Economics doctoral programs exclude the entrepreneur*

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Abstract

Are theories on entrepreneurship covered in doctoral studies in economics? Our study examines economics doctoral programs in the United States (US) and Sweden, in particular the prevalence of concepts related to the entrepreneur in textbooks. We find that coverage of entrepreneurship is rare. It is more common in newer textbooks, which indicates a renewed interest in the entrepreneur. Even the textbooks that mention the entrepreneur do not define the concept or discuss the entrepreneur's economic role in any depth; their discussion represents a regression compared with earlier insights. Therefore, we posit that the entrepreneur's economic function is not covered in the core economics curriculum. This gap may lead to a lack of understanding of the economy and to ineffective or harmful economic policy, as economists advise policymakers.

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The theoretical firm is entrepreneurless—the prince of Denmark has been expunged from the discussion of Hamlet.

William Baumol, "Entrepreneurship in economic theory" (1968)

1 Introduction

Recent decades have seen an upsurge in interest in the entrepreneur's economic role, as entrepreneurship has increasingly been considered a key driving force behind job creation and economic growth. The expansion of entrepreneurship research has mostly taken place outside the confines of what might be termed "mainstream economics".[1] The entrepreneurial function was difficult to define in mathematical terms and was thus pushed out of the dominant paradigm when economics increasingly became a mathematically grounded science from the 1930s onwards (Baumol 1968; Blaug 1986; Barreto 1989; Hébert and Link 1989, 2006; Winter 2016).

This article aims to examine the extent to which the entrepreneurial function is currently covered in theories that are taught in doctoral programs in economics. Advocates for giving the entrepreneur a prominent role within economics argue that the entrepreneur is a key actor for economic development.

We study the top ten doctoral programs in economics in the United States (US) and all universities in Sweden that offer a full course program in economics. In particular, we use the content of doctoral program textbooks and course offerings as instruments to determine what economists consider the core of contemporary economic thought. We examine the prevalence of "entrepreneur" and related words in the subject index of the textbook(s). Index mentions are used as a proxy for the importance afforded to a given subject in a textbook. We expect that concepts that are central to a theory are included in textbook indices and that missing keywords

[1] Referring to Becker (1976, p. 5), Winter (2016) defines "mainstream economics" as the "unflinching application of the combined postulates of maximizing behavior, stable preferences, and market equilibrium".

indicate that the related topic is not covered to a significant extent. Our investigation refers to the academic year 2014–2015.

We find that most textbooks exclude the "entrepreneur" as a theoretical concept. However, the topic is more prevalent in recent textbooks, which suggests a renewed interest in the entrepreneur. The few textbooks that refer to the "entrepreneur" do not define the concept theoretically (with one or two arguable exceptions). For instance, they use "entrepreneur" synonymously with "borrower" or leave it undefined entirely. Hence, even textbooks that cover entrepreneurship to some degree do not relate entrepreneurship to theoretically recognized definitions, such as Joseph Schumpeter's introducing new combinations, Frank Knight's making judgmental decisions under conditions of uncertainty or Israel Kirzner's seizing of business opportunities. We conclude that doctoral candidates in economics do not encounter meaningful theories about the entrepreneur's economic function in their core training.

Economists traditionally advise policymakers on economic policy. The absence of exposure to any theory of the entrepreneurial function can lead to a fragmented understanding of the economy, which can result in poor advice and ineffective economic policy.

Next, we present the theoretical background that underlies our analysis, then our method, and thereafter our results. The article ends with a concluding discussion.

2 Theoretical background

Many definitions of the "entrepreneur" have been proposed within economics, three of which have dominated contemporary discourse (e.g., Hébert and Link 2006):

- Joseph Schumpeter (1912/1934) defines the entrepreneur as the economic actor who introduces new combinations into the economic system.

- Frank Knight (1921) argues that the entrepreneurial function entails making judgmental decisions and bearing uncertainty.[2]
- Israel Kirzner (1973) emphasizes the entrepreneur's alertness to the discovery and exploitation of profit opportunities.

These scholars' ideas are still relevant and have bearing on today's discussion of core issues, such as resource allocation, ownership and the theory of the firm (e.g., Shane and Venkataraman 2000; Rocha and Birkinshaw 2007; Acs et al., 2009; Kirzner 2009, Henrekson and Johansson 2009; Henrekson and Sanandaji 2014; Audretsch et al., 2015; Foss and Klein 2015; Elert and Henrekson 2016). They all assign the entrepreneur a key role in economic change through the discovery and use of new knowledge. Furthermore, they consider the entrepreneur an economic actor who is defined according to the economic *function* that (s)he carries out. This idea is similar to noting that a lender lends, a professional football player plays football, and so forth. Without a clear definition of an actor's economic function, using the concept in economic analysis is difficult. Notably, the particular definition of the concept of the "entrepreneur" is not critical to our study. For our purposes, investigating whether a definition or discussion of the concept exists in the examined textbooks is sufficient.

