“Learning-by-Living”: The Hidden Contribution of Universities to Economic Development

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Abstract
The importance of the contribution of universities to economic development has been widely acknowledged, citing the role of education and research. We propose that the contribution of universities goes much beyond the one provided by these activities. The hidden dimension of the university’s role in promoting growth is associated with the institutional characteristics of the university. This paper presents anecdotal evidence that we argue, shows that “learning-by-living” in universities has contributed to economic development. We describe traditional perspectives on the impact of universities on growth, and discuss recent advances that shed light on the importance of learning-by-living. Finally, we derive policy, university management, and theoretical implications. An important result is that the institutional integrity of the university must be preserved.

1. Introduction
Universities have as their primary role to provide higher education, and to develop research activities [1, 2]. The recent university investments in establishing closer links with the surrounding community, namely by seeking to exploit its scientific and technological potential [3], has led to the recognition that beyond the university’s traditional roles in education and research, a wide range of other activities, usually grouped together under the heading of “provision of services” or “links to society”, are now part of the university’s mission [4].

Nonetheless, the contribution of universities to economic development has been studied within the context of what we will call the “standard model”, depicted in Figure 1. In the standard model, ideas and human capital flow linearly to society which, in return, finances universities, and provides feedback information.

Figure 1- The “Standard Model”: University’s Contribution to Economic Development

Linear models are both powerful and dangerous. They are powerful because they are simple and parsimonious. Mathematical modeling is easily developed as an input-process-output set of equations, which in economics result in production functions. Their danger, ironically, stems from the power they provide: this kind of modeling necessarily leaves out much of the complexity of the social and economic processes involved in the reality under analysis.

The evolution of theories of innovation is illustrative of both the power and limitations of linear models. Schumpeter’s understanding of innovation is implicitly linear. The entrepreneur, or a large corporation, in a later refinement, capture ideas that they introduce in the market as innovations. This perspective still informs much of the modeling done in economics1. The linear models of innovation were also powerful in influencing policy making, since they legitimate...

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1 However, Schumpeterian competition is much more complex than the competition normally modeled in neoclassical economics. Several efforts have been made to model Schumpeterian competition, but these do not change the fundamentally linear process implicit in Schumpeter’s reasoning.
huge public and private investments in R&D as a way to achieve innovations. Rosenberg and Kline later made more justice to the complexity of the innovation process, proposing the so-called interactive models of innovation. R&D is just part of a complex process, and innovations do not necessarily come linearly as a result of research efforts. This revision called for integrative policies joining R&D, industrial, financial and other aspects to achieve innovation.

The standard model of the contribution of universities to economic development is rarely explicitly acknowledged, but is implicit in most studies. In section 2 we illustrate this point by showing how the model is implicit in mainstream economic analysis. In section 3 we present evidence on the complexity of the university’s contribution to development, showing that we need to go much beyond the linearity of the standard model to acknowledge this complexity. In the concluding section 4 we discuss the policy, management, and theoretical implications of the hidden dimension of the university’s role in economic development, and summarize the main results of the paper. Our calling is for a renewal in research on the economic impact of universities, a renewal that must go behind the structure imposed by the standard model.

2. Perspectives on the Contribution of Universities to Economic Development

This section briefly summarizes dominant traditional perspectives on the role of universities in promoting economic growth, and presents some recent advances that are promising new avenues for research. We begin by describing the views on the impact of education in section 2.1, and on the impact of research in section 2.2. In both these sections we focus on macro type of studies, and argue, towards the end of each section, that the same framework is used in micro studies. Our main point is that the analysis of the economic impact of universities implicitly follows the standard model. We finalize, in section 2.3, with a brief description of recent developments on the economic characterization of knowledge. These new developments shed new light on the role of the university’s formal functions, education and research, and open perspectives for newer roles.

2.1. The Impact of Education

A university degree is valuable both for individuals, and at the macro level. Figure 2 shows the unemployment rates for the general population and for the share of population with a university degree. The later are typically half of the former.

