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William J. Baumol: Innovative Contributor to Entrepreneurship Economics

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Abstract: William J. Baumol was one of the most prolific economists of his generation, analyzing a broad range of central economic issues addressing real problems of the world. In this essay, we present and critically evaluate Baumol's research contributions in entrepreneurship economics and point to areas for future research. Baumol contributed an impressive number of important insights, increasing our understanding of entrepreneurship from both a macro and a micro perspective. He also devoted a large part of his writings to discussing public policy, linking his theoretical insights with policy issues in practice. His analyses are rooted in contemporary mainstream neoclassical economics, and one of his main objectives was to integrate the entrepreneur into this tradition. Today, Baumol is best known for his tripartite distinction between productive, unproductive, and destructive entrepreneurship and his associated idea that the institutional framework, "the rules of the game," will determine how entrepreneurs allocate their time and effort across different—productive or unproductive—activities. An institutional environment that encourages productive entrepreneurship and spontaneous experimentation while disincentivizing unproductive activities becomes, through this insightful lens, the driving force of economic growth. As an economist, Baumol was knowledgeable and well acquainted with earlier scholars and their writings about entrepreneurship. Baumol's writings were greatly inspired by Joseph Schumpeter's views on entrepreneurship, and he made several attempts to formalize Schumpeter's concept of the innovative entrepreneur. Baumol was in all senses an innovative contributor to entrepreneurship economics. His work has inspired the research community of entrepreneurship scholars, but like all great scientists, he also encountered criticism.

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Entrepreneurship is perhaps a bit like the weather—commentators frequently complain about it (or, rather, about its absence) but no one seems to know anything that can be done about it.
William Baumol (1987)

Introduction

During his long and prolific career, which lasted almost 70 years, William Baumol wrote more than 80 books and published over 500 articles in professional journals, covering an impressive range of topics, including the area of entrepreneurship (Duke University Libraries, n.d.). Even though he is arguably most recognized for an idea aptly named “Baumol’s cost disease,” he published several pathbreaking articles and books related to entrepreneurship.¹ These contributions inspired a whole research community and spurred the development of a vibrant research agenda covering theory, history, and policy from both a micro and a macro perspective. In this essay, we will present and evaluate Baumol’s contributions to entrepreneurship economics. Thereby we also implicitly mark out his place in the history of thought in this field.

Baumol was far from being a “normal scientist” in the sense of Kuhn (1962). He was a Renaissance man, perhaps even one of the last of his kind in the economics profession. He covered central issues in microeconomics, macroeconomics, public economics, economic history, methodology and history of economic thought. As his interest was not focused on one specific area, his never-ending urge to try to understand how the world really worked resulted in what is one of the broadest high-quality portfolio of scientific works of any economist in the postwar period (Duke University Libraries, n.d.). Thus, it is not surprising that his interests came to include the role of entrepreneurship in the economy. Although his roots were in mainstream economics, he consistently ventured beyond that paradigm, arguing that entrepreneurship must not be left out of mainstream economics. As such, he was the most prominent voice in his time to urge the economics community to start paying attention to the role of entrepreneurship. The general ambition of Baumol’s research agenda was to extend traditional economic models to include phenomena that those models did not properly address or entirely overlooked.

Entrepreneurship had been discussed and analyzed in economics for more than 300 years when Baumol began to write about it. However, he managed to make fundamental contributions to the advancement of entrepreneurship research in many different directions. His impact on the entrepreneurship and business literature is huge. In 2011, he was ranked the 7th most influential entrepreneurship scholar in history, surpassed only by a few “superstars” in the field, such as Joseph Schumpeter and Israel Kirzner (Landström, Harirchi & Åström, 2012, Table 2). When he died in 2017, at age 95, his legacy was remarkable, both in economics in general and in entrepreneurship economics. His work and pioneering research influenced a generation of economists and business managers as well as the thinking of policymakers and politicians, thus altering the way they view public policy and the role of the public sector. As we will show, this does not mean that his work was never criticized.

The missing entrepreneur

After his dissertation in the United Kingdom, Baumol soon became a full professor at Princeton and later also at New York University. In the United States, Baumol became involved in consulting activities. Often,

¹ Monetary economists might argue that he is best known for the Allais-Baumol-Tobin model of the transactions demand for money.

he worked as an expert witness in regulation and antitrust cases, including railroad and telecommunications issues. These engagements gave him substantial real-world experience and insights that resulted in two new books (Baumol, 1959, 1961) in which he analyzed business practices and management objectives. Even though those books did not deal directly with entrepreneurship, they paved the way for his later thinking. Among other things, he discussed whether sales maximization is a better approximation for firm behavior than profit maximization (Chirat, 2022). During the 1980s, Baumol developed the concept of contestable markets, which he considered “the most fruitful piece of research in which I have ever participated” (Baumol, 1989, p. 329). The idea is that competitive pressure in a market may come from potential firms that would enter the market if the incumbents were not sufficiently efficient or had appropriated excess profits. In theory, “perfect” contestability implies that the threat of entry is sufficient to prevent dominant firms from abusing their market power (e.g., Baumol, 1982, 1988).

Even if Baumol wrote about firm behavior and tried to expand contemporary models based on insights from his firsthand discussions with corporate managers about firm behavior already in the 1950s, it was not until 1968 that he firmly stated his now well-documented views about the missing entrepreneur in mainstream economic theory (Baumol, 1968). In this *AER* article, he pointed to the absence of the entrepreneur in the microeconomic model of the firm. Without the entrepreneur, arguably the most essential actor in the economy was expunged from the standard model of the firm. As a result, a proper understanding of how the firm worked was not possible.

The reason for the exclusion, or even neglect, of the entrepreneur is easy to understand. In mainstream neoclassical theory, the firm reacts mechanically to a well-defined and limited number of known variables; by means of mathematical optimization, an equilibrium is then derived. However, the options available to an entrepreneur are often largely unknown and only revealed over time, and the outcomes of many potential choices remain unexplored and highly uncertain. Moreover, entrepreneurship and innovation are inherently heterogeneous, which makes these phenomena largely impervious to formalized theorizing. This fact also makes it hard to quantitatively measure these concepts, which renders econometric analyses difficult. Mathematics is a powerful and proven helpful tool in economics, but in a derived optimal static equilibrium, there is simply no place for the entrepreneur—the room for entrepreneurial initiatives is effectively eliminated. This point was made repeatedly by Baumol in subsequent books and articles.

Baumol convincingly argued that entrepreneurship should belong to the core of microeconomics rather than being relegated to the footnotes on its periphery. He (1968, p. 66) summed up this view in his now classical catchphrase: “The theoretical firm is entrepreneurless—the Prince of Denmark has been expunged from the discussion of *Hamlet*.”² However, Baumol also refrained from criticizing traditional theories and models. For instance, he claimed that his idea “constitutes no criticism,” as “[the mainstream] model does what it was designed to do and does it well” (Baumol, 1968, p. 67). In a later interview, he expanded on the idea by claiming that “the reason [for the exclusion of entrepreneurship] is not ill-will or misunderstanding, but because entrepreneurship or innovative entrepreneurship does not lend itself to conventional methods of research and analysis” (Griffith, Kickul, Bacq & Terjesen, 2012, p. 618). He was convinced that the formal neoclassical approach was the best way to analyze and understand the world, including entrepreneurship. However, the focus on “getting the price right” should be replaced by (or

² The felicitous parable about *Hamlet* was first used by Schumpeter (1943, p. 86) when discussing competition.

complemented with) a focus on innovations and “getting the incentives right.” In many industries around the world, innovation has replaced price as the central competitive weapon.

The missing entrepreneur was not only absent in microeconomics; the exclusion also trickled down to the domain of macroeconomics. This was particularly apparent in macroeconomic growth theory. In the 1950s, Robert Solow and Trevor Swan pioneered what is now called exogenous growth theory—a theory that highlights the accumulation of factors of production (capital and labor)—and even today, this theory is the starting point in textbook treatments of economic growth.

According to this theory, savings were automatically transformed into the most profitable investments, resulting in growth and prosperity without any need for human agency. It implicitly assumed that a never-ending queue of well-informed potential entrepreneurs was always waiting outside the market for savings to increase and be directed towards them and their successful entrepreneurial projects with a zero rate of failure. Growth theory was thereby reduced to a mathematical exercise to derive optimal savings rates; entrepreneurs were made redundant. Thrift and saving should be facilitated or even subsidized, while the realization of profitable and successful investments was merely assumed. However, it soon became clear that capital accumulation and labor force growth could explain only a minor part—one-fifth or less—of the aggregate growth that arises in a country. The remainder—the so-called Solow residual—was attributed to “technical change.”

