

# From the entrepreneurial university to the university for the entrepreneurial society

David B. Audretsch

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**Abstract** This article examines how and why the role of the university in society has evolved over time. The paper argues that the forces shaping economic growth and performance have also influenced the corresponding role for the university. As the economy has evolved from being driven by physical capital to knowledge, and then again to being driven by entrepreneurship, the role of the university has also evolved over time. While the entrepreneurial university was a response to generate technology transfer and knowledge-based startups, the role of the university in the entrepreneurial society has broadened to focus on enhancing entrepreneurship capital and facilitating behavior to prosper in an entrepreneurial society.

**Keywords** Entrepreneurial society · Entrepreneurial university · Knowledge filter · Technology transfer

**JEL Classification** N31 · O30

## 1 Introduction

In his highly influential book on higher education in the United States, *A Larger Sense of Purpose: Higher Education and Society*, the former Princeton University president Harold Shapiro (2005) laments that American universities do not actually seem to possess a larger sense of purpose. Shapiro's concern echoes a recent assessment condemning what is characterized as the selling out of American universities in the *New York Times*, which chides higher education in the United States because "colleges prostitute themselves to improve their U.S. News & World Report rankings and keep up a healthy supply of tuition-paying students, while wrapping their craven commercialism in high-minded sounding

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D. B. Audretsch (✉)  
Indiana University, Bloomington, IN 47405, USA  
e-mail: daudrets@indiana.edu

D. B. Audretsch  
WHU Otto Beisheim School of Business, 56179 Valendar, Germany

academic blather...I would keep coming up with what I thought were pretty outrageous burlesques of this stuff and then run them by one of my professor friends and he'd say, 'Oh yea, we're doing that.'"<sup>1</sup>

Similarly, Steve Lohr of the *New York Times* warns that "the entrepreneurial zeal of academics also raises concerns, like whether the direction of research is being overly influenced by the marketplace."<sup>2</sup> The eminent sociologist, Toby E. Stuart wonders whether "basic scientific questions are being neglected because there isn't a quick path to commercialization? No one really knows the answer to that question."<sup>3</sup>

Perhaps the confusion and concern about the university losing its way reveals confusion concerning its role and mission in society and in the economy. The purpose of this article is to suggest that the role of the university has evolved considerably over time. Since the second world war, the university has evolved from a mandate and role characterized as the Humboldt model, with a primary emphasis on freedom and independence of scholarly inquiry and "knowledge for its own sake" to being a source of knowledge that is requisite for economic growth and a strong economic performance. While this increased the importance and significance of the university in terms of its impact on the economy, it did not greatly alter the functions and activities of the university.

However, just generating knowledge did not ensure that knowledge would spill over for commercialization driving innovative activity and economic growth. The emergence of the entrepreneurial university gave universities a dual mandate—to produce new knowledge but also to alter its activities and values in such a way as to facilitate the transfer of technology and knowledge spillovers.

In the entrepreneurial society, institutions are created and modified to facilitate entrepreneurial activity which serves as the driving force underlying economic growth and prosperity. This paper concludes by suggesting that the role of the university in the entrepreneurial society is considerably broader and more extensive than the more narrow mandate for the entrepreneurial university. In particular, in the entrepreneurial society the university contributes by enhancing entrepreneurial university and enabling individuals to thrive in such an entrepreneurial society.

## 2 Role of the university in the Solow economy

Robert Solow (1956) was awarded a Nobel Prize for his pioneering research identifying the driving forces underlying economic growth. In what became known as the Solow model, two key factors of production –physical capital and (unskilled) labor—were identified as influencing economic growth and the standard of living. In fact, most of economic growth remained unaccounted for in the Solow model, which Solow attributed to the unobserved factor of technical change, which was considered to "fall like manna from heaven." As Nelson (1981, p. 1032) emphasized, a minor army of scholars empirically estimated the Solow model across a broad spectrum of national, spatial and temporal contexts that invariably linked these two factors, physical capital and labor to economic growth, "Since the mid-1950s, considerable research has proceeded closely guided by the neoclassical

<sup>1</sup> Stephen Budiansky, "Brand U.," *New York Times*, April 26, 2006, p. A23.

<sup>2</sup> Steve Lohr, "U.S. Research Funds Often Lead to Start-Ups, Study Says," *New York Times*, April 10, 2006.

<sup>3</sup> Quoted from Steve Lohr, "U.S. Research Funds Often Lead to Start-Ups, Study Says," *New York Times*, April 10, 2006.

formulation. Some of this work has been theoretical. Various forms of the production function have been invented. Models have been developed which assume that technological advance must be embodied in new capital...Much of the work has been empirical and guided by the growth accounting framework implicit in the neoclassical model.”