Joseph Schumpeter's definition of entrepreneurship is the most widely used. His analytical starting point was that an economy that produces the same goods and services in the same way will yield the same output. Therefore, long-run growth requires the introduction of new ideas about how to produce the same goods and services more efficiently or how to produce new products that consumers prefer to older ones. Therefore, his intention was to explain economic growth as a process of change (1934, p. 63): "It is just this occurrence of the 'revolutionary'

[2] Risk concerns random events with known probability distributions, while uncertainty concerns random events with unknown probability distributions. Risk is insurable, while uncertainty is not.

change that is our problem". Schumpeter was explicit in stating that he formulated a theory of endogenous growth (p. 63): "By 'development,' therefore, we shall understand only such changes in economic life as are not forced upon it from without but arise by its own initiative, from within". He defined key actors according to the economic *function* that they carried out:

- *Inventors* come up with novel ideas about how to combine factors of production in new productive ways.
- *Entrepreneurs* introduce the new combinations into the economic system.
- *Capitalists* finance entrepreneurial enterprises.

Schumpeter referred to an inventor's activity as *invention* and an entrepreneur's activity as *innovation*. In daily speech, innovations are often referred to as technical or scientific activities. This definition was too narrow for Schumpeter, who, for instance, stressed the importance of organizational innovations, such as bookkeeping and the joint stock company. He classified innovations into five broad categories: (i) the introduction of a new good, (ii) the introduction of a new method of production, (iii) the opening of a new market, (iv) the conquest of a new source of supply of raw materials or half-manufactured goods, and (v) the carrying out of the new organization.

According to Schumpeter's definition, the entrepreneur can hence be described as the *persona causa* of economic growth. He argued that entrepreneurial talent and skill is unevenly distributed in the population in quantity and quality. Hence, entrepreneurship is a scarce resource, and a limited number of entrepreneurial activities can be carried out in an economy. However, it has been argued that any economy has a potential density of entrepreneurs that is sufficient to generate general prosperity (Baumol 1990).

Why, then, are some economies more entrepreneurial than others? The most common explanation currently put forward by economists for the differences in economic development paths is grounded in the concept of *institutions* and the two-way interaction of institutions and

entrepreneurship (North and Thomas 1973; Rosenberg and Birdzell 1986; Acemoglu and Robinson 2012). The concept of the "institution" is broad, and, as with the concept of entrepreneurship, different definitions are currently in use. For instance, North's (1990, p. 3) definition reads as follows: "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction", which includes both formal institutions (e.g., the law) and informal institutions (e.g., societal norms). Institutions are considered critical because they determine entrepreneurs' incentives and thus direct entrepreneurial activities toward productive, unproductive or destructive use (Baumol 1990). Institutions also mediate the interplay between invention and innovation. New ideas and inventions lead to little economic development unless institutions facilitate their commercialization.

Notably, Schumpeter changed his view on entrepreneurs during his lifetime. The early, "Mark I", Schumpeter (1934) emphasized entrepreneurship and the role of new ventures in introducing novel ideas into the economic system. The late, "Mark II", Schumpeter (1942) predicted that entrepreneurs would become superfluous and that their function would be overtaken by large firms because of economies of scale in production and research and development (Malerba and Orsenigo 1995).

3 Method

We investigate the top ten doctoral programs in economics in the US[3] and all economics doctoral programs in Sweden with a full course program. The American part of the study includes Harvard University; the Massachusetts Institute of Technology (MIT); Princeton University; the University of Chicago; Stanford University; the University of California, Berkeley; Northwestern University; Yale University; the University of Pennsylvania; and

[3] According to the US News and World Report's (2015) rankings of US graduate programs.

Columbia University. The structure of the programs is similar across universities. The studies generally start with mandatory courses the first year, followed by elective courses the second year and thereafter writing of the thesis. The first year courses include econometrics, macroeconomics and microeconomics. Some universities also require mathematics courses as part of the program.