![Figure 2- Selected Rates of Unemployment. Source: OECD.](image-url)
Using employment to illustrate the economic significance of universities, however, does not follow the traditional way in which the contribution of education to economic growth is investigated. Most studies follow the growth decomposing strategy first developed by Solow [5, 6], who devised an aggregate production function, representing the way an economy produces output by processing physical capital, labor, and "other factors". The contribution of these other factors was named the residual, and was identified by Solow with technological change. One way to investigate the meaning of the residual was suggested by the human capital theorists [7, 8].

Using a recently developed version of the Solow production function [9], output can be expressed as

\[ Y(t) = A(t) \left[ (K(t))^\alpha \cdot (L(t))^\beta \cdot (H(t))^\gamma \right] \]

where \( Y \) is output, \( K \) capital, \( L \) labor, and \( H \) human capital. The exponents indicate the shares of income. Most accounts attribute \( \alpha = 0.4 \) to capital, and consequently, \( \alpha + \beta = 0.6 \) to wages. The challenge is to determine the part attributable to human capital in the share of wages, or in other words, to determine the impact of human capital on economic growth.

An example on how the impact of human capital on growth can be computed is developed below, taken from Lant Pritchett [10]. The assumption is that there is a 10% wage increase in wages for every additional year of education. This estimate is based on studies on the impact of education on individuals' income [11].

Table 1 illustrates the way the computation of the shares of return from human capital is performed. With the relative wage premia by educational attainment, and having the partition of the work force by years of schooling [12], the shares of human capital can be calculated.

<table>
<thead>
<tr>
<th>Wage</th>
<th>Share of Work Force by Educational Attainment 1985</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dev. C.</td>
<td>Africa</td>
<td>LAC</td>
<td>S. Asia</td>
<td>OECD</td>
</tr>
<tr>
<td>No Schooling</td>
<td>1</td>
<td>49.7%</td>
<td>48.1%</td>
<td>22.4%</td>
<td>69.0%</td>
</tr>
<tr>
<td>Some Primary</td>
<td>1.4</td>
<td>21.3%</td>
<td>33.2%</td>
<td>43.4%</td>
<td>8.9%</td>
</tr>
<tr>
<td>Primary Complete</td>
<td>1.97</td>
<td>10.1%</td>
<td>8.5%</td>
<td>13.2%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Some Secondary</td>
<td>2.77</td>
<td>8.7%</td>
<td>7.7%</td>
<td>8.4%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Secondary</td>
<td>3.9</td>
<td>5.9%</td>
<td>1.6%</td>
<td>5.5%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Some Tertiary</td>
<td>5.47</td>
<td>1.4%</td>
<td>0.2%</td>
<td>2.5%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>7.69</td>
<td>3.0%</td>
<td>0.8%</td>
<td>4.6%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Average years of schooling</td>
<td>3.56</td>
<td>2.67</td>
<td>4.47</td>
<td>2.81</td>
<td>8.88</td>
</tr>
</tbody>
</table>

Source: [10]. Developing Countries; Sub-Saharan Africa; LAC: Latin America and Caribbean.

The shares vary from .26 to .62. Since the contribution for growth of total wages is 6, then the contribution of human capital is between .16 in Sub-Saharan Africa, and .37 in the OECD.

From Table 1 we can see that university education provides almost a eight-fold increase premium in wages. As a policy implication, a way to maximize the impact of human capital would be to increase the proportion of the workforce with a tertiary education. Although this policy prescription is welcome, it is unlikely, per se, to solve the developmental problems of, say, sub-Saharan Africa. This is an example of the limitations of the analysis just presented.

More than the substantive conclusions, we are interested here in discussing the conceptual understanding underlying these studies. First, we should note how the departure point is a production function, implying a underlying model of the type input \rightarrow process \rightarrow output. Inputs are human and physical capital, and labor. The process is represented by the production function, which transforms the inputs into the output of the economy.

Even accepting a production function framework, note that human capital production is exogenous to the process of growth. The institutions that provide human capital, namely universities, are absent. Representing the economic impact of universities is only a measure of the graduates.
and registered students. This takes us back to the standard model, which is, implicitly, the model that guides these studies.

The use of a production function, however, extends also to micro approaches. Examples of this approach include [13-16] and, more recently, [17]. These references provide a rich sampling over time, journals, and even academic fields, on micro studies on the economics of education and, particularly, the way schools, in general, and universities, in particular, function. In all of these references, a depiction of the standard model as the conceptual framework underlying the analysis would have been most appropriate. In its absence, it is clearly implicit in the discussion.