The primacy afforded to physical capital combined with unskilled labor that Solow formalized into an economic model seemingly reflects the driving force of the U.S. economy during the post-world war II era. The most important industries were highly capital intensive and characterized by substantial scale economies, such as automobiles, steel and tires. As Charlie “Engine” Wilson, chairman of General Motors declared, “What’s good for General Motors is good for America.”<sup>4</sup>

In a capital-driven economy, there did not seem to be significant and substantial economic contributions that the university could contribute to the factors of physical capital and unskilled labor. Most of the research and educational activities could hardly be interpreted as enhancing the stock of physical capital or increasing the availability of unskilled labor for industry.

Rather, the contribution of universities in the United States during the post-war era was in the social and political realms. The university was an institution preparing young people to think freely and independently, and where the fundamental values of western civilization and culture were passed down from generation to generation.

American universities had evolved from being extensions of religious institutions to effective independent institutions of higher learning by the twentieth century. The earliest colleges founded in the United States, such as Harvard College, were burdened with explicit ties to the church. In fact, the church played a fundamental role in creating and sustaining institutions of higher education during the early years of the country. The sponsorship and support of universities by the church was more the norm than the exception, and had been established as the norm for higher education in Europe (Audretsch 2007).

The historical and institutional linkage between the church and the university was disrupted by Alexander Humboldt in Berlin during the 1800 s. In particular, Humboldt triggered a new tradition for universities centering on freedom of thought, learning, intellectual exchange, research and scholarship as the salient features of the university. As the Humboldt model for the university diffused through first Europe and subsequently to the other side of the Atlantic, universities became free from parochial constraints, leading instead to the nonsecular university committed to independence of thinking, learning and research (Audretsch 2007).

Thus, the Humboldt tradition for the university was reinforced during the Solow economy, with the emphasis on physical capital and unskilled labor as the twin factors shaping economic performance. Despite the preeminent contributions to social and political values, the economic contribution of universities was modest.

### 3 Role of the university in the Romer economy

The salient feature of the endogenous growth model introduced by Romer (1986), and subsequently refined by Lucas (1988), was the explicit inclusion of knowledge in the model, rather than leaving it as an undetermined residual, as had been the case in the Solow

<sup>4</sup> Halberstam (1993, p. 118) points out that what Wilson actually said was somewhat different, “We at General Motors have always felt that what was good for the country was good for General Motors as well.”

model. Romer, Lucas, and others argue that knowledge was a key factor of production, which, along with the traditional factors of physical capital and labor, had a substantial impact on economic growth. Knowledge was considered to be particularly potent as a driver of economic growth because of its inherent propensity to spill over from the firm or university creating that knowledge to other firms and individuals who could apply that knowledge and enhance their productivity.

In fact, some American colleges and universities were thrust in the role of directed research with specific and concrete commercial applications as the goal. In an effort to stem the tide and ultimately win the Second World War, the United States Government turned to a number of American colleges and universities to produce innovative technological based weapon systems. This partnership between the federal government and the universities was so fruitful that it contributed a significant role in the ultimate victory by the allies.

One of the engineers who had played a key role in the development of the nuclear bomb, Vannevar Bush, argued for an expanded role for universities once the peace had been won. In his 1945 book, *Science: The Endless Frontier*, Bush provided a mandate for sustained involvement and investment in science, technology and research by the United States federal government to ensure that the United States would not just win the war but also the peace.

In fact, the deviation from the traditional role afforded by the Humboldt model of the university that came about from the Second World War was supported by an even older tradition oriented the land grant colleges and universities towards commercialization established by passage and implementation of the Morrill Act. The Morrill Act, which was more commonly known as the Land Grant Act, was signed into law by Abraham Lincoln in 1862, and granted land to each state that was to be used in perpetuity to fund agriculture and mechanical colleges benefiting the state. As they evolved, the land-grant universities developed an effective set of institutional mechanisms that enabled the commercialization of science and technology from the land grant universities that contributed to agriculture in the United States becoming the most productive in the world (Audretsch 2007, 2009).

As the Romer economy replaced the Solow economy, or as the factor of knowledge became more important while the role of physical capital receded, the role of universities in the economy shifted from being tangential and marginal to playing a central role as a source of knowledge. Universities in the United States became not just viewed as institutions promoting social and cultural values but as key engines driving the growth of the economy. In the Solow economy, where economic growth was achieved by combining unskilled labor with physical capital, the economic contribution of universities was marginal. As the Romer economy replaced the Solow economy, a new role for the university emerged, as an important source of economic knowledge.