The Swedish part of our study includes all Swedish universities with a full doctoral program in economics: Göteborg University, Uppsala University, Lund University, Umeå University, Stockholm University and the Stockholm School of Economics. Stockholm University and the Stockholm School of Economics cooperate within "the Stockholm doctoral course program in economics, econometrics and finance" (SPDE). Several other Swedish universities offer PhDs in economics, but these programs do not provide a full course program. Instead, they cooperate with universities that do. Dalarna University, Jönköping University, Karlstad University Linköping University, Linnaeus University, Södertörn University and Örebro University cooperate within the Swedish Graduate Program in Economics (Swegpec) to offer a complete course program. Swedish course programs are similar to US ones and include mandatory first-year courses in econometrics, macroeconomics, microeconomics and mathematics, followed by elective courses and writing of the thesis.

We note that economics is a heterogeneous science that spans a wide array of theories regarding the functioning of the economy. The various conceptual frameworks that are used in economics are formed by key concepts that, in turn, form a terminology. Therefore, the factors that a theory deems important can be understood by studying the prevalence of different concepts and their meanings within the framework of said theory. Textbooks are of particular interest because they generally present established theory. Furthermore, textbooks tend to be authored by scholars with a strong position within their field.

The mandatory courses in microeconomics and macroeconomics represent the "canon" of economics, or the theoretical foundation, that all doctoral students are expected to know and we therefore begin to investigate the content of the textbooks used in these courses. Furthermore, we include elective courses in industrial organization in our investigation. Industrial organization is a well-established research area within mainstream economics[4] that studies competition and industrial structure, and students will thus be likely to encounter theories related to entrepreneurship within this field of research. Our investigation refers to the academic year 2014–2015.

The presence of many references to the "entrepreneur" and related concepts in textbook subject indices indicates that the entrepreneur's economic function plays a prominent role in the theory covered, while few or no references indicate that entrepreneurship is not considered important—or at least has not yet been incorporated into that particular theory. Baumol (1968, p. 66) suggested this approach:

> Contrast all this with the entrepreneur's place in the formal theory. Look for him in the index of some of the most noted writings on value theory, in neoclassical or activity models of the firm. The references are scanty and more often they are absent.

Johansson (2004), who performed a similar study that was limited to Sweden, found that the key concepts that underlie entrepreneur-driven economic development naturally fall in two categories. The first category contains terms related to the process of discovery and the use of knowledge, including the entrepreneur, invention, innovation, tacit knowledge and bounded rationality. The second concerns the conditions for this process, as provided by the rules of the game, including institutions, property rights and economic freedom.

[4] For instance, Jean Tirole was awarded the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel for his research on industrial organization in 2014.

We focus on “entrepreneur”, “invention”, “innovation” and “institutions” for reasons of parsimony. Economic freedom and private property rights may be regarded as redundant, as they can be covered under the concept of “institutions”. We also exclude the terms “bounded rationality” and “tacit knowledge”, as any text that covers these concepts in the context of entrepreneurship is also likely to list “entrepreneurship” as an index item. We include all variants of the concept, e.g., “entrepreneurial” and “entrepreneurship”, and count the references in the same way, e.g., “Innovation 64”, one reference; “Innovation 64–67”, one reference; “Innovation, 37, 64–67”, two references; and so on. The concepts examined are core concepts in entrepreneur-based theories:

Entrepreneur

We consider this the most important keyword, as discussing entrepreneurship is very difficult without mentioning the entrepreneur. The entrepreneur plays a key role in well-known strands of the economic literature, such as the Schumpeterian (1934) tradition and Austrian economics, and in other disciplines, such as management and sociology. The study of entrepreneurship has also emerged as a research field of its own—entrepreneurship research.

Invention and Innovation

According to the Schumpeterian definitions of invention and innovation, the concept of invention represents the discovery of new combinations, while innovation represents the entrepreneurial commercialization of the invention. Schumpeter argued that differentiating between the two is critical because inventions need to be practically implemented to create economic value.

Institutions

As discussed above, the role of entrepreneurship in an economy cannot be separated from the institutional context of said economy. Research on institutions have been awarded several times the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (Friedrich A. Hayek and Gunnar Myrdal in 1974, Ronald H. Coase in 1991, Douglass C. North in 1993 and Elinor Ostrom and Oliver E. Willamsson in 2009). Institutional economics has also been accepted as a subject in its own right and is taught at universities with its own textbooks, e.g., Kasper et al. (2012).