One view derived from this type of model was the idea of convergence, i.e., that poor countries will catch up and grow faster than rich countries and that all countries eventually will end up in (or approach) a common steady state. However, developing countries will not catch up based on mathematical assumptions derived from a highly abstract model. A cursory glance at a table comparing national real per capita income is sufficient to infer a lack of general convergence—some important aspects must be missing in the model.³

Baumol was astonished by the unprecedented economic growth and increase in living standards that had characterized the Western world for the previous 150 years. Trying to understand this without including the entrepreneur seemed inconceivable. However, he did not directly criticize the growth theorists for omitting the entrepreneur; instead, he believed that macroeconomists had made many valuable contributions to theory and that their ignorance should be seen as an effect of the “nature of macroeconomics,” which used an aggregate approach to abstract from the actions of individual agents to produce the aggregate outcomes. What seemed to be missing were the microeconomic fundamentals of macroeconomic theories; i.e., the macrotheories were not derived and aggregated from individuals and firms (see, e.g., Baumol, 2011a for this view).⁴

³ Baumol (1986) actually supported the idea of convergence in an empirical article in which he hardly mentioned the entrepreneur. His conclusion was criticized by DeLong (1988) and in Baumol & Wolff (1988), Baumol agreed that there was probably no overall convergence but a “convergence club” of countries. The important question was how to join the club (and why countries may leave the club).

⁴ In a review of Baumol’s 2002 book, in which Baumol continued to downplay the critique of contemporary macroeconomists, Holcombe (2004) claimed that “[p]erhaps Baumol is too much of a gentleman,” suggesting that Baumol instead should speak out against mainstream economists and plainly state that they are “looking in the wrong places for answers.”

Highlighting the importance of the entrepreneur was not a novel or groundbreaking idea. The entrepreneur was a central figure in the classical works of Richard Cantillon and Jean-Baptiste Say.⁵ Even leading 20th-century economists such as Joseph Schumpeter (died in 1950) and Frank Knight (died in 1972) had emphasized and discussed the role of the entrepreneur. Baumol's writings are in the vein of Schumpeter; he consistently attempted to integrate the Schumpeterian innovator-entrepreneur into the mainstream approach. Many of Baumol's basic ideas emanated from Schumpeter, and he frequently cited Schumpeter in his papers and books on entrepreneurship. Schumpeter was the first scholar to define the entrepreneur as an innovator, and Baumol took this idea as a starting point for many of his writings.⁶

Even though Baumol's insight may not have been novel, the clarity and cogency with which he made his argument and the impact he had on the research community cannot be overvalued. His view was soon echoed by innumerable other scholars.

Economics consists of much more than the mainstream orthodoxy. When the entrepreneur left the stage through the back door in mainstream economics, (s)he remained a major character in Austrian economics. Pointing to the mainstream neglect of entrepreneurship and trying to bring the entrepreneur back into the center of analysis by combining the mainstream and Austrian traditions, Israel M. Kirzner played a role similar to the one played by Baumol among mainstream economists.⁷ Kirzner's most influential work was his book *Competition and Entrepreneurship* (Kirzner, 1973).⁸ In subsequent works, Baumol often referred to both Kirzner and Schumpeter.⁹

An important question in entrepreneurship research is how the entrepreneur should be defined. The definition will frame how entrepreneurs are perceived by economists, politicians and the public and, as a

⁵ The Irish-French 18th-century economist Richard Cantillon, often mentioned as the first person to emphasize the entrepreneur as a key actor, depicted the entrepreneur as an undertaker in the economic process who decides about production, distribution, and trade under risk. For Say, the entrepreneur was a crucial agent who coordinates activities within a firm, deciding how (and what) resources should be organized. See Hébert & Link (2006) for an overview.

⁶ Baumol (1968) mentioned and credited Schumpeter and (to some degree) Knight. Baumol's predilection for Schumpeter became apparent when he claimed that the Schumpeterian model of entrepreneurship is "the deservedly best known foray into the theory of entrepreneurship" (Baumol, 1993b, p. 202). Baumol repeatedly asserted that the Schumpeterian process of creative destruction and the resulting output surge in the market economy had been described by Marx long before Schumpeter (Baumol, 2016). In fact, Schumpeter himself had credited Marx for his insights in the introduction to the Japanese edition of *The Theory of Economic Development* (Baumol, 2011c). See Baumol (2015) for a further discussion.

⁷ Whereas Schumpeter focused on the disequilibrating effects of entrepreneurship, Kirzner emphasized its equilibrating effects resulting from the discovery of previously unnoticed opportunities. See Baumol (2003) for his views on the Austrian tradition and entrepreneurship.

⁸ Kirzner received his PhD at New York University in 1957 and later became full professor there as well, thus being a colleague of Baumol from 1971 onwards. However, there is no evidence of any form of collaboration between them. In his writings Baumol mentions countless people with whom he interacted and cooperated throughout his academic career, but Kirzner is not among them. Mario Rizzo, economist of the Austrian school and associate professor at New York University confirms in personal correspondence that Baumol had discussions with Kirzner about entrepreneurship, but "he rarely gave Kirzner the kind of credit in his own published writings that one would have expected on the basis of their conversations." Rizzo further asserts that "Baumol was always in search of approval and affirmation from the mainstream. Kirzner was not in the mainstream and not well-known among the main players. Therefore, Baumol saw no need to credit a relative unknown as having ideas similar to his own."

⁹ See, e.g., Baumol, Litan & Schramm (2012), where entrepreneurs both find and create the opportunities. Some writings, such as Baumol & Strom (2007), refer only to Kirzner and the alertness of entrepreneurs when discussing entrepreneurship.

corollary, how their contribution to society is valued. In Baumol (1968, p. 65), the entrepreneur is defined as the person who is supposed “to locate new ideas and to put them into effect”; in short, “he is the Schumpeterian innovator.” Does that mean that entrepreneurship, by definition, is something beneficial and productive that should be promoted by public policy? Not necessarily—a groundbreaking analysis by Baumol would, once again, profoundly affect the research field.

Productive, unproductive, and destructive entrepreneurship

In a seminal article about two decades after his influential 1968 piece, Baumol took his previous observations one step further, resulting in one of his most cited works.¹⁰ The article was first published in 1990 in the *Journal of Political Economy*, one of the top five economics journals, and was later (in 1996) republished in the leading entrepreneurship journal, *Journal of Business Venturing*.

Baumol (1990) started out by building on Schumpeter, who referred to an entrepreneur as an innovator carrying out “new combinations” and listed five broad classes of innovative activities.¹¹ Baumol argued that although Schumpeter’s list is not wrong, it is incomplete and should be expanded to include innovative activities that may be detrimental to the economy. Baumol (1990) claimed that if entrepreneurs are viewed simply as “persons who are ingenious and creative in finding ways that add to their own wealth, power and prestige,” (p. 897) it is easy to see that entrepreneurship is not necessarily beneficial for society at large.¹² Baumol pointed to rent seeking and organized crime as examples of unproductive entrepreneurial activities. Rent seeking in the form of frivolous lawsuits, lobbying or outright criminal or fraudulent behavior can to some extent be regarded as an entrepreneurial activity. Previously, such activities had been either overlooked or categorized as nonentrepreneurial. More specifically, Baumol introduced the tripartite distinction between *productive*, *unproductive*, and *destructive* entrepreneurship, claiming that entrepreneurship should not be regarded as a panacea for economic development, as it is not necessarily socially beneficial but may instead be unproductive or even destructive.¹³

Baumol asserted that entrepreneurship is pervasive in all human societies, but whether a society prospers is determined not by the absolute amount of entrepreneurship but by how it is allocated among

¹⁰ It is occasionally said that it is his most cited work, but according to Google Scholar, this is not *quite* true. This work is his most cited *article*, with more than 7,000 citations, but two books covering environmental issues and contestable markets, both published in 1988 (Baumol & Wallace, 1988; Baumol, Panzar & Willig, 1988), have actually received slightly more citations.

¹¹ New goods, new methods of production, new markets, new sources of supply and new organizations (Schumpeter, 1934, p. 66).

