking first differences in order to obtain growth in X/R as the dependent variable, for small % changes, $\Delta \ln(X/R)$ = % change in (X/R)

$$\Delta \ln(X/R) = \Delta \ln P^{\alpha} + \alpha [\Delta \ln(Q/R)] \quad (3)$$

We assume the growth in disembodied factor productivity, to be explained by technological innovation and TEA:

$$\Delta \ln P^{\alpha} = B^{\alpha} + \Phi PT + \lambda TEA \quad (4)$$

where B^{α} = constant, PT = patent intensity measuring technological innovation, TEA = Total Entrepreneurship Activity measuring entrepreneurship rate.

Substituting (4) into (3):

$$\Delta \ln(X/R) = B^{\alpha} + \Phi PT + \lambda TEA + \alpha [\Delta \ln(Q/R)] \quad (5)$$

Creation of new venture and innovation were entered as exogenous variables pertaining to economic growth and production whereby creation of new venture was considered to be an expression of entrepreneurial capital and technological innovation related to formation of knowledge capital. The regression model used for the study took the following shape:

Economic growth rate = $\alpha_0 + \alpha_1$ (Base year GDP/worker) + α_2 (Growth in capital/worker) + β_1 (creation of new venture) + β_2 (technological innovation)

where economic growth rate is the dependent variable and was measured using the growth in GDP per

employed person over a period of five years, base year GDP per worker was included to control the conditional convergence effect described by Barro (1991), growth in capital per worker was computed by taking the average of annual compound growth rates between 2001-2002 and 2007-2008 from World Bank Enterprise Surveys (2006).

creation of new firm was measured using the TEA rates computed from GEM dataset of 2008, and technological innovation was measured using the ratio of patents to GDP over a 5-year period.

Data Analysis and Interpretation

To test the hypotheses, linear least square regression model was applied. The alternating seven different types of TEA indices were used as measure of entrepreneurship. The

results of regression analysis were presented in Table-2. The regression results (Table1) revealed significant *F* statistics and adjusted R square values above 65%. Multicollinearity was absent between the variables as tolerance and VIF were found to be acceptable to go with the model. The results did support the first hypothesis that higher degree of technological innovation will stimulate higher degree of growth (GDP). Technological innovation intensity was found to have a profound effect and a positive determinant of GDP growth. The results reveal that overall higher degree of TEA will result in a higher GDP did lend support to the second hypothesis. Similarly, the estimated coefficients on opportunity and necessity TEA rates were found to be significantly associated to GDP growth. The other five subcomponents of TEA considered to be types of new venture creation were found to have significant impacts on economic growth.

Table1: India's position with respect to GEM data (2006) associated with TEA levels

Country	Name	2008
India	International Orientation early-stage Entrepreneurial Activity	15
	New Product early-stage Entrepreneurial Activity	54
	Growth Expectation early-stage Entrepreneurial Activity: Relative Prevalence	15
	Informal Investors Rate	13.6
	Total early-stage Entrepreneurial Activity for Female Working Age Population	8.9
	Total early-stage Entrepreneurial Activity for Male Working Age Population	11.2
	Improvement- oriented Entrepreneurial Activity: Relative existence	43
	Necessity-Driven Entrepreneurial Activity: Relative Prevalence	28
	Established Business Ownership Rate	5.6
	Total early-stage Entrepreneurial Activity (TEA)	10.1
	New Business Ownership Rate	5.2
	Nascent Entrepreneurship Rate	5.2
	Media Attention for Entrepreneurship	69
	High Status Successful Entrepreneurship	84
	Entrepreneurship as Desirable Career Choice	67
	Know Startup Entrepreneur Rate	63
	Entrepreneurial Intention	31.3
	Fear of Failure Rate	24
	Perceived Opportunities	52
	Perceived Capabilities	62

Conclusion

The study revealed a significant correlation between an intensive entrepreneurship effect or creation of new ventures and the economic growth of a nation. The results of regression analysis using GEM, WES and Prowess data sets confirmed that economic growth of India (in terms of GDP) is significantly attributed to entrepreneurship activities. The results did conform to the recent disclosure in economic survey where a significant proportion of GDP has been accounted for by the micro, medium and small enterprises (MSMEs) and the SSIs. Overall high Total Entrepreneurship Activity (TEA) was found to be significantly correlated to economic growth and the same results were obtained for overall TEA and necessity TEA. The results of the study did converge with the findings of Davidsson (2003) whereby he established that the significance of high potential ventures were immense particularly to register a high economic growth. Technological innovation was found to have a significant correlation with economic growth and it did confirm the rate of technology adoption by India in the last decade or so.

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