Gathering the syllabi for every course surveyed is not trivial, as most universities publish these documents on closed internal websites. Hence, to a significant degree, we have used e-mail requests to obtain textbook data, which, in turn, implies that some courses in the US are excluded due to repeated non-replies to our requests.[5] The textbooks included in our survey are those that are used as core or required reading in the course. If no textbooks are required reading, optional textbooks are included.

Textbooks in core subjects are not the only indicator of a concept's importance in a doctoral program. Therefore, we extend the analysis to include the full range of courses available in each program to examine if courses in entrepreneurship, institutional economics and/or other courses related to entrepreneurship are offered.

[5] All Swedish courses are included. A list of included/excluded courses are available from the authors upon request.

4 Results

In total, 37 textbooks are examined (Table 1), eight of which are used in both Sweden and the US. One of these, Varian (1992), is used in more often in Swedish courses than in US courses (eight Swedish courses compared with two US courses).

Insert table 1 here

Mas-Colell et al. (1995) is by far the most used textbook, as it is taught in 21 courses. The second and third most used are Ljungqvist and Sargent (2012) and Varian (1992), which are taught in 12 and 10 courses, respectively. Most textbooks are only used in one course. Eighteen textbooks are only used at US universities, while 11 textbooks are used only at Swedish universities. Textbook usage over time is seemingly somewhat stable. Johansson (2004) identified 19 textbooks, 13 of which are still used (sometimes in a revised edition).

Johansson (2004, p. 526–527) found few references to the terms investigated, i.e., two references to the entrepreneur. Furthermore, he argued that, when references were made (p. 527), "the meaning and significance of the ideas are lost, diluted, or distorted, compared to entrepreneurship-rich and institution-rich theories". He concluded (p. 527) that "[i]t is quite obvious that economists have eradicated entrepreneurship and institutions from core PhD training".

Similar to Johansson (2004), we observe that concepts related to entrepreneurship and institutional economics are relatively scarce in core subject textbooks in doctoral economics

programs. Our conclusions are similar for the US and Sweden, which is expected given the similarity of the Swedish and US course and program structures. [6]

Most textbooks (27) do not include any references in the subject index to the investigated concepts. "Entrepreneur" is mentioned in the index of six books. Three of those concern macroeconomics: Acemoglu (2009), Aghion and Howitt (2009) and Romer (2012). The other three are Mas-Colell et al. (1995) on microeconomics, Bolton and Dewatripont (2005) on contract theory, and Salanié (2011) on taxation.

Compared with the results of Johansson (2004), the main difference is found in the introduction of Acemoglu (2009) and Aghion and Howitt (2009) as course literature. Acemoglu (2009) contains extensive coverage of institutional economics and a moderate amount of discussion of the role of entrepreneurship in economic development. It is in use at three US schools (MIT, Stanford and the University of Pennsylvania) and two Swedish doctoral programs (the SDPE and Uppsala). The Aghion and Howitt (2009) text includes an extensive discussion of Schumpeterian growth models and institutional economics and is in use in one Swedish program (SDPE).[7]

The most widely used textbook, Mas-Colell et al. (1995), makes one reference to "Entrepreneurs" in an exercise (p. 475):

> Entrepreneurs go to banks to borrow the cash to make the initial outlay (assume for now that they borrow the entire amount). A loan contract specifies an amount R that is supposed to be repaid to the bank. Entrepreneurs know the type of project they have, but the banks do not. In the event that a project yields profits of zero, the entrepreneur defaults on her loan contract, and the bank receives nothing. Banks are competitive and risk neutral. The risk-free rate of interest (the rate the banks pay to borrow funds) is *r*. Assume that…

[6] The four of textbooks that do not contain a subject index have been excluded from the analysis. After examining them, we conclude that they do not cover entrepreneurship theories. Thus, excluding them does not have an impact on our conclusions.

[7] Philippe Aghion received the Global Award for Entrepreneurship Research in 2016 (www.e-award.org).

The entrepreneur is not mentioned at all in the fundamental function of Schumpeterian, Knightian or Kirznerian theory, and these scholars are not included in the reference list. Instead, the entrepreneur represents a generic borrower. The terms "innovation", "invention" and "institutions" are also absent in the subject index.

Salanié (2011) makes one reference to "Entrepreneurial capital". In the conclusions on page 150, he writes:

> Returns to capital are notoriously risky, unlike the model in this chapter in which r and $F_K(t+1)$ were nonrandom. This matters most in that different individuals may be better in investing their assets, and risky returns to capital may also be driven partly by the effort of the investors. The risky returns show up, in particular, in entrepreneurial capital. Entrepreneurial effort generates returns that are highly idiosyncratic, and that are only partly appropriated by entrepreneurs (e.g., because of spillover effects of new knowledge, or the limited duration of patents). The returns to entrepreneurial capital could be subsidized then at least relative to other forms of capital income.

