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ENTREPRENEURSHIP AND ECONOMIC GROWTH ALONG STAGES OF DEVELOPMENT

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Abstract

Economies at different stages embody diverse characteristics in the term of underlying forces, external environment, and government policy because of their disparate primary inputs. While private inputs, e.g., capital are critical to growth through accumulation in the investment-driven economies, knowledge indeed is the main input bringing about productivity-based growth in innovation-driven economies, e.g., the US with Silicon Valley. However, the investment-driven economies also have new knowledge flowing from advanced economies through foreign trade and FDI and therefore requires entrepreneurship either.

This study aims at: (1) determining whether entrepreneurship, as a mechanism for knowledge spillover, is integral to growth; (2) finding out whether entrepreneurship's contribution to growth varies among stages; and (3) determining if entrepreneurship differs among stages.

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1. Introduction

In the second half of the 20th century, productivity rather than capital accumulation was academically considered a primary determinant of long-run economic growth in both exogenous and endogenous growth theories. The world also has witnessed few OECD nations, including the United States (US), the United Kingdom (UK), and Singapore and China in recent years (Wei, Xie, & Zhang, 2017) came to strategies for structural transformation from investment-driven to an innovation-driven economy. Therefore, technological knowledge has become the predominant factor in the innovation-driven economies because of its integral role in enhancing productivity. More importantly, Romer (1990) developed the theory of endogenous technology, which demonstrates the significance of conscious investments in new knowledge, e.g., R&D activities to technological change. Consequently, economic growth is endogenously determined by relevant policies, e.g., innovation policy. However, the theory came with the hypothetical assumption that knowledge spillover automatically occurs without specifying any mechanism.

Since 1990, the resurgence of small-scale firms in transformed economies and bursts of studies incorporating entrepreneurship into the growth economics marked the highest peak of entrepreneurship literature and an alternative direction in the manipulation of economic growth. The knowledge spillover theory of entrepreneurship was an exemplification. In this theory, knowledge filter[1] which is defined as the difference between new knowledge and economically relevant knowledge (David B. Audretsch & Keilbach, 2007) was introduced and furthermore could be narrowed down by entrepreneurship. In other words, entrepreneurship could be either considered as a mechanism for knowledge spillover or defined as the process of exploiting the unexploited profit opportunities (Kirzner, 1973). Therefore, this study combines the knowledge spillover theory of entrepreneurship with endogenous growth theories.

Economies at different stages embody diverse characteristics in the term of underlying forces, external environment, and government policy because of their disparate primary inputs. While private inputs, e.g., capital are critical to growth through accumulation in the investment-driven economies, knowledge indeed is the main input bringing about productivity-based growth in innovation-driven economies, e.g., the US with Silicon Valley. However, the investment-driven economies also have new knowledge flowing from advanced economies through foreign trade and FDI and therefore requires entrepreneurship either.

This study aims at: (1) determining whether entrepreneurship, as a mechanism for knowledge spillover, is integral to growth; (2) finding out whether entrepreneurship's contribution to growth varies among stages; and (3) determining if entrepreneurship differs among stages.

2. Stages of Economies

2.1. Investment-driven economies

"The output is produced with the help of two factors of production, capital, and labor. Technological possibilities are represented by a production function" (Solow,

1956, p. 66). Solow (1956) considered capital and labor the primary factors to the manufacturing and postulated growth in output just takes place as economies accumulate capital. These factors have the attributes of rivalry and excludability. Therefore, the production process could be operated the most efficient at the large scale. This was a justification for the dominance of large corporations and the declining importance of entrepreneurship and small business in Europe and North America during the post-war era from 1945 to the late 1980s (Audretsch & Thurik, 2004). The large corporations featuring mass production[2] were the engine of the economies. As a result, the policymakers were confronted with the tradeoffs between efficiency brought about by the large corporation on the one hand and political and economic decentralization associated with small firms on the contrary (Audretsch & Thurik, 2004). The economies identified with efficiency focus, the dominance of large corporations, stability, homogeneity, and continuity are called investment-driven (or managed) economies (Audretsch & Thurik, 2001). Moreover, entrepreneurship was just a new scientific research programme in the field of business administration in this era (Cuervo, Ribeiro, & Roig, 2007).