2.2 The Impact of Research

When trying to determine the impact of R&D, most mainstream studies use a modified form of the Solow production function, as in education. Again using a recent example, [18] took a production function of the form:

\[
Y(t) = A(t) \cdot \left[R(t)\right]^{\lambda} \cdot \left[L(t)\right]^{uL} \cdot \left[K(t)\right]^{uK}
\]

Here the meaning of the variables is as in (1), and \( R \) represents the stock of R&D. The way the impact of R&D is measured from (2) is slightly less direct and intuitive than in (1), except for the trained economist. The key is also in the exponents, more specifically in \( \lambda \), which is the output elasticity of R&D. Therefore, \( \lambda \) gives the percentage change in output that results from a percentage change in R&D. Table 2 summarizes the estimates that resulted from studies [20-25]. Typically, a 1% increase in R&D leads to an increase in output ranging from 0.5% and 0.1% in output.

<table>
<thead>
<tr>
<th>Study</th>
<th>Elastcity (( \lambda ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>*Griliches (1980) 0-7%</td>
</tr>
<tr>
<td></td>
<td>+Patel and Soete (1988) 6%</td>
</tr>
<tr>
<td></td>
<td>*Naďa and Prucha (1990) 24%</td>
</tr>
<tr>
<td>Japan</td>
<td>*Mansfield (1988) 42%</td>
</tr>
<tr>
<td></td>
<td>+Patel and Soete (1988) 37%</td>
</tr>
<tr>
<td>France</td>
<td>+Patel and Soete (1988) 13%</td>
</tr>
<tr>
<td>W. Germany</td>
<td>+Patel and Soete (1988) 21%</td>
</tr>
<tr>
<td>U. Kingdom</td>
<td>+Patel and Soete (1988) 7%</td>
</tr>
<tr>
<td></td>
<td>*Cameron (1995) 0-27%</td>
</tr>
<tr>
<td>G7</td>
<td>Coe and Helpman (1993) 23%</td>
</tr>
</tbody>
</table>

Source: [19]. * industry, + national level.

An alternative way to look at the impact of R&D is by determining rates of return to R&D, after computing costs and benefits. Rates of return are useful because they differentiate between public and private returns. Table 3, adapted from [26], summarizes the results of studies [27-34], dealing with private R&D investments.

<table>
<thead>
<tr>
<th>Study</th>
<th>Rates of Return %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private</td>
</tr>
<tr>
<td>Naďa (1993)</td>
<td>20-30</td>
</tr>
<tr>
<td>Mansfield (1977)</td>
<td>25</td>
</tr>
<tr>
<td>Terlecký (1974)</td>
<td>29</td>
</tr>
<tr>
<td>Sveikauskas (1981)</td>
<td>7-25</td>
</tr>
<tr>
<td>Goto and Suzuki (1989)</td>
<td>26</td>
</tr>
<tr>
<td>Bernstein and Naďa (1988)</td>
<td>10-27</td>
</tr>
<tr>
<td>Scherer (1982, 1984)</td>
<td>29-43</td>
</tr>
<tr>
<td>Bernstein and Naďa (1991)</td>
<td>15-28</td>
</tr>
</tbody>
</table>

Source: [26].

As in subsection 2.1, we are more interested in the process by which these studies are performed than in their content. However, Table 3 presents evidence of substantive importance: although private rates of return are in the vicinity of 20-25%, social returns tend to be closer to 50% or more, even when we are dealing with private R&D investment. This results from the large spillovers involved with private R&D efforts.

At the university level, assigning a social rate of return is difficult, and almost meaningless. It is known that there is a reinforcing relation between university R&D, on the one hand, and private R&D and innovation, on the other [35], but computations of the social rate of return seem hopelessly to underestimate the social impact of university R&D3. Perhaps more revealing is the finding that without university R&D 11% of new products and 9% of new processes would have not been possible in the United States, according to a survey of 76 manufacturing firms [37].

The conclusion of this subsection could be almost exactly replicated from 2.1: R&D is always modeled as an exogenous input into a production function. Implicit, once again, is the standard model described in the introduction. In the next subsection we present recent theoretical advances that have broadened the perspectives by which the contribution of universities to growth is perceived.