¹² McCaffrey (2018) claimed that Baumol’s idea is not dependent upon a specific definition of entrepreneurship. Of course, the same insights could be drawn if Baumol had centered his theory around, e.g., Kirzner’s or Knight’s view of entrepreneurship. However, some definitions assume that entrepreneurship is beneficial (see, e.g., Kilby, 1971 or Stevenson & Jarillo, 1990), and if the outcome is bad for society, the activity behind it should not be labeled entrepreneurship. With this kind of definition as a basis for the analysis, the distinction between productive and unproductive entrepreneurship cannot be made, and the insights derived from this classification are missed.

¹³ The distinction between unproductive and destructive is not crystal clear, and Baumol did not present an unequivocal distinction between them (Desai & Acs, 2007). One “conventional” interpretation is to define unproductive entrepreneurship as an activity that is purely redistributive and destructive entrepreneurship as an activity that reduces social welfare or output (see Coyne & Leeson, 2004). As all activities are associated with an opportunity cost, the distinction breaks down (McCaffrey, 2018), and in the subsequent literature, unproductive and destructive activities are often merged into one category (typically denoted “nonproductive”). The main insight is not whether an activity is unproductive or destructive but that it need not necessarily be welfare enhancing.

competing uses. If an economy is to prosper, entrepreneurial effort must be channeled to socially productive activities. The problem in underdeveloped countries is therefore normally not a lack of entrepreneurship per se but how it is allocated across activities. For example, instead of starting a new firm to produce new socially valuable products or services, a talented person with entrepreneurial aspirations might use his/her talent to create a new type of criminal organization (e.g., an efficient distribution system based on a new form of highly addictive self-produced drugs). Or, an incumbent entrepreneur might respond to increased competition from foreign imitators either by intensifying innovation or by lobbying for protection (customs duties and quotas) or special treatment (subsidies, tax reductions, and tax-financed facilities). To support his view, Baumol presented several historical cases from, e.g., ancient Rome, medieval China, and the Middle Ages in Europe.¹⁴

Occasionally, it has been claimed that Baumol argued that the supply of entrepreneurship is (completely) fixed in the economy. A careful reading reveals that this is a misinterpretation of what he actually wrote. It is evident that Baumol thought that the supply might vary (e.g., Baumol, 1987, p. 415; 1990a, p. 894), but the supply of productive entrepreneurs is more variable. In Baumol (1990a, p. 894) he wrote:

Changes in the rules and other attendant circumstances can, of course, modify the composition of the class of entrepreneurs and can also alter its size. Without denying this or claiming that it has no significance, in this paper I shall seek to focus attention on the allocation of the changing class of entrepreneurs rather than its magnitude and makeup.

Baumol thought that it was unlikely or even implausible (or, at least, not the simplest available explanation) that a takeoff (increase) or slowdown (decrease) in growth or productivity in an economy would be a result of changes in the supply of (talented) entrepreneurs. Talented entrepreneurs do not suddenly disappear as if they had been decimated by a plague, nor do they unexpectedly emerge in profusion as if they had been created by Christmas elves and delivered by Santa Claus.

According to Baumol, the supply of entrepreneurship may vary due to changes in the spirit of entrepreneurship, which is a function of social tradition, cultural patterns and/or biological factors. Discontinuous breaks in the “national character” or favorable mutations pervading the population’s gene pool are too rare to explain the economic fluctuations and differences exhibited over time. Although abrupt changes may occur from time to time, culture and genes normally change only very slowly and are by and large impervious to policymaking. A more suitable explanation for the observed differences in economic patterns over time and across countries is that the allocation of the (possibly slowly changing) supply of entrepreneurial effort is directed towards different activities, which in turn alters output and productivity (see Baumol, 1993a, 1993b for a further discussion). After all, it is easier for a talented entrepreneur to shift his/her focus from a socially productive activity to nonproductive lobbying or criminal activities (or vice versa) than it is for an arbitrary person lacking the necessary motivation or talent to metamorphose into a successful entrepreneur.

Since changing the absolute supply of entrepreneurial effort (e.g., by trying to alter cultural attitudes or the incidence of the relevant psychological traits in the population) is likely to be difficult for policymakers, it is far more efficient for policymakers to strengthen the incentives for existing entrepreneurs to shift their efforts to more socially productive activities. By highlighting the allocation of

¹⁴ Baumol clearly stressed that these examples were used as anecdotal illustrations only.

entrepreneurship, Baumol tried to change academic thinking about policy-relevant questions, paving the way for more efficient growth and development policies. This was a major improvement compared to earlier research-based policy advice, which had more or less mechanically endorsed policies that allegedly stimulated the aggregate volume of entrepreneurial effort irrespective of its allocation across activities (cf. discussion in Sobel, 2008 and McCaffrey, 2018).

How, then, can public policy influence the allocation of entrepreneurial activity? According to Baumol, the relative payoff across different activities determines how entrepreneurs allocate their time and effort; an entrepreneur will gravitate towards the most privately rewarding activity. It is important to stress here that the payoff does not necessarily have to be exclusively in the form of pecuniary rewards or wealth; nonpecuniary factors such as power and prestige also matter. This was stressed repeatedly in Baumol's work. Baumol (1993, p. 203) maintained that the accumulation of personal wealth is probably "the primary objective" of a typical innovating entrepreneur. Baumol & Strom (2007) asserted that the incentive structure is guided not only by individual rewards (independently of what to include under this heading) but also by cultural and social norms. They also suggested that the pursuit of (pecuniary) wealth may be the predominant objective in the present-day Western world, but that may not have been the case historically.¹⁵

At the end of the day, Baumol asserted that the institutional framework, "the rules of the game," will determine the relative payoffs of different types of activities and whether an entrepreneur chooses to spend time and effort on productive or unproductive ventures. The government has an important role to play here, as the institutional framework that shapes entrepreneurial incentives to a large extent will be politically determined. By changing the economy's structure of payoffs and the relative profitability of different activities, politicians can direct entrepreneurs to endeavors that are socially beneficial. Although the size of the pool of entrepreneurs may remain largely unchanged, the amount of entrepreneurial effort expended on socially profitable activities will rise.

Based on the above reasoning, Baumol made the point that entrepreneurship per se is not the key to economic development. In fact, the reverse may be true if the rules of the game favor unproductive and destructive entrepreneurship. Thus, the extent to which the institutional environment, broadly construed, fosters productive entrepreneurship and human experimentation while disincentivizing unproductive and destructive behavior becomes the ultimate determinant of economic growth.

The idea presented in Baumol's 1990 article was further elaborated and refined in his subsequent writings (e.g., Baumol, 1993a, 2002a).¹⁶ The implications of his article also inspired a generation of researchers in entrepreneurship, leading to extensive studies with a seemingly never-ending flow of new research based on Baumol's insight. Finding suitable empirical measures or conceptualizations of Baumol's types of entrepreneurial activities is not straightforward, and there is no widely accepted approach. Despite the difficulty, several articles have tried to test Baumol's ideas, almost invariably confirming his viewpoint in one way or another (Sobel, 2008 and Bowen & De Clerq, 2008 are two often cited examples; Aeeni, Motavaseli, Sakhdari & Mobini Dehkordi, 2019 provide a systematic review). The *Journal of*

¹⁵ In Baumol (2010), he specifically mentions that the prestige associated with successful radical innovations was one driving force for Eli Whitney, James Watt, Elias Singer, Thomas Edison, and the Wright brothers.

¹⁶ In Baumol & Strom (2007), the concept of "productive opportunities" was introduced. This article seemed to be written more in the vein of Kirzner, in which entrepreneurs should be alert to discovering and exploiting unnoticed opportunities but where these opportunities could be (objectively) productive or unproductive.

Entrepreneurship and Public Policy devoted a whole issue in 2016 to discussing the impact of Baumol's *JPE* article 25 years after its publication. This bears witness to the extraordinary influence of Baumol on the key role of the institutional setup in the allocation of entrepreneurial activities across socially productive and nonproductive activities and how that allocation, in turn, becomes arguably the most important determinant of a country's relative income and wealth.

However, Baumol's insights as formulated in his 1990 article were not conceived *ex nihilo*. Baumol was an intellectual who combined an extraordinary level of knowledge about history and the history of economic thought with unique insights regarding contemporary economists' ideas, and—as is the case with so many other creative researchers—he was “standing on the shoulders of giants.”¹⁷ Without mentioning all scholars who inspired Baumol, it is worthwhile to refer to a few of them.