There is no further discussion of the "entrepreneur", and the term is not mentioned before or after this passage. No references are made to the other concepts investigated. Hence, no definition of the entrepreneur assigns her/him a distinct economic function that distinguishes the entrepreneur from other actors. Neither Knight nor Kirzner are used as references. The text does not refer to Schumpeter (1934) or Schumpeter (1942), although Schumpeter (1949), which discusses the communist manifesto in economics and sociology, is mentioned.

Romer (2012) relates to Baumol's (1990) and Murphy et al.'s (1991) argument that society's incentive structure allocates talent toward different uses. He refers to "entrepreneurship" in one paragraph (pp. 120–121) [8]:

> Murphy, Shleifer, and Vishny provide a general discussion of the forces that influence talented individuals' decisions whether to pursue activities that are socially productive. They emphasize

[8] Another reference is made on page 127; this reference does not mention entrepreneurship but rather patents in the context of endogenous growth.

> three factors in particular. The first is the size of the relevant market: the larger is the market from which a talented individual can reap returns, the greater are the incentives to enter a given activity. Thus, for example, low transportation cost and an absence of barriers to trade encourage entrepreneurship; poorly defined property rights that make much of an economy's wealth vulnerable to expropriation encourage rent-seeking. The second factor is the degree of diminishing returns. Activities whose scale is limited by the entrepreneur's time (performing surgeries, for example) do not offer the same potential returns as activities whose returns are limited only by the scale of the market (creating inventions, for instance). Thus, for example, well-functioning capital markets that permit firms to expand rapidly tend to promote entrepreneurship over rent-seeking. The final factor is the ability to keep the returns form one's activities. Thus, clear property rights tend to encourage entrepreneurship, whereas legally sanctioned rent-seeking (through government or religion, for example tends to encourage socially unproductive activities.

No explicit reference is made to any distinct function of entrepreneurs that makes them different from other economic actors, for instance, surgeons. Furthermore, the quotation implies an oppositional relationship between entrepreneurship and rent-seeking. Hence, the author overlooks the distinction between productive and unproductive entrepreneurship, which is surprising, considering that the citation provided is Baumol (1990). The very point of Baumol (1990) is to expand Schumpeter's concept of entrepreneurship to include unproductive and destructive activities, and he particularly singles out rent-seeking as an unproductive entrepreneurial activity.[9]

Innovation and invention are not mentioned in the subject index. Schumpeter, Knight and Kirzner are not in the reference list. Four references are made to institutions. The only link to entrepreneurship is that provided in the quotation above.

[9] Productive activities create wealth; unproductive activities redistribute it; and destructive activities (e.g., war enterprises) destroy wealth.

Bolton and Dewatripont (2005) makes ten references to "Entrepreneurs" in the subject index and uses the term extensively. The entrepreneur is again treated as a borrower who borrows from an investor. Innovation and invention are not included in the subject index. Neither Schumpeter nor Kirzner appear in the reference list. Knight is included, but his fundamental distinction between risk and uncertainty is not made clear in the text. On the contrary, the concepts of risk and uncertainty are treated synonymously and are used interchangeably. No reference is made to institutions.[10]

Aghion and Howitt (2009) make the second most references to "Entrepreneur" (12 references). They develop an alternative model of endogenous growth, in which growth is generated by a random sequence of quality-improving innovations. It is called "Schumpeterian" because it attempts to model the process that Schumpeter (1942) termed "creative destruction", i.e., new innovation challenges and—if successful—replaces previous structures. The model, a general equilibrium model, assumes that one final good is produced by perfectly competitive firms using labor and a single intermediate product as inputs. The intermediate product is produced by a monopolist in each period. A new agent, termed the "entrepreneur", is introduced on page 87. The entrepreneur can decide in each period if attempting innovation is worthwhile.

> In each period there is one person (the "entrepreneur") who has an opportunity to attempt an innovation. If she succeeds, the innovation will create a new version of the intermediate product, which is more productive than previous versions.

If innovation succeeds, the entrepreneur becomes a monopolist and receives the monopoly profit from the improved productivity of the intermediate good. This basic setup is then developed in a number of ways, for instance, allowing for general purpose technologies, the

[10] One reference to institutional design reads, "Institutional design. See organizational design". Organizational design concerns itself with the design of workflows in a business context.

effect of trade liberalization on innovation and growth or the environmental impact of innovation.