#### 4 The entrepreneurial university

The assumption implicit in the endogenous growth models that investments in new knowledge, either by firms or universities, would automatically spill over for commercialization resulting in innovative activity and ultimately economic growth has not proven to be universally valid. In fact, new knowledge investments must penetrate what has been termed “*the knowledge filter*” in order to contribute to innovation, competitiveness and ultimately economic growth (Audretsch et al. 2006; Acs et al. 2010). The knowledge filter is defined as the barrier or gap between the investment in new knowledge and its

commercialization. The knowledge filter poses a barrier that impedes or preempts the commercialization of investments in research and knowledge. Senator Birch Bayh was essentially concerned about the magnitude and impact of the knowledge filter when he warned his colleagues in Congress, “A wealth of scientific talent at American colleges and universities—talent responsible for the development of numerous innovative scientific breakthroughs each year—is going to waste as a result of bureaucratic red tape and illogical government regulation.”<sup>5</sup>

The knowledge filter can be viewed as posing a barrier or impediment between investments in new knowledge and their commercialization, which leads to innovative activity and growth of the economy. Senator Bayh actually challenged the mandate for funding university research if its commercialization is impeded by the knowledge filter, “What sense does it make to spend billions of dollars each year on government-supported research and then prevent new developments from benefiting the American people because of dumb bureaucratic red tape?”<sup>6</sup>

The existence of the knowledge filter suggests that investments alone in research at universities will not suffice in facilitating the spill overs that are requisite to generate innovative activity and economic growth. The universities needed to become more entrepreneurial in that they pro-actively engaged in entrepreneurial activity to facilitate knowledge spillovers for commercialization out of the universities.

Part of the response to creating the entrepreneurial university was the development of academic fields and areas of research that were not just focused on “knowledge for its own sake”, which is the gold standard of scholarly inquiry under the model of the Humboldt University, but rather oriented towards knowledge for the sake of solving specific and compelling problems and challenges confronting society. Thus, relevance and applicability emerged as the key guiding values in these new, external oriented fields and areas of research, such as biochemistry, informatics, and bioengineering. As Fig. 1 depicts, the core of the university remains the basic disciplines, fields and academic traditions comprising the Humboldt University. However, an additional strand of academic activity is added around that core with the primary focus on and mandate for providing solutions and applications to major problems confronting society or particular aspects of society.

However, just having applied research, education and fields with a focus on meeting particular needs, interests and demands in society did not prove to generate sufficient knowledge spillovers from the universities for commercialization, innovation and economic growth. Thus, a third ring around the core of basic research and education at universities was created which consists of mechanisms to facilitate the spillover of knowledge from the research core and applied programs generating that knowledge to society where that knowledge would be commercialized or at least applied.

In order to facilitate university entrepreneurship and technology transfer from the university, in an effort to penetrate such a formidable knowledge filter, the Congress enacted the Bayh-Dole Act in 1980.<sup>7</sup> The Bayh-Dole Act was passed into law by the Congress with the goal of promoting the commercialization of university science (Kenney and Patton 2009; Link and Siegel 2005; Link et al. 2007).

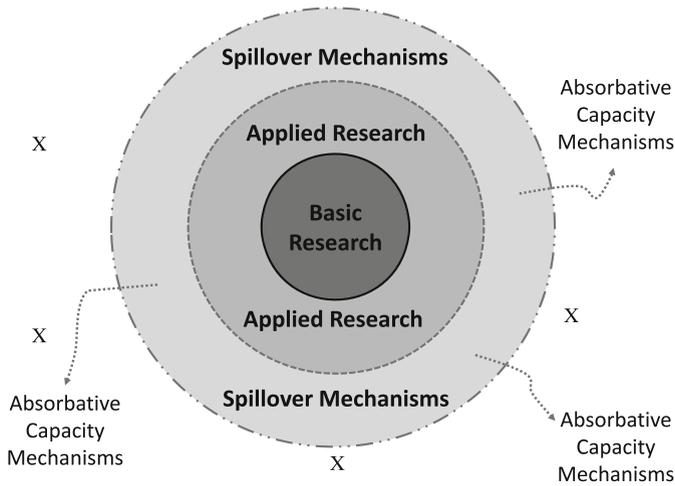
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<sup>5</sup> Introductory statement of Birch Bayh, September 13, 1978, cited from the Association of University Technology Managers Report (AUTM) (2004, p. 5).

<sup>6</sup> Statement by Birch Bayh, April 13, 1980, on the approval of S. 414 (Bayh-Dole) by the U.S. Senate on a 91-4.