Baumol credited Veblen (1904) directly in his original article for the idea that firms are directed not towards the most socially valuable activity but towards what is deemed most profitable for the firm owners. Cantillon (2001 [1755]) had already mentioned thieves as an example of entrepreneurs, thus hinting that entrepreneurship need not be unambiguously positive. Ideas about the omnipresence of entrepreneurship in society can be found in both Jean-Baptist Say's and Ludwig von Mises' writings. The former also mentioned that entrepreneurship may be influenced by the institutional framework (McCaffrey, 2018). There is little doubt that Baumol was familiar with the writings of these scholars.

In modern times, one could mention Gordon Tullock, born in the same year as Baumol, who introduced the concept of rent seeking in public choice (Tullock, 1967). Jagdish Bhagwati (1982) was another forerunner who spoke about “directly unproductive profit-seeking activities,” which echoed Baumol's ideas, although Bhagwati's (and Tullock's) ideas were not framed within an entrepreneurial context.

The novel insight in Baumol's 1990 article was similarly expressed in a parallel article published in the following year (Murphy, Shleifer & Vishny, 1991).¹⁸ The authors of this article claimed that their ideas “were developed independently” (p. 507) of Baumol.¹⁹ Murphy et al. had some 3,200 citations in *Google Scholar* in September 2021, while Baumol's article had more than 7,800 citations.

In 1987, Baumol published a precursor to the 1990 article in the less well-known Swiss journal *Schweizerische Zeitschrift für Volkswirtschaft und Statistik* (now named *Swiss Journal of Economics and Statistics*). At the end of the third issue (*Heft*) in 1987, following five articles in German and four in French, Baumol's essay “Entrepreneurship: Creative, unproductive, and destructive” appeared in English.²⁰ One important difference from his 1990 article is that he used the term “creative” rather than “productive” entrepreneurship in the title. Still, in the main text he talks about productive entrepreneurship. The core idea is virtually identical, but the first part of the paper mainly focuses on innovative vs. imitative

¹⁷ This famous expression is customarily attributed to Isaac Newton, who used it in a 1675 letter to fellow scientist Robert Hooke.

¹⁸ Murphy et al. (1991, pp. 506–507) stated that “Baumol (1990) makes the same basic point as we do that entrepreneurship can be ‘productive’ or ‘unproductive’ and the allocation of people between the two activities depends on the relative returns.”

¹⁹ Baumol made the same claim in his article (Baumol, 1990a, p. 894), referring to a mimeographed version of Murphy et al.'s paper. Even though the ideas may have evolved completely independently of each other, they seem to have read each other's articles and been aware of the similarities.

²⁰ The article is not included in Baumol's publication list, which is more than 100 pages long, on his NYU web page, nor does he refer to it in his 1990 article.

entrepreneurship (a distinction that was not covered in the 1990-article) and a mere 1.5 pages at the end of the article are devoted to a discussion of how the institutional framework may affect the allocation of entrepreneurship.²¹ The extensive historical evidence in the 1990 article is largely absent and the reference list merely includes six works, while the 1990 article contains 48 references.

The origin of Baumol's 1990 article may, however, dates back much further, to 1968, when he wrote his first highly cited article on entrepreneurship. Baumol did not make the distinction between productive and unproductive entrepreneurship there. Instead, his main concern was a possible undersupply of entrepreneurial talent and effort in general, which could hinder undeveloped and poor countries from raising their living standards. In a discussion and review part following his 1968 *AER* article, the discussant Evsey Domar asked "whether underdeveloped countries, about whom Baumol worries, really lack entrepreneurs as persons with specific traits, or whether those who do exist are prevented from functioning properly?" (Domar, 1968, p. 93). This may have been the spark that led Baumol to start thinking about how a country's entrepreneurial talent is used and allocated instead of worrying about how to increase the pool of entrepreneurial talent.

Today, increased use of capital and labor are not seen as ultimate causes of economic growth. Although capital and labor may be necessary to create growth, they are far from sufficient, as someone—the entrepreneur—must coordinate and decide how and to what purpose these resources should be used. Does this mean that entrepreneurship should be considered the ultimate cause of growth? Not necessarily; how entrepreneurship is allocated is, as Baumol showed, determined by and a consequence of the institutional framework. Hence, it might be more correct to claim that institutional quality is the ultimate cause of economic growth.

In a sense, Baumol's insights made it possible to bridge the institutional and entrepreneurial explanation to economic growth. Institutions that foster productive entrepreneurship lead to economic growth. Baumol's contribution not only highlighted the importance of productive entrepreneurship but also pointed to the institutional rules of the game. Baumol was a pioneer in jointly examining the role of institutions and entrepreneurial behavior. But it is noteworthy that Baumol's policy prescriptions rarely, if ever, went beyond these broad-stroke suggestions. Thus, he did not pursue any detailed political-economic analysis in real-world contexts, including establishing any explicit connections between law and economics. Currently, the importance of institutions seems self-evident and indisputable among economists, who instead focus their attention and academic discussion on which institutions matter (most) and how institutions should be designed in practice (see Douhan & Henrekson, 2010 and Boettke & Piano, 2016 for a further discussion).²²

²¹ The 1987 hypothesis reads (p. 420–421), "entrepreneurship may often be exercised in ways that do not contribute to production and that may perhaps even interfere with prosperity whether it takes preponderantly productive or unproductive directions ... depends on the reward structure." In 1990, the central hypothesis reads (p. 898–899), "the exercise of entrepreneurship can sometimes be unproductive or even destructive ... whether it takes one of these directions or one that is more benign depends heavily on the structure of payoffs in the economy."

²² The companion books Elert, Henrekson & Sanders (2019) and Sanders, Marx & Stenkula (2020) are a case in point. They analyze how the European Union should change its institutional framework to foster productive entrepreneurship.

Other contributions to entrepreneurship economics

Baumol expanded and dug more deeply into his often simple yet profound ideas about entrepreneurship in the following books and articles. It is not possible to present every idea Baumol put forward in the area of entrepreneurship; instead, we will focus on the ones that we deem to be substantively most important.

In his 1987 article and subsequent writings, Baumol typically distinguished between different forms of entrepreneurship (in addition to the productive-nonproductive distinction), namely, *innovative* and *imitative* entrepreneurship.²³ Innovative entrepreneurs are, of course, vital—without them, there is nothing to imitate. Although imitation normally plays only a secondary role when entrepreneurship and innovation are discussed and analyzed, Baumol asserted that imitative entrepreneurs can be as important as innovative ones in spreading successful innovations around the world.²⁴ Imitative entrepreneurship normally also includes some innovative aspects, e.g., when adapting a new technology to local circumstances or the local market. Analogously, most innovations are, in the same way, not 100 percent novel but might also include some parts that are imitated. In this context, Baumol occasionally quoted De Camp: “Every invention contains some borrowing and every borrowing some invention” (e.g., Baumol, 2010, p. 106).

In later works (e.g., Baumol, 2010; Baumol, Litan, Schramm & Strom 2011, Baumol & Schilling, 2018), Baumol instead talked about *innovative* versus *replicative* entrepreneurship, where the latter referred to persons who organize (new) businesses producing or selling already available goods and services in ways similar to already existing firms. Baumol now considered the former most important for the development of the whole economy and the latter of secondary importance. However, this is not to say that he deemed replicative entrepreneurs unimportant; replicative entrepreneurship often offers a way out of poverty and provides many individuals with an income for a living.

Baumol also made a distinction between *radical* (or revolutionary break-through) innovations and *incremental* (or routine) innovations (see, e.g., Baumol, 2002b, 2004a, 2005a).²⁵ Both types of innovation are important, but without the initial pathbreaking innovation, there is nothing to be improved through incremental innovations. Nevertheless, the combined effects of the two types of innovation had ultimately resulted in extraordinary growth in social welfare over the previous 150 years. For example, present-day all-purpose powerful electronic computers are the combined results of the initial (radical) innovation of the device and the ensuing myriad of small, incremental improvements.

When discussing this distinction, Baumol also formulated his now famous thesis, aptly dubbed the David-Goliath symbiosis, i.e., that spontaneous specialization in the free-market economy has emerged where small firms founded and run by independent entrepreneurs focus on radical innovations, whereas large incumbent firms perform mainly incremental innovation, which is said to produce “superadditive” results. Even if the bulk of all formal R&D in an economy is performed by large firms, these firms are often inherently cautious and direct their resources towards low-risk projects. Moreover, radical breakthrough

²³ In his 1993 book, he distinguished these two forms of entrepreneurship from unproductive and rent seeking entrepreneurship as well as from mere business founding and management.

²⁴ Economies without innovative entrepreneurship may still be able to catch up with innovative economies “with a slight lag” if they have an institutional environment highly conducive to imitative entrepreneurship (Baumol 1987, p. 418).