We can make several observations with regard to this formalization of the entrepreneurial function. First, it is a more extensive treatment of entrepreneurship than is the rule in macroeconomics, as the model captures the notion that productivity growth is driven by entrepreneurs' decisions. It constitutes what is probably the most serious attempt at the mathematical formalization of entrepreneurship-related topics in the examined literature. However, we also note that Schumpeter's definition of the entrepreneurial function is not discussed. The entrepreneur is simply defined as the agent who makes the research decision and who subsequently obtains the monopoly profit from research investment (note that "research" is a broad term that encompasses many different activities).

No distinction is made between invention and innovation, and these activities are combined into a single research and development decision. The inventor's function is consequently not recognized. "New combinations" are not mentioned, and different types of innovations and their relative importance are not discussed. The model can easily be reconciled with "Schumpeter Mark II" and with "Schumpeter Mark I". This is also supported by the fact that the one reference to Schumpeter (1912/1934) concerns the importance of financing for firms. It is perhaps telling that Aghion and Howitt (1992), who first outlined the "creative destruction" model of growth, never mention "entrepreneur" or "entrepreneurship".

Aghion and Howitt have developed the Schumpeterian growth framework further since the publication of their textbook. Hence, future updates to the textbook may incorporate a richer view of entrepreneurship. However, recent work contains no further development of the concept of the entrepreneur; see Aghion (2016) and Aghion et al. (2015a, b) for an overview of their current work on entrepreneurship.

Acemoglu (2009) emphasizes the fundamental causes of growth and particularly covers the role of institutions and secure property rights in the generation and application of new technology. Technology is not limited to production and production processes; it is instead given a broad meaning that refers to general advances in knowledge. He makes 15 references to the "entrepreneur", who is introduced as follows (pp. 556– 557):

> Consider the problem of a single entrepreneur with a risk-neutral objective function
>
> $$\sum_{t=0}^{\infty} \beta^t c(t)$$
>
> This entrepreneur's consumption is given by the income he generates in that period (there is no saving or borrowing). If the entrepreneur uses an idea of quality *a(t)*, he can then produce income equal to
>
> $$y(t) = a(t)$$
>
> at time *t*. At *t*= 0, the entrepreneur starts with *a*(0)=0. From then on, at each date, he can either engage in production using one of the techniques he has already discovered or spend that period searching for a new technique. Let us assume that each period in which he engages in such a search he gets an independent draw from a time-invariant distribution function *H(a)* defined over a bounded interval $[0,\bar{a}]$.
>
> Therefore the decision of the entrepreneur at each date is whether to search for a new technique or to produce with one of the techniques he has discovered so far. Since there is no saving or borrowing, the entrepreneur simply consumes his current income *c(t) = y(t)*.

In short, this framework is similar to that presented in Aghion and Howitt (2009). Acemoglu refers to both early and late Schumpeter, but he presents no explicit definition of the "entrepreneur" and does not discuss the entrepreneur's economic function in any depth. He makes no reference to "invention". Acemoglu does occasionally distinguish between invention

and innovation in the text, without defining the terms explicitly. Institutions and their importance for entrepreneurship and economic growth are discussed at length.

While "innovation" is covered in a few textbooks in macro and industrial organization, "invention" is never mentioned in the index, indicating that the difference between coming up with a novel idea and commercializing that idea is not made in these books.

Only four books refer to "institutions" in the reference list, which is remarkable considering that this concept is increasingly recognized as fundamental for the organization of markets and economic growth. Acemoglu (2009) and Aghion and Howitt (2009) make numerous references, 92 and 32, respectively, and Acemoglu particularly emphasizes institutional factors as fundamental in explaining economic growth. Romer (2012) makes four references to institutions, and Sørensen and Whitta-Jacobsen (2010) make two.

With regard to elective courses in economics doctoral programs, our results show that courses in entrepreneurship, institutional economics and related courses are rare in both countries. In the US, only Harvard University offers an elective economics doctoral-level course in entrepreneurship. Courses in institutional economics, broadly defined, are more common: in the US, MIT, Stanford, Berkeley, and Yale offer various courses in institutional economics. The University of Chicago, Stanford and Berkeley offer courses in the related area of innovation and creativity.

In Sweden, only Jönköping University offers courses in entrepreneurship. Jönköping is also the only Swedish economics PhD program to offer a course in innovation. These courses are not economics courses, and they are taught by teachers in management and business administration. Only Lund University offers a course related to institutional economics, although it focuses only on institutions in the Chinese economy.

