

Innovation, progress, entrepreneurship and cultural aspects

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Published online: 1 September 2012
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Abstract In the case of economic progress, some of the literature has considered economic growth and economic progress to be the same thing. However, there is a relevant difference between the two concepts. As Holcombe states, economic growth considers the quantity of products and economic progress the quality of products. Innovation has been considered as a key factor to promote economic progress. A culture would have a direct and an indirect effect on innovation through entrepreneurship. The goal of this paper is to analyze the relationship between culture and innovation. To carry out this study, an empirical estimation has been developed for the case of 11 countries.

Keywords Progress · Economic growth · Culture · Entrepreneurship

Introduction

Keynes (1921–1923, p. 440) stated that “A belief in the material progress of mankind is not old. During the greater part of history such belief was neither compatible with experience nor encouraged by religion.” However, ancient thinkers considered the effects of progress on society. They stated that progress is the slow improvement of knowledge in general terms (techniques, science). The positive aspect of progress is

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that it increases the happiness of a society. Due to progress, individuals have more commodities and greater comfort. At the societal level, progress lowers the unemployment rate, reduces social conflicts, and improves welfare, among other things. However, progress also has some negative aspects that must be considered, such as technological dependence and environmental problems.

On one hand, an important correlation between economic growth and progress has traditionally been considered: higher economic growth implies an improvement in economic progress. In this sense, for example, Clark (1899, p. 55) states that, “Progress is mainly the result of the social relation. One function of economic activity is that of growth.” Social progress develops men’s wants and powers.

On the other hand, Holcombe states that these terms are different or mean different things. Following Holcombe (2007), economic growth is related to quantity of product and economic progress to quality of product. And in this case, innovation plays a relevant role in the process and the entrepreneur is the person who introduces innovations in the production process. For this reason, the main factor of economic progress from Holcombe’s point of view is entrepreneurship. However, there are also other factors to be considered in the analysis, such as culture, as well as the moral and ethical aspects noted in the economic growth literature.

From the economic thought perspective, several authors have tried to analyze those factors that influence economic progress. In this vein, we can consider three main schools of thought. First, Adam Smith and his followers stressed the role of international trade and the division of labor. Second, Keynes considered the role of public government activity in avoiding some economic problems. Schumpeter stressed entrepreneurial activity and the influence of some cultural aspects.

The main goal of this paper is to analyze the relationship between innovation, progress and entrepreneurship activity, taking into account cultural aspects. In section two, the role of innovation in the economic growth process is considered, looking also at the cultural aspects. In section three, an empirical analysis is developed, and section four presents the main conclusions.

The role of innovation in progress and economic growth

In the analysis of the relationship between economic growth and progress, at least three perspectives must be considered:

1. Adam Smith, the division of labor.

Adam Smith (1776) considered division of labor as the main factor promoting economic growth. Division of labor originated in the concept of barter, as some individuals considered barter the best way to transform costs of transacting into benefits (Smith 1776, p. 25).

In this process, innovation plays a relevant role as it increases quantity of product, and encourages the invention of new machines. Smith said, “A great part of the machines made use of in those manufactures in which labour is most subdivided, were originally the inventions of common workmen, who, being each of them employed in some very simple operation, naturally turned their thoughts towards finding out easier and readier methods of performing it” (Smith 1776, p. 9).

If we accept Holcombe's statement, then, "The innovation that leads to economic progress is thus the result of the division of labour" (Holcombe 2007, p. 16). One of the results of innovation is to change the nature of the output, which affects the progress of the society.

2. Keynes and the increase of demand aggregate.

Traditionally, Keynes is considered to be the champion of public activity. In general terms, he considers that the maladjustments of an economy are due to an insufficiently effective demand (Keynes 1936). Thus, his advice is to increase private investment, or, if this is not possible, to stimulate public expenditure or private consumption. With this policy design, we will promote economic growth and, ultimately, economic progress.

However, we will see below that Keynes considered two factors that promote economic progress: capital accumulation and technology. Thus, private investment could enhance progress directly and consumption indirectly, if there is a capital accumulation due to a higher demand. He stated that the "slow rate of progress, or lack of progress, was due to two reasons—to the remarkable absence of important technical improvements and to the failure of capital to accumulate" (Keynes 1930, p. 323). He added that, "The modern age opened, I think, with the accumulation of capital which began in the sixteenth century." And the result is that "In spite of an enormous growth in the population of the world, which it has been necessary to equip with houses and machines, the average standard of life in Europe and the United States has been raised, I think, about fourfold" (Keynes 1930, p. 324).