²⁵ These are, of course, the two extreme points on a spectrum where some innovations will be intermediate cases somewhere in between.

innovations often make incumbents' know-how and products obsolete, thus eroding the profitability of those products. Baumol (e.g., Baumol, 2004, 2010) presented a telling list of radical innovations invented by small firms, including the zipper, the microprocessor and the FM radio.²⁶ Hence, large and small firms complement each other in the innovation process, with radical innovations by small firms being sold (leased or in some way transferred) to larger incumbents who can incrementally develop the innovations further and have the necessary financial strength to develop the large-scale production and distribution networks needed to profit by scale economies. In this context, Baumol underscored that the prediction— notably by Schumpeter (1943)—of the declining role of independent entrepreneurs had not turned out to be true.²⁷

Baumol also put much effort into analyzing (optimal) spillovers, technology dissemination and the trade-off between providing innovation incentives versus rapid diffusion of knowledge. There is a need for a well-designed patent system that strikes a balance between the need to ensure that the initial entrepreneur can appropriate part of the surplus from a successful innovation (to incentivize entrepreneurial activity) and that the dissemination and utilization of the innovation is not unnecessarily delayed (to benefit society at large). Baumol argued for a patent system facilitating voluntary exchange between firms through the lease or sale of patent rights or other forms of exchange agreements, including joining technology exchange consortiums, which should benefit all parties involved as well as the economy more broadly. Baumol argued that these arrangements may arise spontaneously in the market.

To incentivize potential entrepreneurs, they must be able to appropriate a part of the financial gain from their innovations. However, Baumol pointed out that *on average*, the return to entrepreneurship is arguably negative and that the lion's share of all surpluses that successful entrepreneurship generate accrues to parties not directly involved in innovation creation, notably consumers.²⁸ An entrepreneur, on average, receives no premium compared to if (s)he is working for a regular wage. What drives the entrepreneur is the "mirage" of winning a "mega-prize" if he or she manages to launch a successful radical innovation (see Baumol, 2011b, for a further discussion).

An important issue for Baumol was capturing the essence of the entrepreneurial role and the innovation process in a formalized mathematical framework by creatively applying the standard microtheoretic toolbox. Baumol did not shy away from using formal mathematics; on the contrary, he thought it was a useful tool that should be used when appropriate.²⁹ Hence, he tried to formalize some arguments or certain aspects from previous works and ideas when he, e.g., attempted to provide a micro

²⁶ In this context, Baumol was indebted to Scherer (1980), who was the first to put forth the hypothesis that small, independent entrepreneurial firms were responsible for most radical innovations and to back his assertion with a list of radical innovations by small independent firms.

²⁷ A potential extension here could be to talk about individual employees who act as innovator-entrepreneurs within established firms, customarily called *intrapreneurs*. The same tripartite distinction between productive, unproductive and destructive activities could then be applied to intrapreneurship (Elert & Stenkula, 2021).

²⁸ Nordhaus (2005) calculated that the entrepreneur, on average, receives less than five percent of the increased value generated by entrepreneurial activities. The rest accrues primarily to consumers in the form of lower prices and products of higher quality. Baumol (2002b) estimated that approximately 80 percent of an innovation's value goes to parties who are not directly involved in its creation and exploitation.

²⁹ Even when he was a young economist, he urged the profession to use more formal modeling in economic analyses. He later admitted that "it may have gone a bit far in the opposite direction," as many upcoming economists now feel that what "they produce will automatically be rejected as unworthy if it is not liberally sprinkled with an array of algebraic symbols" (Baumol, 1991, p. 2).

theory of the innovative entrepreneur that allowed for a temporary surplus in the form of intertemporal price discrimination. Baumol himself maintained that this could be seen as the first “quasi-formal” analysis aiming at integrating the *innovative* entrepreneur into the core of formal mainstream theory (Baumol, 2010, p. 1). Of course, there had been attempts to formalize the entrepreneur before, but then often only as, e.g., a talented business owner or manager (e.g., Lucas, 1978) or with some other particular feature or personality trait such as high tolerance towards risk (e.g., Kihlstrom & Laffont, 1979) that distinguished the entrepreneur from other workers. The innovative aspect was often muted and these models mainly captured aspects characterizing replicative entrepreneurs (see Bianchi & Henrekson, 2005, for a summary of earlier formal models that tries to capture the entrepreneurial spirit).

One way to explicitly include the entrepreneur through the back door in macro- and microeconomic analyses is to expand the conventional list of production factors by including entrepreneurship as a formal third, fourth or fifth production factor.³⁰ If something is supposed to constitute a production factor, there must exist a supply, a demand and a price (remuneration).³¹ Baumol discussed the supply of entrepreneurship (or entrepreneurial talent) and the remuneration of entrepreneurs at great length. The demand was hardly discussed, but unlike other production factors, entrepreneurs often create their own demand through self-employment (cf. Baumol & Schilling, 2018); i.e., there is no “market” for entrepreneurs in the same way as for other production factors.³² That said, he did not present any formal mathematical value theory based on neoclassical theory that included entrepreneurship as a distinct factor of production (this point will be further discussed in the next section).

Baumol devoted a fair share of his writing to arriving at the policy implications of his theoretical and empirical findings. After all, his main underlying driving force and interest in conducting research in economics was to understand why some nations prosper and others do not and to offer well-grounded advice to help economies around the world eliminate poverty and increase social welfare.

A market-based capitalist system does not automatically produce economic growth and a high level of social welfare that benefits all inhabitants. Baumol (e.g., Baumol, Litan & Shramm, 2007) distinguished between four different forms of capitalism: state-guided capitalism, oligarchic capitalism, big-firm capitalism, and entrepreneurial capitalism. From a growth perspective, Baumol asserted that a mix of the last two forms is optimal.

Baumol identified four conditions that should guide policymakers in establishing and refining a “well-oiled economic growth machine” based on a successful entrepreneurial market economy where large and small firms complement each other:

- (1) It must be easy to start, close and grow a business (e.g., there should be well-designed business registration procedures and bankruptcy laws).

³⁰ Contemporary textbooks typically include only two production factors (capital and labor), and land has traditionally been seen as the third production factor. In Baumol & Blinder (2009), exhaustible natural resources were seen as a fourth production factor in addition to the three traditional factors. Other production factors that are sometimes included are human capital and knowledge capital.

³¹ Baumol (2010, chapter 12) also noted that one should be able to say something about the price of the output that uses the production factor as well as the allocation of the production factor among possible uses and its efficiency.

³² However, Baumol frequently talked about the demand and supply side of innovation markets (e.g., Baumol et al., 2012)

- (2) The institutional framework must reward productive entrepreneurial activity (e.g., there should be an effective judiciary system that ensures the rule of law and enforcement of contracts, onerous taxation should be avoided, and a well-balanced patent system should be in place).³³
- (3) The institutional framework must disincentivize nonproductive activities (e.g., be harsh on criminal and destructive activities).
- (4) The system should keep the winners “on their toes” (e.g., by having well-balanced antitrust legislation and facilitating foreign trade and competition).³⁴

In addition to providing an institutional framework that stimulates productive entrepreneurship in small and large firms, universities and government have a role to play in an innovative economy. The government can facilitate firm innovation by funding and carrying out basic research and facilitating the acquisition of foreign technology. However, Baumol was skeptical of government provision of funds to specific entrepreneurial endeavors (“picking winners”), as that will foster lobbying and rent seeking (e.g., Baumol, 2012, p. 125–126).

Baumol also mentioned that immigration may provide a channel to attract talent from abroad and that the education system should foster a creative, inventive and well-educated population (e.g., Baumol et al., 2011). The latter idea leads to another question that Baumol explored (e.g., Baumol, 2005b, 2012b): How important is formal education for entrepreneurship, and can individuals be formally taught to become (productive) entrepreneurs? After all, many entrepreneurial “superstars,” such as Bill Gates, Steve Jobs and Michael Dell, are university dropouts. Nevertheless, Baumol observed that an increasing share of successful entrepreneurs have graduate-level degrees from elite universities, and he believed that more education will be required in the future for success in innovative entrepreneurship.³⁵ At the same time, Baumol claimed that little is known about how to train and educate individuals to become successful entrepreneurs.³⁶

Baumol wrote (at least) four books about entrepreneurship (Baumol, 1993a, 2002a, 2007, 2010) in which he essentially summed up and expanded on the ideas expressed in his peer-reviewed articles. In 2002, at age 80, he published by far his most cited book on entrepreneurship. Here, Baumol focused on the importance of innovation and entrepreneurship as essential in explaining why the free-market economy is unrivaled in regard to producing economic growth and prosperity. This was based on ideas already seeded in his 1968 article, which underscored Baumol’s consistency and commitment to advancing and refining his thoughts. In his last book on entrepreneurship, published in 2010 (when he was 88 years of age!), he made a final attempt to integrate entrepreneurship into contemporary microeconomics.