We conclude that none of the investigated textbooks clearly defines the entrepreneur or the entrepreneur's economic function. Acemoglu and Aghion and Howitt are partial exceptions to

this rule, as their Schumpeterian growth models relate the entrepreneur to innovation and creative destruction, although without going into deeper theoretical discussions with regard to the entrepreneur's economic function. The examined textbooks also do not cite previous work on the history of the thought on entrepreneurship, such as Blaug (1986), Barreto (1989) or Hébert and Link (1989). All textbooks fall well within the mainstream paradigm and are grounded in general equilibrium theory. Acemoglu (2009), for instance, writes (page 23):

> Our next task is to systematically develop a series of models to understand the mechanics of economic growth. I present a detailed exposition of the mathematical structure of a number of *dynamic general equilibrium models* that are useful for thinking about economic growth and related macroeconomic phenomena, and I emphasize the implications of these models for the sources of differences in economic performance across societies. Only by understanding these mechanics can we develop a useful framework for thinking about the causes of economic growth and income disparities. [our italics added]

Aghion and Howitt (2009) argue in the same vein; the introductory paragraph (page xvii) reads:

> To learn about the economic growth you need *formal theory*, for organizing the facts, clarifying causal relationships, and drawing out hidden implications. In growth economics, as in other areas of economics, an argument that is not disciplined by a clear theoretical framework is rarely enlightening. [our italics added]

This framework has been argued to help explain the absence of any clear definition of entrepreneurship in the literature surveyed. It has simply proven too difficult to "fit" the entrepreneur—who disturbs the equilibrium by introducing change—into equilibrium models, particularly with regard to the role of entrepreneurs in managing uncertainty (Barreto 1989; Hébert and Link 2006; Winter 2016). The main potential challenge to this argument is posed by Schumpeterian growth models, particularly if they develop in a way that enables them to

capture more aspects of the entrepreneurial function. We observe a development over time, where the "entrepreneur" is not covered in older textbooks but tends to be included in more recent ones. One possible explanation for this finding is that growth theory has undergone a development from exogenous growth to endogenous growth and then tentatively to Schumpeterian growth models. If this interpretation is correct, we will expect the entrepreneur to make more frequent appearances in future textbooks.

5 Conclusions

What makes economies grow and nations prosper? We argue that entrepreneurship and institutions are key factors in answering this question. This view is supported by economic history and contemporary economic development. Therefore, we expect theories on entrepreneurship and institutions to be covered in textbooks that are taught in core doctoral courses in economics—the academic discipline that intends to explain the wealth of nations.

We find that the vast majority of textbooks used in the US and Swedish economics doctoral programs leave out the "entrepreneur" as a concept entirely. When used, the concept is generally watered down and is not given a clear definition that is grounded in established definitions, such as his/her role in introducing new combinations (Schumpeter), seizing business opportunities (Kirzner) or bearing uncertainty (Knight).

We can also conclude that the Schumpeterian division of the economic development process into invention and innovation is not used in core economics textbooks. While innovation is occasionally discussed, invention is not. When theories of entrepreneurship are not considered, not differentiating between the two is logical. The entrepreneur is the link between a novel idea (invention) and its commercialization (innovation), and making a clear distinction between these activities is unnecessary if the entrepreneurial function is absent. This

partly explains the strong emphasis on research and development as the primary determinant of growth in growth modeling. A greater emphasis on the importance of entrepreneurship will potentially shift the focus toward incentives and institutional conditions for entrepreneurship and commercialization.

Most textbooks do not refer to institutions, with the exception of Acemoglu (2009) and Aghion and Howitt (2009), who give this concept significant attention. Issues related to entrepreneurship, the institutional context, and the interplay of the two are consequently generally left out or considered peripheral in core economics textbooks. This picture is confirmed by our analysis of course offerings. Some elective courses in entrepreneurship, institutional economics and innovation exist in economics doctoral programs, but they are scarce.

Our results do not imply that economics as a discipline is blind to factors such as innovation and technological development. Rather, these topics are treated using a different conceptual toolkit compared with entrepreneurship research, with a strong emphasis on the research and development allocation decision.