2.2. Innovation-driven economies

In the early 1990s, the trend was reversed in the same economies. Particularly, the sales share of small firms in the United States (US) increased from one-fifth in 1976 to one-quarter in 1986. Employment share in the manufacturing of small companies from the 1970s to the 1980s significantly increased in Netherlands (68.3% - 71.8%); UK (30.1% - 39.9%) and North of Italy (44.3% - 55.2%) (David B. Audretsch & Thurik, 2004). This was called the emergence of entrepreneurship and small firms. Research on entrepreneurship also exploded into an avid interest in political and academic fields upon the arrival of Birch's (1979) report "The Job Generation Process." This report showed new firms accounted for up to 50% new jobs created in the US from 1969 to 1976 (Cuervo et al., 2007).

The reemergence of entrepreneurship and small firms can be justified by the enormous significance of knowledge to economic growth (Audretsch & Thurik, 2004). Additionally, in the theory of technological change developed by Romer (1990) knowledge was considered a source of technological change. In practice, the investment-driven economies in the previous period, e.g., the US and the UK were transforming into the innovation-driven economies which were dictated by the dominance of knowledge as the source of comparative advantage. The innovation-driven economy can be identified with flexibility, turbulence, diversity, novelty, and innovation (David B. Audretsch & Thurik, 2004).

3. Exogenous Entrepreneurial Opportunities

"Entrepreneurs like (Richard) Branson are born…From family, they inherit may traits key to entrepreneurship: creativity, drive, a willingness to take risks." (Hopkins, 2004). This quote reflects exactly the core of entrepreneurship literature.

In entrepreneurship literature, the context in the term of knowledge surrounding entrepreneurs is assumed fixed while the cognitive process of entrepreneurial opportunities and propensity to act on those opportunities through a start-up totally depend on individual-specific traits, characteristics, and ability (Audretsch & Keilbach, 2007). Particularly, those individual-specific characteristics including, attitude to risk, desire for autonomy and self-sufficiency; availability and accessibility to a wide range

[2] Mass production means production of highly standardized products in large volume.

of resources[3] (Eckhardt & Shane, 2003; Shane & Venkataraman, 2000) totally account for the variations in entrepreneurship.

The literature seems to have no policy implications for economic growth because it could not show sources of entrepreneurial opportunities (Audretsch et al., 2006; Holcombe, 1998) and posits that entrepreneurs are not made but born. Section 5 employs the knowledge spillover theory of entrepreneurship (KSTE) to deal with this drawback of entrepreneurship literature.

4. Modern Growth Theories

4.1. Post-war era and physical capital

The post-war era featured: (1) Solow or investment-driven economies, which are appropriately explained by Solow-Swan model and have consisted of physical capital-based economic activities efficiently conducted by economic agents including laborers and capitalists in large-scale operations to achieve economic growth (David B. Audretsch, Keilbach, & Lehmann, 2006); (2) the focus on efficiency associated with large corporations; (3) minor significance of entrepreneurs because of the competitive assumption (Leibenstein, 1968); (4) the 3rd stage of entrepreneurship as a scientific research programme from scratch (Cuervo et al., 2007).

4.2. Globalization era and knowledge capital

The new era was marked by the significant advances in technology, especially the rise of ICT[4] (Davis et al., 2002; Heizer & Render, 2011). The ICT has carried wide-ranging implications for the corporate organization, globalization, even the demise of the communist system, and entrepreneurship (Thurik et al., 2013). As a result, this era featured: (1) the emergence of innovation-driven economies, consisting of economic activities primarily based on knowledge and depending on the role of entrepreneurship in innovation process (Audretsch & Thurik, 2001; Audretsch et al., 2006); (2) the shift in comparative advantage to knowledge-based economic activities; (3) the structural transformation in some nations e.g., US or UK; (4) the emergence of entrepreneurship; (5) knowledge as the primary input to economic activities.

4.3. FDI and trade

The Heckscher-Ohlin model postulated that increased openness benefits countries through static effect, e.g., resource allocation. However, there exit many implicit benefits (Cameron, 1998). Firstly, trade partners can gain the flow of ideas, which is often called diffusion of knowledge as well as affect domestic rate of innovation (Cameron, 1998). The diffusion of knowledge takes place as the domestic producers are in contact with the most efficient foreign producers as well as other local producers from which they can learn and improve their technologies (Buera & Oberfield, 2016). Secondly, the foreign direct investment (FDI) often is understood as bringing economic growth and know-how to developing countries (Lagace, 2002). Particularly, the foreign firms, which usually come from developed nations, establish their businesses, including build manufacturing plant, recruit and train local workforce, import machine tools and material, deploy procedures for various functions in the host country. Through that