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2 The authors also include a term M(t), which stands for intermediate inputs. This is not significant for the discussion.

3 Mansfield [36] estimated it as 28%
2.3. Endogenous Growth and the Economics of Knowledge

In this section we discuss recent theoretical developments that have improved some of the shortcomings described above. The production functions (1) and (2) showed that the sources of growth were exogenous, as if they would fall from heaven. One must not, however, neglect the accomplishment of the framework previously described, namely the differentiation between conventional inputs (capital and labor), on the one hand, and technology and human capital, on the other [38, 39].

Our inheritance from the neoclassical models can be summarized in three key points:

- knowledge (of which technology and human capital are part) is either:
  - a public good, in the case of technology or R&D results, largely exaggerating the social returns resulting from spillovers;
  - a private good, in the case of human capital, largely neglecting the huge externalities associated with education;
- knowledge is exogenous, determined outside the economic context;
- growth is a process that exhibits diminishing returns to the private inputs.

The first point, although seemingly a technical one, is of huge importance, and we will see why below. However, the really disturbing shortcoming that had been bothering economists for a long time is related with the second point. As Romer said, knowledge is clearly associated with things that people do [40], and having the main drivers of growth coming from outside was clearly a nuisance.

The first effort to endogenize the role of knowledge is due to Arrow [41], who formalized the positive effect of experience on a firm’s production: workers learn-by-doing, increasing their productivity. Arrow chose to formalize this contention by assuming that knowledge creation (the result of learning) is a side product of physical investment, or capital accumulation. Mathematically, this can be expressed by stating that each firm exhibits a neoclassical labor augmenting production function of the form

\[ Y_i = F(K_i, A_i, L_i) \]

where \( A_i \) can be understood as the index of knowledge available to the firm. The growth rate of \( A_i \) is assumed to be constant in the steady state.

Two more assumptions are added:

i) Learning-by-doing increases with the firm’s investment. Therefore, increases in the firm’s capital stock have a parallel increase in the firms level of knowledge \( A_i \), that is:

\[ \dot{K}_i / K_i = \dot{A}_i / A_i. \]

ii) Knowledge at each firm is a public good. Knowledge spills over from one firm to the economy instantly, and any other firm can access this new knowledge at zero cost. It is important to note that this assumption means that all new knowledge is an unintended result of investment; it does not result from purposive actions of the firm. This assumption leads to:

\[ \dot{A}_i = \text{const.} \dot{K} \]

that is, the increase in knowledge in one specific firm is reflected in the increase of capital of the whole economy (\( K \) represents the capital stock of the entire economy).

Combining assumptions i) and ii) we can replace \( A_i \) by \( K \) and express the production function as

\[ Y_i = F(K_i, K, L_i) \]

or with more generality as

\[ Y_i = A(K)F(K_i, L_i) \]

This development leads to the so-called AK model of economic growth, in which growth is endogenous and, in this case, results exclusively from learning-by-doing [42].

Following Romer [40], the basic framework included in (7) provided the inspiration for the resurgence of endogenous growth theories in the mid 80s. Lucas [43] gave more emphasis to formal learning, and assumed that the spillover effect came from investments in human capital, rather than physical capital. Following a similar line of reasoning, he suggested

\[ Y_i = A(H)F(K_i, H_i) \]

where \( H \) stands for human capital (at the firm level with the subscript, and the total stock, without it).

Romer [44] proposed that spillovers from private research would increase the stock of public knowledge, which led him to write:

\[ Y_i = A(R)F(R, K_i, L_i) \]

where \( R \) stands for the stock of R&D results.
Table 4 summarizes the discussion of these three theories of growth. The important point is that all models exhibit potentially increasing returns, with the source of these returns being endogenous to the model. The engine of this endogenous growth is, in all cases, the creation of new knowledge through a specific learning process. These models clearly go beyond the linearity implied in the standard model, but they still do not resolve the first of the shortcomings of the neoclassical model pointed out above.