However, in addition to these books, Baumol wrote economics textbooks for undergraduate students. Together with Alan Blinder, he wrote an introductory textbook (first edition in 1979, 14th edition in 2019)

³³ It is beyond the scope of this chapter to go into detail, but Baumol preferred, e.g., consumption taxes to income taxes and even considered a business tax that is regressive, with a lower tax rate for a faster percentage rate of growth of output and sales (Baumol et al., 2011).

³⁴ Baumol (2004b) stated that firms should be engaged in a “Red Queen Game,” where all incumbent firms are forced to keep “running” (innovating) as fast as they can in order to stay in the same place (not lose their market position).

³⁵ Henrekson & Sanandaji (2014) showed that as much as one-third of all U.S. entrepreneurs who have become billionaires by building a company from scratch had a degree from one of the 15 most highly ranked U.S. universities.

³⁶ Baumol occasionally taught an NYU course in “Innovative Entrepreneurship,” and he started the class by humbly telling the students that “...you are the unfortunate attendees of the course in which the professor does not know what he is doing” (Griffith et al., 2012, p. 617).

that was also divided into two distinct parts, micro- and macroeconomics.³⁷ The missing entrepreneur is not only absent from the established theories and models used by contemporary researchers around the world but also from the textbooks used to teach graduate and undergraduate students alike.³⁸

Barbara, Strom & Baumol (2012) evaluated how entrepreneurship is treated in popular introductory textbooks in economics. Only three of the eight examined books included more than a brief mention of the entrepreneur. One of these three books was the 11th edition of Baumol and Blinder (2009). Here, Baumol showed how the entrepreneur, though not the main character of the textbook, can be integrated more into a traditional principles textbook. Baumol explained that the elusive “Prince of Denmark” is missing or is only briefly discussed in textbooks, as (Krueger, 2001, p. 225) “competition forces us to make sure we have the standard story in there [in the textbook],” and “new contributions are harder to explain at an elementary level.” Thus, even Baumol’s own textbook writings underlined how difficult it is to incorporate entrepreneurship into the standard framework of mainstream economics.

Criticism

Baumol must be amply credited for his extraordinary scientific contributions. However, it should come as no surprise that more or less legitimate criticism has been leveled against his well-cited works. A total absence of “glitches” or inconsistencies in his immense output on entrepreneurship spanning more than five decades would be inconceivable (cf. Baumol’s, 2017, critique of Schumpeter). His ideas have occasionally been judged to be correct but incomplete. A complete presentation of all objections raised is beyond the scope of this essay. Instead, we limit ourselves to presenting the critique of Baumol’s two foremost contributions: his typology and institutional framework and the missing entrepreneur in contemporary mainstream economics.

Baumol’s typology

One of Baumol’s main insights was that the relative reward structure in society influences the allocation of entrepreneurship across more or less socially productive activities. However, the choice between different activities is not a pure effect of the institutional framework. In a society with a specific institutional framework, productive and nonproductive activities coexist. Highlighting institutional factors is not wrong, but to understand the allocation of entrepreneurial effort in the economy, one must also include individual factors such as intentions, capabilities, and perceptions. Baumol failed to explain why, at a point in time in a specific system, some entrepreneurs pursue socially productive activities and others do not. One likely candidate is individual factors influencing the direction of attention and entrepreneurial effort regardless of the institutional framework (see Aeeni et al., 2019, and Hmieleski & Lerner, 2016, for a further discussion).

In Baumol’s original view, the reward structure seems to be purely exogenous and amenable to manipulation by benevolent policymakers, perhaps well informed about Baumol’s insights. However, this may be an overly simplistic model of how the world works (see, e.g., the criticism by McCaffrey, 2018, Aeeni et al., 2019, and Kalantardis, 2014). The causality between the reward structure and entrepreneurship may be bidirectional. Not only does the reward structure influence the behavior of entrepreneurs, but entrepreneurs themselves can try to influence the institutional setup to their own

³⁷ The most recent edition had an additional coauthor: John Solow, the son of Robert Solow.

³⁸ For a review of the missing entrepreneur in undergraduate textbooks, see Kent (1989, 1999); for graduate textbooks, see Johansson (2004) and Baumol (2006).

advantage. Entrepreneurs do not necessarily passively abide by institutions; they can evade or even try to alter the institutional framework. This potential reverse or bilateral causality was initially ignored or ruled out, and a new literature around the concept of “institutional entrepreneurship” has emerged in which this phenomenon is analyzed (see Douhan & Henrekson, 2010, Henrekson & Sanandaji, 2011, or Elert & Henrekson, 2017).³⁹

The tripartite distinction between productive, unproductive, and destructive entrepreneurship has also been questioned (e.g., Douhan & Henrekson, 2010, McCaffrey, 2018, Davidsson & Ekelund, 1994, and Lucas & Fuller, 2017). As already noted, the distinction between unproductive and destructive is not clear-cut, but whether an activity is productive or not is not self-evident either. Whether an activity should be deemed productive depends on the context and can be determined only relative to the institutional context in which the activity took place. What at face value *appears* to be an unproductive activity may in fact be a second-best productive response in the presence of suboptimal institutions that cannot be changed in the short run. Comparing some ideal state with real-world activity is not a relevant comparison when denoting something “unproductive.” Some “unproductive” activities may be a productive way of breaking a bureaucratic deadlock and rent seeking may not necessarily be unproductive.⁴⁰

Additional problems refer to the uncertainty of the world (see, e.g., the discussion in McCaffrey, 2018). Baumol wrote mainly in the vein of Schumpeter, who did not dwell on the uncertainty aspect of entrepreneurship. However, the entrepreneurial environment is rife with uncertainty, and the outcome cannot always be classified as productive or unproductive *ex ante* by either the potential entrepreneur or other agents. If successful, an innovation might be highly beneficial for both society and the entrepreneur, but success is never guaranteed. Entrepreneurial activities can result in failures for many known or unknown reasons. The outcome in terms of social welfare is revealed only over time; therefore, whether an entrepreneur has allocated his/her efforts to a socially productive activity cannot be affirmed in advance based on the entrepreneur’s intentions and expectations or based on society’s institutional framework. A potential entrepreneur does not make a simple choice between productive and unproductive activities where the success or outcome of the choice is assured. Whether an entrepreneurial activity should ultimately be classified as productive or unproductive does not necessarily result from a conscious choice, as uncertainty, ignorance, or (bad) luck may swing the end result from a societal perspective in a favorable or unfavorable direction (based, e.g., on unforeseen behaviors and responses of other agents in the economy or due to an unexpected world crisis).

As also mentioned, some scholars believe that entrepreneurship should be used to refer only to successful productive events, which would make Baumol’s typology misleading, confusing the discussion

³⁹ In later work, Baumol (2010, p. 173) acknowledged and recognized this possibility: “Entrepreneurs and institutions have a two-way relationship: the institutions are primary determinants of entrepreneurial activity and its reward, while the entrepreneurs return the favor, doing what they can to mold the relevant institutions in ways that best serve their own interests.”

⁴⁰ Davidson & Ekelund (1994) even claimed that the Catholic Church’s sale of indulgences to avoid (or mitigate) the painful after-death purgatory should be seen as a productive entrepreneurial rent seeking activity given the historical circumstances. The Church received rents, and the population relieved some of their anxiety, which increased the value of their alleged salvation. The use of extensive price discrimination also implied that the Church could extract high revenue, while even the poor could participate in the trade and buy small indulgences. In effect, social welfare unambiguously increased for both priests and servants. In later work, Baumol (1993a) acknowledged that rent seeking is a complex phenomenon that may not be regarded as an unproductive activity in all circumstances.

and debate regarding the need for stimulating entrepreneurship. Rent seeking, lobbying, criminality, warfare, etc. should not be conflated with entrepreneurial activities, although entrepreneurially talented persons might direct their attention to these activities (McCaffrey, 2018).