[3] Financial capital, human capital, social capital and experiential capital; information and social capital; required skills and experience for starting up

[4] The ICT was derived from three inventions ranging from information to communication technologies. Those inventions are the transistor by Bell Labs, 1947; integrated circuit by Texas Instrument, 1958 and microprocessor by Intel, 1971 (Thurik, Stam, & Audretsch, 2013)

establishment of new FDI firms, knowledge can be learned by local workforce directly and quickly. Therefore, FDI is an efficient channel through which knowledge can spill over (Cameron, 1998)

5. Endogenous Entrepreneurial Opportunities

According to the knowledge spillover theory of entrepreneurship (Audretsch & Keilbach, 2007; Audretsch et al., 2006), the source of entrepreneurial opportunities is endogenous, as opposed to exogenous as assumed in the literature of entrepreneurship. Particularly, entrepreneurship is related either to knowledge or economic growth.

6. Empirical Model and Results

The study estimates two equations – one for economic output and the other for entrepreneurship. Firstly, the production function consists of both private factors, knowledge capital, and human capital. Additionally, the theory of technological change features the value of λ less than one. λ reflects the tacit knowledge spillover among researchers. Hence, the high value of λ means R&D activities are productive. More importantly, the value of λ is determined by entrepreneurship and by agglomeration.

$$\log(y) = a_0 + a_1 A + a_2 INFRAST + a_3 HC + a_4 k + a_5 L + a_6 A \times ENTRE + a_7 A \times AGGL + a_8 ENTRE + a_9 AGGL + a_{10} ENTRE \times D$$

Secondly, the entrepreneurial opportunity is not exogenous at all but is the function of the purposive investment in knowledge. Economies also gain new knowledge from engaging in international trade or receiving FDI from foreign countries. Therefore, entrepreneurship is determined by the availability of opportunities, the permeability of knowledge filter and some barriers – government size.

$$ENTRE = b_0 + b_1 A + b_2 FDI + b_3 GOV + b_4 W + b_5 Log(Y) + b_6 PATENT + b_7 AGGL + b_8 INFRAST + b_9 HC + b_{10} Log(Y) \times D$$

The study adds dummy variables into equations to find out whether the contribution of entrepreneurship to economic growth differs significantly between stages; and whether entrepreneurship varies between stages. (Entrepreneurial economies take value of 1, and managed economies take value of 0). It uses the panel data and the two-stage least squares to estimate the system of two equations. The panel data is made of 331 observations on 35 OECD nations from 2002 – 2014.

Table 1: Variable definition and data source

VARIABLE	DEFINITION	SOURCE
A; Technological knowledge stock	R&D expenditures (%GDP)	WDI
PATENT: Knowledge filter	Total patent application (resident as well as non-resident)	WDI
ENTRE: Entrepreneurship	New registrations per 1000 people ages 15 - 64	WDI
FDI: Openness of the economy	FDI net inflow (%GDP)	WDI
GOV: Barrier to entrepreneur	General government final consumption expenditure (%GDP)	WDI
INFRAST: Infrastructure	Internet user per 100 people	WDI
HC: Human capital	Education expenditure (%GDP)	WDI
K: Physical capital	Gross fixed capital formation (%GDP)	WDI

Y: Output per capita	GDP per capita, PPP, (2011USD)	WDI
W: Wage	Average annual wage	OECD
L: Labor in industry (Excl Agri)	Employment in industry (% total employment)	WDI
AGGL: Agglomeration	Large city population (%Urban population)	WDI
HC: Human capital	Education expenditure (%GDP)	WDI

Table 2: Regression results for Log(y)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	4.3 (0.00)	4.39 (0.00)	4.39 (0.00)	4.39 (0.00)	4.16 (0.00)*
A	0.08 (0.00)	0.13 (0.00)	0.13 (0.00)	0.13 (0.00)	0.18 (0.00)*
INFRAST	0.001 (0.00)	0.000 (0.38)	0.000 (0.38)	0.000 (0.38)	0.00 (0.44)
HC	0.01 (0.01)	0.02 (0.00)	0.02 (0.00)	0.02 (0.00)	0.014 (0.02)**
K	0.00 (0.72)	0.001 (0.43)	0.001 (0.43)	0.001 (0.43)	0.00 (0.73)
L	-0.006 (0.00)	-0.007 (0.00)	-0.007 (0.00)	-0.007 (0.00)	-0.00 (0.02)**
AxENTRE	-0.002 (0.64)	-0.02 (0.06)	-0.02 (0.06)	-0.02 (0.06)	-0.03 (0.00)*
AxAGGL	-0.001 (0.00)	-0.00 (0.24)	-0.000 (0.24)	-0.000 (0.24)	-0.00 (0.00)*
ENTRE	0.0003 (0.73)	0.036 (0.07)***	0.036 (0.07)	0.036 (0.07)	0.05 (0.00)*
AGGL		-0.003 (0.054)	-0.003 (0.054)	-0.003 (0.054)	
ENTRExD					0.03 (0.00)*
Adj-Rsrq	0.54	0.44	0.44	0.44	0.53