Technology has played a relevant role in the process. It not only increases production but also reduces human effort in the production process. However, Keynes also showed some problems that could arise when new technology is introduced in the economy. The primary problem is "technological unemployment, that is, unemployment due to our discovery of means of economizing the use of labour outrunning the pace at which we can find new uses for labour" (Keynes 1930, p. 325). However, he pointed out that it is possible to solve the technological unemployment issue and have important positive effects on human welfare. As it is only a temporary phase of maladjustment, mankind will, in the long run, resolve its economic problem, with a resultant improvement in the progress of society. Thus, the standard of life of the progressive countries one hundred years hence will be between four and eight times as high as it was at the beginning of the 1930s (Keynes 1930, pp. 325–326).

3. Schumpeter and the innovator entrepreneur

Schumpeter is, perhaps, the economist that has most stressed the relevance of technology in the economic process. In his book, *The Theory of Economic Development* (1934, Chapter II), he develops an economic growth model that includes not only traditional quantitative variables, but also qualitative ones. His production function includes labor, capital stock, resources and technology. For our purposes, it is interesting to take into account that Schumpeter considers two kind of investment: autonomous and induced. The former depends on the innovation process (that is, technological progress and/or discovery of new resources); the latter depend on profits, interest rate and stock of capital. Technological progress and discovery of resources depend on entrepreneurial

behavior. Nowadays, this term includes the entrepreneur himself. While it is quite difficult to determine the factors that influence an entrepreneur, the role of the entrepreneur is vital. It is possible that a society has a wealth of scientists and innovators creating new machines and technologies, but without a person to introduce these innovations, they would be useless. This person is the entrepreneur/entrepreneurship (Kesting and Ulhøi 2010; Huanng and Yu 2011).

Schumpeter (1934) considers that entrepreneur activity depends on profits and “social climate,” that is, the sociological-economics-institutional aspects of the society. It includes the social environment in which the entrepreneur develops his or her activity. Therefore, it includes social values, class structure and the education system. For this reason, it is critical that the entrepreneur knows and accepts the “game rules,” that is, the existing conditions in the environment in which he or she develops his or her activity. In general terms, it could be stated that Schumpeter considered that income distribution existing in the society reflects that “social climate.” If there is inequality, there would be social stress, labor unions would try to convince the government to introduce distribution taxation, and it would negatively affect entrepreneur intentions. The concept of “social climate” could also include cultural aspects.

Recent technological analysis models usually do not include so many factors. Holcombe (2007), for example, distinguishes between progress and economic growth, based on the quality or quantity, respectively, of product. However, this distinction is not common. It is supposed that economic growth and progress are similar. The rest of the connections are very similar among the models. Someone, entrepreneur and or entrepreneurship, introduces innovation into the firm’s activity, and this enhances growth-progress.

Finally, cultural and intellectual capital aspects also must be included in this analysis (Huang and Wu 2010; Sharabati et al. 2010; Curado et al. 2011; Huang and Kung 2011; Naranjo-Valencia et al. 2011). One way to do that is to incorporate culture in the Schumpeterian social climate, by including in the variable the values and behaviors shared by the individuals in a country (Herbig and Dunphy 1998). Therefore, through culture, models of conduct and behavior are established that facilitate the relationships among individuals.

Thanks to this culture, which could also be considered as the way to carry out the activity in a society, there would be less or more propensity by individuals to innovate (Huang et al. 2010; Akehurst et al. 2011; Rowley et al. 2011). Institutions that promote a “business culture” among economic agents encourage entrepreneurs to enhance their activity, to be more efficient and to create new possibilities for their products. Innovations are a key factor to obtain all these results.

Therefore, in general terms, culture would have a positive indirect effect on economic growth and progress through innovations and entrepreneurship. Culture and training would stimulate entrepreneurs’ activity, inducing them to introduce innovations to promote their activity. This, indirectly, would enhance economic growth.

Empirical analysis

In order to analyze the empirical relationship between innovation, culture and entrepreneurship, a model with three equations has been developed. To estimate the following equations, a panel data methodology has been used for a balanced sample of the countries of Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom and United States, for the period 2002–2007. This provides the empirical bases for testing these hypotheses. This empirical analysis uses data of World Bank database and World Values Survey database. A panel model with fixed effects has been selected. The general specification of panel data with fixed effects is:

$$Y_{it} = \alpha_{it} + \sum_{k=1}^K \beta_{kit} X_{kit} + U_{it} \quad (1)$$

where i denotes the countries, t the time periods; α_{it} is a parameter that shows the specific effects of each cross-section, in this case, of each country (this parameter is constant on time); and U_{it} collects the effects of omitted variables that are particular to the cross-section and period considered.