<sup>7</sup> Public Law 98–620.

## Entrepreneurial University



**Fig. 1** The entrepreneurial university

Studies have generally had a positive assessment of the impact of the Bayh-Dole Act (Aldridge and Audretsch 2011). More impressionistic reactions about the efficacy of the Bayh-Dole Act have been highly enthusiastic, “Possibly the most inspired piece of legislation to be enacted in America over the past half-century was the Bayh-Dole Act of 1980. Together with amendments in 1984 and augmentation in 1986, this unlocked all the inventions and discoveries that had been made in laboratories through the United States with the help of taxpayers’ money. More than anything, this single policy measure helped to reverse America’s precipitous slide into industrial irrelevance. Before Bayh-Dole, the fruits of research supported by government agencies had gone strictly to the federal government. Nobody could exploit such research without tedious negotiations with a federal agency concerned. Worse, companies found it nearly impossible to acquire exclusive rights to a government owned patent. And without that, few firms were willing to invest millions more of their own money to turn a basic research idea into a marketable product.”<sup>8</sup>

A similar positive reaction was, “The Bayh-Dole Act turned out to be the Viagra for campus innovation. Universities that would previously have let their intellectual property lie fallow began filing for—and getting patents at unprecedented rates. Coupled with other legal, economic and political developments that also spurred patenting and licensing, the results seems nothing less than a major boom to national economic growth.”<sup>9</sup>

One of the key mechanisms or instruments created by universities to facilitate the spillover of knowledge by commercializing research undertaken at the universities is the university Technology Transfer Office (TTO). In fact, a number of universities had a TTO prior to enactment of the Bayh-Dole Act. A compelling set of studies has shown that the TTOs have in particular facilitated patenting activity and licensing intellectual property at universities in the United States (Lockett et al. 2003; 2005; O’Shea et al. 2008; Phan et al. 2005; Siegel et al. 2007). Other mechanisms created at universities to facilitate the

<sup>8</sup> “Innovation’s Golden Goose,” *The Economist*, 12 December, 2002.

<sup>9</sup> Cited in Mowery (2005, p. 64).

spillovers emanating from university research include science parks, incubators, and proof of concept centers.

To facilitate knowledge spillovers from university research even further, many communities, cities, regions and states have created a series of institutions with the mandate to absorb knowledge created at the university and enable commercialization by firms. Examples of such absorptive capacity institutions include the Georgia Research Alliance in Atlanta, the Indiana Venture City in Indianapolis and CONNECT in San Diego. Such institutions are not actually part of the university but serve as a conduit to facilitate the spillover of knowledge from the source where it was created, the university, and the organization which commercializes it to generate innovative activity (Audretsch 2007).

Taken together, the role of the entrepreneurial university is to create new businesses, ventures and commercialization where it previously did not exist, or at least to increase the amount of technology transfer from the university to private and not-profit firms and organizations.

## 5 Role of the university in the entrepreneurial society

Just as physical capital is the key factor driving economic performance in the Solow economy, and knowledge is the crucial factor shaping growth in the Romer economy, Audretsch et al. (2006) argue and provide compelling empirical evidence that the entrepreneurial economy is characterized by entrepreneurship as the driving force underlying economic growth and performance. An entrepreneurial society facilitates this entrepreneurial driven economic growth through an institutional context which is conducive to entrepreneurial activity.

The role of the university in the entrepreneurial society is broader than just to generate technology transfer in the form of patents, licences, and university-sanctioned startups. Rather, the mandate of the university in the entrepreneurial society is to contribute and provide leadership for creating entrepreneurial thinking, actions, institutions, and what Audretsch et al. (2006) refer to as entrepreneurship capital.

What distinguishes the entrepreneurial university from the role of the university in the entrepreneurial society is the scope of the mission. The entrepreneurial university leaves the core Humboldt disciplines and research areas untouched, as well as all other parts of the universities that are not engaged in generating knowledge that might have a commercial application. Thus, something of a dichotomy emerges for the entrepreneurial university with certain parts of the university contributing to the commercialization mission while other parts alienated or at least not participating in this mission.

By contrast, for the university contributing to the entrepreneurial society, many if not most aspects of the university contribute to the generation of entrepreneurship capital, if not explicitly then through an orientation enhancing and celebrating freedom of inquiry and creativity but also with an awareness these values have beyond the walls of the university.