Note: p-value in brackets
* Statistically significant at the two-tailed test for 99% level of confidence
** Statistically significant at the two-tailed test for 95% level of confidence
*** Statistically significant at the two-tailed test for 90% level of confidence

Table 3: Regression results for entrepreneurship

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-92.9 (0.00)	118.7 (0.00)	91.6 (0.03)	-133 (0.00)	-61.8 (0.1)
A	-1.125 (0.00)	-1.29 (0.00)	-1.39 (0.00)	-1.5 (0.00)	-1.32 (0.00)*

FDI	-0.00 (0.97)	-0.019 (0.37)	-0.01 (0.47)	0.0009 (0.68)	0.004 (0.83)
GOV	-0.021 (0.78)	0.045 (0.53)	0.007 (0.92)	-0.136 (0.1)	-0.164 (0.02)**
W	-0.00 (0.09)	0.00 (0.00)	0.000 (0.02)	-0.00 (0.00)	-0.00 (0.64)
Logy	22.7 (0.00)	-30.3 (0.00)	-23.7 (0.02)	32.11(0.00)	14.22 (0.10)***
PATENT	-0.00 (0.24)	-0.00 (0.00)	-0.00 (0.06)	0.00 (0.3)	-0.00 (0.08)***
AGGL	0.1 (0.00)	0.14 (0.00)	0.133 (0.00)	0.08 (0.00)	
INFRAST		0.14 (0.00)	0.13 (0.00)		0.076 (0.00)*
HC			0.37 (0.16)	1.3 (0.00)	1.33 (0.00)*
LOGYxD					-0.95 (0.00)*
Adj-Rsrq	0.06	0.19	0.25	0.04	0.28

Note: p-value in brackets
* Statistically significant at the two-tailed test for 99% level of confidence
** Statistically significant at the two-tailed test for 95% level of confidence
*** Statistically significant at the two-tailed test for 90% level of confidence

The results in tables 2 are consistent with the model and support the two first hypotheses. Firstly, entrepreneurship has statistically significant and positive contribution to long-run growth from model 2 to model 5. These results support the first hypothesis that entrepreneurship as a mechanism for knowledge spillover is integral to long-run economic growth.

Secondly, agglomeration plays the key role in enhancing entrepreneurship's contribution to growth (See. Model 1 versus model 2). An area with high density has an advantage in recognizing and acting on entrepreneurial opportunities. Furthermore, large population creates a broad variety of demand as well great quantity demanded. These are fertile sources for entrepreneurial opportunities.

Thirdly, the fact that the coefficient of the interaction term between entrepreneurship and dummy is statistically significant in Model 5 supports the second hypothesis of the study. Entrepreneurship's importance to economic growth varies among stages of development. Particularly, entrepreneurship contributes to economic growth more in innovation-driven economies than in the investment-driven because knowledge is the primary factor to innovation-driven economies.

There are three valuable findings about the determinants of entrepreneurship in table 3. Firstly, human capital plays an integral role in facilitating entrepreneurship (see model 4 and 5). Each person has his own knowledge specific to time and place. With this specific knowledge, some people can notice profits opportunities that other people cannot notice. For example, a song should be written by composers but not engineers (Holcombe, 1998).

Secondly, infrastructure has a significantly positive effect on entrepreneurship in model 2 and 3. This fact supports the function (14). Good infrastructure is a facilitator. On the contrary, poor infrastructure is a barrier to entrepreneurship.

Finally, the fact that coefficients of both Log(y) and Log(y)xD are statistically significant implies that entrepreneurship considerably varies between various stages. Particularly, the same change in output level makes a change in entrepreneurship greater in investment-driven economies than in innovation-driven economies. This result also supports the third hypothesis.