The equations have been estimated with Generalized Least Square (GLS)-Cross-section weights. This method permits a feasible GLS specification assuming the presence of cross-section heteroskedasticity (Wooldridge 2008), and it characteristically increases the value of DW in comparison with results with Panel Least Squares.

The equations considered are:

$$\ln(y)_{it} = \beta_0 + \beta_1 \ln(In)_{it} + \beta_2 \ln(PE)_{it} + \beta_3 \ln(I)_{it} + \varepsilon_{it} \quad (2)$$

$$\ln(In)_{it} = \beta_4 + \beta_5 \ln(KHU)_{it} + \beta_6 \ln(\phi)_{it} + \beta_7 \ln(I)_{it} + \varepsilon_{it} \quad (3)$$

$$\ln(\phi)_{it} = \beta_8 + \beta_9 \ln(\varpi)_{it} + \beta_{10} \ln(KHU)_{it} + \beta_{11} \ln(GOV)_{it} + \beta_{12} \ln(PE)_{it} + \varepsilon_{it} \quad (4)$$

Equation (2) is GDP (y) equation, considering GDP as a proxy of progress, with In innovation, PE public expenditure and I private investment. As a proxy of innovation, patents data are considered. The expected signs are positive.

The estimation of Eq. (2) is shown in Table 1 and the signs obtained are the expected ones. Therefore, innovations have a positive effect on economic growth, so it is convenient to consider those factors that influence this variable.

Equation (3) is the innovation equation (Cavalcante et al. 2011; Cantarello et al. 2011; Hotho and Champion 2011; Schiavone 2011). The variables included are human capital (KHU), entrepreneurship (ϕ) and private investment (I). “ ϕ ” is entrepreneurship, which is measured by the proxy Total Entrepreneurship Activity (TEA), created by Global Entrepreneurship Monitor (GEM). The expected signs of these variables are positive in all the cases. Human capital would include to some extent the

Table 1 GDP equation

Dependent Variable: LOG(Y)				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.688549	0.267310	17.53975	0.0000
LOG(ln)	0.125559	0.027736	4.526970	0.0001
LOG(PE(-2))	0.028959	0.011976	2.418067	0.0219
LOG(I)	0.617706	0.034381	17.96628	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
DEN	-0.433699			
FIN	-0.459613			
FRA	0.161001			
GER	0.207495			
ITA	0.246985			
JAP	-0.000131			
NET	-0.238562			
SPA	-0.017358			
SWE	-0.297177			
UK	0.236198			
USA	0.594860			
Weighted Statistics				
R-squared	0.999981	Mean dependent var	20.11233	
Adjusted R-squared	0.999973	S.D. dependent var	11.48749	
S.E. of regression	0.014607	Sum squared resid	0.006401	
F-statistic	121958.4	Durbin-Watson stat	1.847451	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.999911	Mean dependent var	13.86761	
Sum squared resid	0.006435	Durbin-Watson stat	1.578463	

Source: World Bank

cultural aspect. An adequate cultural environment provided through higher education would promote innovation activities.

The results are shown in Table 2. The signs are the expected and human capital as well as entrepreneurship has a positive effect on innovations. The former plays a significant role, so it is possible to conclude that the culture obtained by economic agents during their period of education and formation would promote the innovation process.

Equation (4) is the entrepreneurship equation. Four factors have been considered, associanism (ϖ), human capital (KHU), governance (GOV) and public expenditure (PE). The expected signs are positive in all the cases.

Associanism is a proxy of culture. In general terms, many persons need to meet other persons in the workplace and in other places such as clubs. Associations are

Table 2 Innovation equation results

Dependent Variable: LOG(In)				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.764569	0.682563	-2.585211	0.0134
LOG(KHU)	0.053555	0.024555	2.180981	0.0350
LOG(ϕ (-1))	0.006690	0.014937	0.447886	0.6566
LOG(I)	0.944981	0.062304	15.16731	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
DEN	0.017062			
FIN	0.613568			
FRA	-0.291320			
GER	0.716312			
ITA	-1.556707			
JAP	1.338689			
NET	0.323080			
SPA	-1.903766			
SWE	0.738898			
UK	-0.048987			
USA	0.053171			
Weighted Statistics				
R-squared	0.999743	Mean dependent var	20.98394	
Adjusted R-squared	0.999661	S.D. dependent var	16.83923	
S.E. of regression	0.071277	Sum squared resid	0.208297	
F-statistic	12256.87	Durbin-Watson stat	1.571184	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.997803	Mean dependent var	10.32111	
Sum squared resid	0.272575	Durbin-Watson stat	0.980654	