## 6 Conclusions

The role of the university has continued to evolve along with the underlying economic forces shaping economic growth and performance. The centuries old tradition of the Humboldt University, with its guarantee of freedom and independence for scholarly

inquiry resulting in the celebration of knowledge for its own sake remained prevalent as long as economic performance was largely shaped by factors that had little to do with the activities of universities—physical capital and unskilled labor.

However, as knowledge became the driving force underlying economic growth and performance, a new and significant economic role for the university emerged. However, just undertaking scholarly research in basic disciplines did not suffice in generating sufficient knowledge to contribute to economic growth and performance. The emergence of the entrepreneurial university was the need to create new interdisciplinary fields and research areas devoted to providing solutions to specific societal problems and challenges, along with a series of mechanisms and institutions dedicated to facilitating the spillover of knowledge from the university to firms and non-profit organizations.

While the entrepreneurial university has a mandate to facilitate the commercialization of university research and generate startups and new ventures, the role of the university in the entrepreneurial society is considerably broader and more fundamental—to provide thinking, leadership and activity to enhance entrepreneurship capital. The goal of the university in the Entrepreneurial Society is not just to promote technology transfer and increase the number of startups but to ensure that people thrive in the emerging entrepreneurial society.

As the university has evolved from the purity of the Humboldt model, to the demands placed on it as first a source for knowledge fueling economic growth and subsequently as a hothouse for technology transfer and startups, and finally as a leader for thriving in the entrepreneurial society, the complexity and ambiguity in the mission of the university has also increased. Perhaps it is the ability of the university to both adhere to its traditional strengths as well as adapt to the needs and concerns of society that has made it one of the most resilient institutions in society.

## References

- Acs, Z., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2010). The missing link: The knowledge filter and entrepreneurship in endogenous growth. *Small Business Economic*, 34(2), 105–125.
- Aldridge, T. T., & Audretsch, D. B. (2011). The Bayh-Dole act and scientist entrepreneurship. *Research Policy*, 40(8), 1058–1067.
- Association of University Technology Managers (2004). *Recollections: Celebrating the history of AUTUM and the Legacy of Bayh-Dole*.
- Audretsch, D. B. (2007). *The entrepreneurial society*. New York: Oxford University Press.
- Audretsch, D. B. (2009). The entrepreneurial society. *Journal of Technology Transfer*, 3(June), 245–254.
- Audretsch, D. B., Keilbach, Max., & Lehmann, Erik. (2006). *Entrepreneurship and economic growth*. Oxford: Oxford University Press.
- Bush, V. (1945). *Science: The endless frontier*. Washington, D.C: Government Printing Office.
- Kenney, M., & Patton, D. (2009). Reconsidering the Bayh-Dole act and the current university invention ownership model. *Research Policy*, 38(9), 1407–1422.
- Link, A. N., & Siegel, D. S. (2005). University-based technology initiatives: Quantitative and qualitative evidence. *Research Policy*, 34(3), 253–257.
- Link, A. N., Siegel, D. S., & Bozeman, B. (2007). An empirical analysis of the propensity of academics to engage in informal university technology transfer. *Industrial and Corporate Change*, 16(4), 641–655.
- Lockett, D. S., Wright, M., & Ensley, M. (2005). The creation of spin-off firms at public research institutions: Managerial and policy implications. *Research Policy*, 34(7), 981–993.
- Lockett, A., Wright, M., & Franklin, S. (2003). Technology transfer and universities' spin-out strategies. *Small Business Economics*, 20(2), 185–201.
- Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22, 3–39.
- Mowery, D. C. (2005). The Bayh-Dole act and high-technology entrepreneurship in U.S. Universities: Chicken, egg, or something else? In G. Liebcap (Ed.), *University entrepreneurship and technology transfers* (pp. 38–68). Amsterdam: Elsevier.

- Nelson, R. R. (1981). Research on productivity growth and productivity differences: Dead ends and new departures. *Journal of Economic Literature*, 19(3), 1029–1064.
- O'Shea, R. P., Chugh, H., & Allen, T. J. (2008). Determinants and consequences of university spinoff activity: A conceptual framework. *Journal of Technology Transfer*, 33, 653–666.
- Phan, P., Siegel, D., & Wright, M. (2005). Science parks and incubators: Observations, synthesis and future research. *Journal of Business Venturing*, 20(2), 165–182.
- Romer, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Shapiro, H. (2005). *A larger sense of purpose: Higher education and society*. Princeton: Princeton University Press.
- Siegel, D. S., Veugelers, R., & Wright, M. (2007). Technology transfer offices and commercialization of university intellectual property: Performance and policy implications. *Oxford Review of Economic Policy*, 23(4), 640–660.
- Solow, R. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70, 65–94.