Baumol also maintained that the allocation of entrepreneurship was more variable and susceptible to incentives than the aggregate supply of entrepreneurship. However, many potential entrepreneurs may not switch from productive to nonproductive entrepreneurship when faced with an unfavorable reward system but instead stop behaving entrepreneurially, i.e., decreasing the supply of entrepreneurial effort (cf. Bylund & McCaffrey, 2017). Why should it be easier or more likely to switch to, e.g., an innovative but unproductive criminal behavior than to give up one's entrepreneurial intentions altogether (and maybe thereby lose the talent in the long run)? For instance, the supply of entrepreneurship in contemporary North Korea is likely to be smaller than it would have been with a more favorable institutional framework. On a similar note, it seems self-evident that the supply of entrepreneurship in China is much greater today than before 1978, when Deng Xiaoping initiated the market reform process. Thus, the supply of entrepreneurship cannot be reduced to a question of allocation; the absolute supply is also important and is also affected by the rules of the game. Changing the institutional framework in ways that promote socially productive entrepreneurship is often difficult and takes time. A sole focus on this aspect on the grounds that it is the best way to influence entrepreneurial activity in practice may therefore be a hasty conclusion (see Kalantaridis, 2014, for a further discussion).

The missing entrepreneur

At face value, there seems to be an overall inconsistency and contradiction in Baumol's main mission of trying to merge entrepreneurship theory with neoclassical analysis. On the one hand, he convincingly explained why the entrepreneur disappeared from neoclassical formal analysis, as combining formal mathematical equilibrium analysis with the entrepreneurial function was an intractable problem. On the other hand, a common thread in much of his writing was the attempt to solve exactly what was, according to him, an unsolvable problem—catching the elusive entrepreneur in the neoclassical net.⁴¹

When he discussed his own book from 2010 (Baumol 2011a, p. 1–2), he affirmed that “I take up arms against myself ... and show that an illuminating formal analysis of innovative entrepreneurship is not only possible but, indeed, is relatively straightforward. ... Schumpeter's story, it transpires, is easily translated into a formal model.”⁴² One can argue that he tried to put the entrepreneur back into mainstream economics and at least partly succeeded. However, it seems that when trying to shoehorn the entrepreneur into the formalized neoclassical micromodel, something was lost on the way. Certainly, some aspects of innovation and entrepreneurial behavior can be incorporated into a mathematical model about prices and quantities based on optimal marginal equilibrium conditions, but the true essence of innovation, i.e., something unique and novel introduced by creative entrepreneurs in an unpredictable and

⁴¹ In an interview with Baumol, Minniti (2016, p. 216) claimed that “[Baumol] is sometimes incorrectly cited as having argued that formal economic models are not suitable to study entrepreneurship. However, this is inaccurate, as he never made that claim.” Nevertheless, in the same interview, Baumol explicitly also asserted that “[i]n analyzing the work of the entrepreneur, there's a limit to what rigorous analysis can do” (p. 226).

⁴² As early as, e.g., Baumol (1993b), he also claimed that a powerful and illuminating theory of entrepreneurship exists, but there are limits to what it can do. Some aspects of entrepreneurial activities, such as the optimal timing of the introduction of an innovation, can be formally analyzed.

noncalculable way, does not fit into this framework (cf. Holcombe, 2004). After all, these attributes are the reason why the entrepreneur disappeared from the mainstream in the first place.

According to Baumol (2011a), the entrepreneur would have been a key part of elementary economics textbooks (and contemporary research) if there had been an established formal price theory (value theory) that included the entrepreneur as a factor of production. However, the difficulty in *measuring* the supply of true entrepreneurial activity in a reasonably objective way is another important reason why economists do not generally treat entrepreneurship as a factor of production. If Baumol's tripartite distinction is added, the empirical measurement problems become even worse, and there is no consensus on the conceptualization or operationalization of his typology.

The last point highlights an important issue in much of Baumol's work, or, more correctly, points to areas that warrant further attention in the future. Baumol often focused on the theoretical aspects of an issue, such as how to formally augment a production function by adding entrepreneurship. He neither grappled with nor offered a solution to problems from an empirical perspective. Even if Baumol's true calling was to find solutions to real-world problems in order to improve the lives of ordinary people, he came to expend large part of his creativity on trying to formalize the entrepreneurial function in a way that would be accepted by leading mainstream economists. Another example of his ambivalence is when he stressed the need for analyzing the economy from a dynamic perspective, while seeking to integrate the entrepreneur into essentially static theoretical formal models.

His humble attitude and aversion to ignite potentially hostile debates made him reluctant to directly attack mainstream economics for disregarding the entrepreneurial role in their formal models. But this gentlemanly stance partly undermined his own research agenda; if the exclusion of the entrepreneur in mainstream models is such a crucial omission, does not warrant a more fundamental attack on mainstream economics?

Quantitative methods may not be appropriate to address all research questions pertaining to entrepreneurship. Occasionally, Baumol restricted himself to using historical, but certainly well-suited and illustrative, examples.⁴³ However, this "narrative form" of empirical research is habitually less valued among economists, and it did not result in renewed appreciation of this approach. Economic history, including illuminating historical examples, is, at best, included as sidebars or footnotes in economics. Instead, convincing today's academic community normally requires the use of the state-of-the-art quantitative toolbox. It is indeed a worthy challenge for entrepreneurship researchers.

At the macro level, a great deal has happened since the publication of the Solow-Swan exogenous growth model. An array of endogenous growth models has been developed, and a subset of those models are even called neo-Schumpeterian to underscore their connection to Schumpeter's thinking.⁴⁴ Baumol (2010, p. 2) discussed this tradition in his last book but also stressed that "in these macro theoretic writings,

⁴³ He also wrote and coedited an economic historical volume about innovation and entrepreneurship (Landes, Mokyr & Baumol, 2010). Here, he claimed that there is little direct empirical evidence for the importance of productive entrepreneurship. However, there is ample of "historical evidence" that points to a highly plausible vital role for productive entrepreneurship.

⁴⁴ See Henrekson, Johansson & Karlsson (2021) for a critical discussion of the neo-Schumpeterian growth models. These models are not called Schumpeterian because they explicitly include entrepreneurs in the model but because of their evolutionary character. The entrepreneurial function is modeled as the pursuit of R&D investments in search of *ex ante* calculable monopoly rents. By assuming that the expected value of innovative activity is fully calculable, the neo-Schumpeterian entrepreneur is reduced to a routine decision-maker.

entrepreneurs usually lurk in the background—largely concealed, but present under certain interpretations.” Baumol wanted to integrate the entrepreneurs and the firms from microeconomics into contemporary growth theory of macroeconomics in a better and more direct way (see Baumol, 2009, for a more in-depth discussion).

However, to fit into the neoclassical toolbox, creative innovation must be compressed into a formal more or less mechanical function devoid of the very traits that define entrepreneurship and innovation. At the end of the day, it seems that Baumol spent a substantial part of his academic career on finding a way to integrate the entrepreneur into the neoclassical model of the firm with limited success. Baumol was keenly aware that the model(s) he presented covered only specific aspects of the entrepreneurial function. He saw his work as a promising start for integrating the entrepreneur into mainstream theories. He summed up his last book by asserting that “the theory of entrepreneurship is on its way” and by sketching what the foundation of this theory could look like. The future will tell whether that turns out to be true or whether it was merely an instance of wishful thinking.

Concluding remarks

Baumol had an exceptionally long—71 years elapsed between his first and last journal article (Baumol, 1946–47, 2017)—and highly prolific academic career. His research output is impressive, not only in terms of quantity but also in its scope, influence, and practical importance. He pointed out that the theoretical microeconomic firm was entrepreneurless and that the macroeconomic theory of economic growth was devoid of entrepreneurial initiative and creativity. Many of Baumol’s publications are now standard references in university courses, including economic development. There is little doubt that Baumol’s perceptive works is one major factor behind the prominent role of institutions and entrepreneurship in the contemporary economic literature.

Baumol was an innovator-entrepreneur in the economic sciences, a “revolutionary from within,” insisting that the mainstream toolbox must not neglect the entrepreneur. Baumol’s writings have inspired a still ongoing research program with the aim of integrating the entrepreneur or the entrepreneurial function into neoclassical microeconomic theory, the theory of the firm, industry development, and macroeconomic growth theory—possibly by treating entrepreneurship as a distinct factor of production. To gain mainstream approval, concepts and ideas, despite entrepreneurship’s heterogenous and complex character, must be forged into a formalized, nonverbal and distinct format. Baumol was well aware of this prerequisite, and his focus was directed towards integrating his concepts with orthodox economics. This goal is far from being attained.