Sources: World Bank and GEM

created because many people need to spend some time speaking, playing or solving problems in an altruistic way, with others. Associations serve to increase trust and cooperation among individuals, building a more prosperous society, and facilitating education transmission and the acceptance and assimilation of new technologies. In many instances, families and associations transfer financial resources to their members or associates, providing funds to finance knowledge acquisition or investments (Putnam 1993; Fukuyama 1995; Woolcock and Narayan 2000; Woolcock 2001). Therefore, these associations have a positive effect on economic activity and are also a channel of culture transmission. The data are obtained from the World Value Survey, namely “Active/Inactive membership of art, music, educational” variable.

Human capital also plays an important role because it facilitates the entrepreneur in obtaining the necessary formation and training to develop his activity and capabilities (Alpkan et al. 2010; Chilton and Bloodgood 2010; Ho et al. 2011).

Good governance can be considered as the existence of an appropriate set of institutions in a country. North (1990) states that these institutions play an important role in economic performance. Institutions introduce rules that determine the conduct of economic agents, i.e. entrepreneurship, in different areas of economic activity. Therefore, governance is expected to have some influence on those factors that promote economic growth, such as investment, entrepreneurship activity, and to create an adequate “social climate” with the protection of property rights and rule of law.

Table 3 Entrepreneurship equation

Dependent Variable: LOG(ϕ)				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.982550	1.979482	0.496367	0.6234
LOG($\omega(-1)$)	0.407514	0.105839	3.850328	0.0006
LOG(KHU(-2))	0.086827	0.028312	3.066781	0.0047
LOG(GOV)	0.145574	0.358175	0.406432	0.6874
LOG(PE(-1))	0.013338	0.115200	0.115780	0.9086
Effects Specification				
Cross-section fixed (dummy variables)				
DEN	0.188679			
FIN	0.113896			
FRA	-0.116974			
GER	0.152991			
ITA	0.224462			
JAP	-1.183967			
NET	-0.280420			
SPA	0.404282			
SWE	-0.263013			
UK	0.119239			
USA	0.640825			
Weighted Statistics				
R-squared	0.956686	Mean dependent var	2.599075	
Adjusted R-squared	0.935776	S.D. dependent var	1.995782	
S.E. of regression	0.154127	Sum squared resid	0.688900	
F-statistic	45.75257	Durbin-Watson stat	2.760079	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.915378	Mean dependent var	1.582375	
Sum squared resid	0.776301	Durbin-Watson stat	2.519209	

Sources: World Bank, GEM and World Value Survey

The World Bank's governance index is used to carry out our estimation. The index is calculated using the principal components method considering the following four key dimensions of institutional quality supplied by the World Bank (Kaufman et al. 2005):

1. Voice and accountability, that measures political, civil and human rights.
2. Government effectiveness, measuring the competence of bureaucracy.
3. Rule of law, measuring the quality of contract enforcement, the police and the courts.
4. Control of corruption, measuring the exercise of public power for private gain.

Finally, public expenditure has also been included in the equation. Government supplies some infrastructure that is necessary to develop the entrepreneurship activity in a more efficient and cost-effective way.

Table 3 shows the results obtained by the estimation. The signs obtained are the expected ones. Associations, as well as human capital and governance, have a positive effect on entrepreneurship activity. So, they have also an indirect positive effect on innovations and on economic growth.

Conclusions

Mandeville (1714) in his *The Fable of the Bees*, stated that a virtuous society would reduce its prosperity and progress. Every business has two faces: one of them is the virtuous one, the other is the dissolute. The latter promotes growth and prosperity because it creates new activities: war, legal business, and prison construction. These non-virtuous activities create benefits and employment for the rest of the society. Mandeville shows that when Jupiter changed the mind about the bees and all of them were virtuous, the prosperity of the society ceased. Keynes (1936) proposed a similar behavior, but one more acceptable from the ethical point of view: it is necessary to increase consumption, public or private, to promote entrepreneur activity.

In this view, innovations play an essential role, as does the entrepreneur as the economic agent that creates them or introduces them in the production process in an efficient way. In this process, it is also necessary to consider culture, because it creates a model of behavior that either promotes or discourages the innovation process.

The empirical analysis developed shows that culture, proxied by associations and human capital mainly, has a positive effect on entrepreneurship and innovations and indirectly on economic growth. However, it would also be necessary to consider the effects of the "culture of consumption" that has been developed in the developed societies to maintain the production activity. To carry out this analysis it is necessary to obtain data that are not yet available.

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