<table>
<thead>
<tr>
<th>Study</th>
<th>Source of Growth</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow (1962)</td>
<td>learning-by-doing</td>
<td>experience</td>
</tr>
<tr>
<td>Lucas (1988)</td>
<td>learning-by-learning</td>
<td>education</td>
</tr>
<tr>
<td>Romer (1986)</td>
<td>learning-by-researching</td>
<td>research</td>
</tr>
</tbody>
</table>

Romer [45] and others [46] proposed other perspectives in which the impact of research does not merely spills immediately to the entire society, allowing for temporary monopolistic rents. These models add the first point mentioned at the beginning of this subsection. Further discussions by Romer and others [47-49] have shown the importance of the non-rivalry of codified knowledge, and the relevance of the possibility of excludability in knowledge products.

Finally, an emerging literature deals with even broader aspects relating to the importance of knowledge creation and diffusion for economic development. Barro [50] studied the impact of public infrastructures; Putnam [51] launched the idea of social capital; knowledge networks are a fast growing focus of research [52].

If there is a message after the story told in this section, Pasinetti [53] articulated it most clearly. He defended that learning is the source of growth, observing that since man is able to learn, advancement occurs because the next society has always a better departure point than the previous. The learning ability of human beings is the ultimate key to economic growth, a perspective which is of the utmost relevance in the knowledge-based economy we live in [54].

3. The Hidden Contribution of the University: “Learning-by-Living”

As discussed in section 2, learning is the fundamental ability of human beings lying at the heart of economic prosperity. We also analyzed how economic theory has conceptualized the mechanisms by which learning occurs, and how the recent developments deviate from the rigidities of the standard model. Learning has been formalized as occurring through experience, through education, and through research. The new endogenous growth theories, and other related efforts, emphasize the importance of the learning process, in contrast with the more traditional perspectives that focused only on the outcomes of this process.

In this section, we present several instances in which the contribution of universities to economic development has gone much beyond the standard model, and has even surpassed what the three formalized ways of learning would lead us to expect. For lack of a better term, we group these instances as “learning-by-living,” reflecting the fact that the common feature to all of them is that they are developed by people living at universities. Universities provide an environment that allows people to learn just by the fact they are there, in an institutionally unique and special setting, a societal space for creativity, experimentation, risk-taking, intellectual venturing, and human interaction. We intend to stimulate an interest for future research, rather than presenting accomplished research results.

The organization of the section, in some sense, could almost define a taxonomy for the ways in which the hidden contribution of universities is reflected in society. We begin, in subsection 3.1, to discuss entrepreneurial universities, in which the institution itself took the initiative of explicitly promoting economic development. In subsection 3.2 we discuss instances in which faculty proved to be entrepreneurial. Finally, in subsection 3.3 we discuss similar entrepreneurial features by students.

3.1. Entrepreneurial Universities

The term entrepreneurial universities was coined down by Dylan Jones-Evans [55], to describe instances in which universities have proved to be key for regional economic development, going much beyond the provision of graduates and research. The case of Stanford is a classical example [56]. Inpired by the leadership of Dean Fred Terman in the 40s, Stanford developed a culture of actively engaging in the economic affairs of the community, namely by encouraging faculty to pursue private ventures outside the research lab.

A less known example is related with the role of the University of Texas at Austin in promoting
the emergence of the city of Austin, Texas, as a technopolis. UT-Austin was key in attracting MCC to Austin, by using its resources and prestige to engage in a massive fundraising campaign. The funds raised largely due to the involvement of UT, in conjunction with local government and business leaders, was used to endow new chairs at the college of engineering, and even to construct the building that, eventually, housed the MCC consortium [57]. More recently, UT-Austin reinforced its activism in promoting economic development by launching and running one of the most successful business incubators in the United States, the Austin Technology Incubator [58].

Jones-Evans [55] provides case studies of entrepreneurial universities in several European countries. The point is that, as with the American examples of Stanford and UT-Austin, sometimes universities as institutions go much beyond the classic role of providing graduates and R&D results, and actively engage in promoting economic development activities.

The ways by which universities can pursue this active role are extremely varied, as the few examples mentioned here suggest. Research is needed to systematize these forms of engagement, and to try to understand why and when they occur, and what are the conditions that make them have an impact.