All contributions, including Baumol’s own, seem in one way or another to end up highlighting or formally analyzing one particular feature or aspect of entrepreneurship. Today’s formal mathematical models are too restrictive to be able to concurrently capture all essential elements of entrepreneurship in the same model. Figuratively speaking, what we have is a jigsaw puzzle consisting of innumerable disparate pieces scattered across several academic disciplines and traditions. A great deal of both theoretical and empirical work is needed before we are even close to arriving at an exhaustive theory of entrepreneurship.

Baumol’s contribution should not be solely evaluated based on the extent to which he succeeded in integrating entrepreneurship into a neoclassical framework, even if this was a prime concern for Baumol himself. Some of Baumol’s thoughts had elements that were more in line with behavioral economics, such as the possible overconfidence and optimism bias in entrepreneurial decision making (when, e.g., trying to

catch the mirage of a fortune as an entrepreneur) or the importance of “psychic income.” He was also among the first to discuss behavioral theories of the firm (Baumol & Stewart, 1971).

Baumol never received the Nobel Prize, but in our view, he is arguably at the top of the list of prizeworthy economists who never became Nobel Laureates. This has not prevented his research contributions from becoming exceedingly influential, and he has received numerous awards and recognitions, including the *Global Award for Entrepreneurship Research*—the foremost global award for entrepreneurship research.

The Prince of Denmark is still—and has always been—the protagonist of *Hamlet*. However, the castle of Elsinore lies in a realm lacking any connection to neoclassical economics. Thanks to Baumol, the entrepreneur is now at least a supportive actor in the contemporary economics drama. Whether he or she will eventually regain his/her deserved place at center stage of mainstream economics remains to be seen.

Appendix

William J. Baumol: A biographical background

William J. Baumol was born in New York in 1922, a son of two self-educated immigrant parents who had fled Poland, which was then under Russian rule, to escape pogroms and political persecution. Baumol's interest in economics in general and entrepreneurship in particular was no coincidence. His father, from Poland, had a working-class background and had run a tavern, whereas his mother, from Lithuania, had a more intellectual background. Both of his parents were ardent Marxists,⁴⁵ and their proclivities introduced Baumol to economics at an early age as he participated in the constant discussions that were an integral part of everyday life. This family environment instilled in him a strong social conscience, and throughout his life, he had a profound interest in poor and underdeveloped countries. In his own words, "I was infected by their [his parents'] interests and their concerns" (Baumol, 1989, p. 209).

When he started college in 1938 at the public tuition-free College of the City of New York (CCNY), he had already studied economic history and was acquainted with Thorstein Veblen, Karl Marx and the classical economists. He majored in economics—but also in art. His interest in art came to profoundly influence his private as well as his professional life. He invented the economics of the arts. The idea behind Baumol's cost disease (Baumol, 1967) emanated from a performing arts project. Many writings about art were coauthored with his wife, Hilda. He was interested in oil painting and wood sculpting, and he taught graduate courses in sculpting at Princeton. (His interest in wood sculpting was kindled by German POWs whom he met during the war.) He was also responsible for introducing art exhibits by economists at scientific conferences around the world. Towards the end of his life, he pioneered computer painting.

The quality of economics teaching at CCNY was mediocre and dated. To compensate, ambitious students organized their own classes to teach each other. There were also vivid discussion groups that they could join. The students' dining hall was organized around different alcoves, each representing distinct discussion themes, including a Trotskyist and a socialist alcove (Baumol, 1989; Krueger, 2001).

After graduation in 1942, Baumol joined the U.S. Department of Agriculture (USDA) before being drafted into the army and sent to France following the Allied landing in Normandy. Baumol did not idle away his free time in the army. He took correspondence courses in mathematics (linear algebra) and bought mathematics books, which were much cheaper in France than in the U.S. After the war, he returned to the USDA before starting his postgraduate studies. At the USDA, he learned how economics could be applied in practice. Among other tasks, he had to analyze how a restricted quantity of U.S. surplus grain should be distributed to a starving world population, introducing him to the complexity of the "calculations of fairness."

Baumol applied for postgraduate studies at the London School of Economics (LSE). He was first rejected as unqualified, but as "compassion was still part of the admission process" (Baumol, 1989, p. 314), he was accepted into the master's degree program after a second attempt. After showing up at LSE and not shying away from participating in intense debates with senior professors at the seminars, he was almost

⁴⁵ During a joint lecturing trip to China in 2008, Baumol told Magnus Henrekson about his father's destiny. His father was an ardent communist when he fled to the U.S. in the 1910s. In New York City, he worked as a grocery shop clerk. When he heard about the communist revolution, he returned with his family to Europe to join the movement. Upon arrival, he was immediately arrested and imprisoned, as the Bolsheviks assumed that he was an American spy. Fortunately, he managed to escape and return to the U.S. with his wife, and roughly two years later, Baumol was born. Despite this harrowing experience, Baumol's father remained a faithful communist for the rest of his life.

immediately transferred to the PhD program and very soon became a full-time member of the faculty and a lecturer responsible for teaching mathematical economic dynamics and about the American economy.⁴⁶ The former course later resulted in his first book (Baumol & Turvey, 1951).

At LSE, Baumol met many influential and promising scholars, including Lionel Robbins, Friedrich Hayek, and Arthur Lewis, as well as the philosopher Karl Popper. He also met and exchanged ideas with Joan Robinson and John Hicks. Baumol depicted LSE as an extraordinarily stimulating place where he joined “Robbins’ Circle,” a group developing the basis for a new welfare economics. Lionel Robbins also became his supervisor.

Baumol wrote his thesis in a mere six weeks, which established his renown for writing quickly and seldom rewriting what had been committed to paper (Krueger, 2001, p. 230). However, he underscored that much time might elapse—sometimes years—of thoughts and discussions with colleagues and friends before he started to write down his ideas. He orally defended his thesis for five hours “over whiskeys and sodas at the Reform Club” in 1949 (Krueger, 2001, p. 214; Baumol, 1989, p. 317).⁴⁷ His thesis dealt with welfare economics and the Marshall-Pigou theory of externalities (Baumol, 1952).

After receiving his PhD, Baumol returned to the United States, where he took up a research position at Princeton University and was soon promoted to full professor. In 1971, he returned to New York when he accepted a professorship at New York University (he also retained his chair at Princeton until 1992), which he held until his death in 2017. When Baumol started his position at NYU, the academy was a hub for economists of the Austrian school, which had a vivid interest in entrepreneurship and its importance for economic development. There should have been plenty of time and opportunities for Baumol to interact with Austrian-minded colleagues who shared the same interest for entrepreneurship, but Baumol’s credit to and cooperation with scholars of this tradition was limited (see footnote 8 in the main text).

Despite being one of the most acclaimed economists of his generation, he was a humble and “extremely modest person” (Griffith et al., 2012, p. 662). He was honest and straightforward and seemed to be one of few economists who, without digression, could admit that he was wrong (Krueger, 2001, p. 227).⁴⁸

Baumol’s background also helped him to become a skilled economic historian who was deeply familiar with the history of economic thought. His interest in economic development always lurked in the background. He did not stray from the calling instilled by his left-wing parents to contribute to eliminating poverty in the world. However, instead of striving for a communist revolution and longing for the communist utopia, his mind focused on what he saw as the key actor in spurring the wealth of nations—the entrepreneur.

⁴⁶ Baumol depicted the prestigious British Oxford Debating Society as a union “composed of amateurs and children” compared to the disputants and speakers at CCNY, which he characterized as a place for “dirty debating as a blood sport” (Krueger, 2001, p. 214). This view can be contrasted with his later experience as a visiting professor at the Stockholm School of Economics (SSE) in 1968. Even though he stated that SSE was a warm, friendly, and hospitable place, he found that the Swedish economists had a brusque manner and avoided “sugar-coating” their arguments in discussions and debates. Baumol did not approve of these harsh manners despite what he had experienced at CCNY. There were two exceptions—the chivalric Bertil Ohlin and the deeply polite Erik Lundberg, who became a lifelong close friend of Baumol (Baumol, 1990b).

⁴⁷ The Reform Club was initially a male, liberal and closed so-called gentlemen’s club known for the quality of its cuisine where stimulating conversations could be held over lavish dinners in splendid mahogany-furnished rooms.

⁴⁸ As a chief juror in a case commented, “That kind of guy wouldn’t lie to nobody (sic!)” (Krueger, 2001, p. 227).

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