We argue that the superficial treatment currently given to entrepreneurship in economics harms our understanding of the process of economic growth. After all, how can growth processes be properly understood and studied without including and clearly defining the economic actor that makes economic change happen? Current textbook discussions of entrepreneurs, innovation and economic growth, when present, constitute a regression compared with earlier literature in general. The few textbooks that include the entrepreneur do not clearly define his/her economic function, do not recognize the difference between invention and innovation and do not provide a nuanced discussion of different types of innovations. Hence, current textbooks lack many of the basic insights that, for instance, Schumpeter (1934) provided us.

However, some signs indicate that the entrepreneur is once again receiving serious attention in economics. Two of the newer macroeconomics textbooks (Acemoglu and Aghion and Howitt) include a more ambitious treatment of entrepreneurship than earlier textbooks. The extent of the coverage given to the entrepreneur's economic role is still limited in many ways. Still, the presence of serious attempts to model the role of entrepreneurship in the growth process may point to a renewed interest in the topic.

We conclude that the current state of affairs omits what many consider critical aspects of the mechanisms behind economic action and economic growth. Some tentative signs suggest that this state of affairs is changing. Still, the entrepreneur's long-term absence from "mainstream economics" may have real-world consequences. A key role of economists is to advise policymakers. A lack of understanding of one of the fundamental causes of growth can thus lead to ineffective or harmful economic policy.

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Table 1. Keyword analysis – keywords

Textbook	*Book topic*	*US*	*Swe*	*Entrepreneur*	*Innovation*	*Invention*	*Institution*
Acemoglu (2009)	Macro	3	2	*15*	*42*	*0*	*92*
Aghion and Howitt (2009)	Macro	0	1	*12*	*41*	*0*	*16*
Bewley (2009)	Macro	1	0	0	0	0	0
Blanchard and Fisher (1989)*	Macro	1	1	0	0	0	0
Bolton and Dewatripont (2005)	Micro	2	0	10	0	0	0
Carlton and Perloff (2005)	Industrial Organization	1	0	0	0	0	0
Cooley (1995)	Macro	2	0	0	0	0	0
Dixit and Pindyck (1994)	Investment theory	1	0	0	0	0	0
Feldman and Serrano (2006)	Macro	0	1	0	0	0	0
Fudenberg and Tirole (1991)	Game Theory	2	0	0	0	0	0
Galí (2008)	Macro	2	2	0	0	0	0
Gibbons (1992)*	Game theory	1	0	0	0	0	0
Hart (1995)	Contract Theory	1	0	0	1	0	0
Jehle and Reny (2011)*	Micro	1	0	0	0	0	0
Kreps (2012)	Micro	4	1	0	0	0	0
Krusell (2007, 2014)	Macro	0	4	N/A	N/A	N/A	N/A
Laffont and Martimort (2002)*	Micro	0	1	0	0	0	0
Ljungqvist and Sargent (2012)*	Macro	8	4	0	3	0	0
Luenberger (1969)*	Optimization	1	0	0	0	0	0
Mas-Colell et al. (1995)*	Micro	14	7	1	0	0	0
McAfee and Lewis (2009)	Macro	0	1	N/A	N/A	N/A	N/A
Myerson (1991)	Game Theory	1	0	0	0	0	0
Obstfeld and Rogoff (1996)*	Macro	0	2	0	0	0	0
Osborne and Rubenstein (1994)	Game Theory	1	0	0	0	0	0
Pissarides (2000)*	Macro	0	1	0	0	0	0
Romer (2012)*	Macro	3	1	2	0	0	4
Rubinstein (2007)	Micro	1	0	N/A	N/A	N/A	N/A
Salanié (2005)	Contract Theory	0	1	0	0	0	0
Salanié (2011)	Taxation	0	1	1	0	0	0
Stokey and Lucas (1989)*	Macro	7	0	0	0	0	0
Sørensen and Whitta-Jacobsen (2010)	Macro	0	1	0	0	0	2
Tirole (1988)*	Industrial Organization	6	0	0	10	0	0
Tirole (2006)	Corporate finance	1	0	0	0	0	0
Uribe and Schmitt- Grohe (2014)	Macro	1	0	N/A	N/A	N/A	N/A
Varian (1992)*	Micro	2	8	0	0	0	0
Vives (1999)	Industrial Organization	0	1	0	0	0	0
Wickens (2012)	Macro	2	0	0	0	0	0
Total:		**67**	**40**	**41**	**104**	**0**	**114**

Note: *Covered in Johansson (2004). N/A = no index is available. The "Book topic" column refers to mentions of "entrepreneur" by book topic. The "US" and "Swe" columns refer to number of times that a book is used in the US and Sweden.

Source: Authors' table.