3.2. Entrepreneurial Faculty

Somewhat related with the later subsection are the instances in which faculty members launch private ventures. However, this can occur even if the university does not provide a friendly environment to individual entrepreneurs. Gibson et al. [58] describe the case of Tracor, a Fortune 500 company founded by UT-Austin faculty members in the 50s. UT was not actively encouraging their faculty to be entrepreneurial, but the university context provided a context that launched the seeds of a successful business venture.

Many other examples of entrepreneurial faculty could be given in the US [59] and Europe [55, 60]. These examples show how the environment provided by the university was valuable, not only as a source of technical expertise, but also as a mean to access capital for investment, and even customers. Literally, faculty members acquired a wealth of codified and tacit knowledge through learning by living at a university.

Research is needed to try to understand which conditions lead faculty to be successful entrepreneurs, how the university may play a role, and what environmental conditions foster these activities. Universities must accept that some of their faculty will go way, taking their risks, impoverishing the intellectual capabilities of the university, but eventually creating local and global wealth, for the well-being of society at large. Wealth that may be valuable to the university prosperity in the long-run.

3.3. Entrepreneurial Students

The stories of Bill Gates, of Microsoft, Marc Andreessen, of Netscape, Michael Dell, of Dell Computer, and Joe Laemandt, of Trilogy, have something in common: they all begin with the protagonists starting their ventures while attending college. These colleges and universities were, respectively Harvard, University of Illinois at Urbana-Champaign, UT-Austin, and Stanford.

The stories of the people mentioned above have been popularized in the business press [61-63], and to these four examples many other could be added[61]. In all the stories the passage through the university has had some impact. Even if they fail as students, as Bill Gates and Michael Dell. And even if they feel the university has tried to impede their business development, as with Marc Andreessen, who complains bitterly of the difficulties he had to face at the University of Illinois [61].

In fact, the university environment provided these entrepreneurs not only with technical skills, often not that important, but also with access to advice, finance, and a market. This last aspect, the access to a market, needs to be particularly researched.

By living in a university environment, these students had a clear perception of what would be the preferences of the future. They learned what the demand imbedded in future high growth markets would be like. Note that all of the ventures mentioned were start-ups that grew very fast as a response to latent preferences. All it took was to identify these preferences. The challenge is to try to understand what universities need to do to foster the appearance of more entrepreneurs, discoverers of the demands of the future. And universities must find ways that allow these people to succeed, both academically, and as entrepreneurs.
4. Conclusions

The ideas put forward in section 3 are largely exploratory, indicating lines of research, more than revealing scientifically confirmed facts. Therefore, the implications at different levels we discuss here are conditional on the results of future research, and will necessarily be succinct. Although an important conclusion implicit in much of what we said in section 3, is that universities should foster an environment in which the results of learning-by-living can have economic impact, one must not forget that the mission of the university must be preserved.

This last observation provides an important counterpoint to possible calls for radical change at universities. In fact, if radical change would occur, the essence of the uniqueness of the environment provided by universities that makes learning-by-living valuable could be destroyed. Those living at an university, students, faculty, and staff, are immersed in an institutional setting that provides them with unique perspectives and opportunities. This paper presented anecdotal evidence that showed that “learning-by-living” in universities has contributed economic development. In this context, we can propose policy, university management, and theoretical implications of our contention.

Policy-wise, we argue that, as an hidden dimension, the contribution of the institutional dimension of universities to well being is not likely to be recognized by the market. The state should intervene, primarily by preserving the institutional integrity of the university, which can be achieved through simple public funding policies [64].

It is upon university management to give visibility to this hidden dimension, creating the mechanisms that nurture and encourage individuals likely to take full advantage of “learning-by-living” at an university. This effort, however, must not endanger the fundamental mission of the university, nor the rules of engagement of the academic community [65].

Finally, theoretically, we defend that there should be an approximation of the formal and appreciative (or institutional) theories on economic growth. This task, though difficult, for at the root of the differences are often epistemological considerations, may be key to illuminating the process by which economic growth occurs in the knowledge based economies.

Again, we must reinforce the important idea that the institutional integrity of the university has to be preserved. Threatening this institutional integrity would be like killing the golden goose. It would destroy the features that make learning-by-living at universities have an important, yet still hidden, impact on economic development.

REFERENCES


[63] Forbes, June 3, 1996, "They Keep Getting Younger".
