



# What *does* determine the profit rate? The neoclassical theories presented in introductory textbooks

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The theory of the profit rate varies across introductory texts. Economic profits are caused by entrepreneurship, or not. Entrepreneurship is a kind of human capital, or not. Normal profits are determined in the money market, the market for loanable funds, or a hybrid market involving demand or supply of physical capital. The downward-sloping demand for capital reflects diminishing marginal productivity (the Cambridge controversy is forgotten), or rank-ordered investment projects. The supply is a physical capital stock, accumulated or current saving(s) (or wealth), or desired accumulation. We conclude that the inconsistencies and confusions in the textbooks reflect the state of high theory.

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'All I really need to know I learned in Kindergarten'.

Robert Fulghum

## 1. Introduction

The theory of the profit rate is the cornerstone of any economic theory, since profit 'is the prime mover, or energizer, of the capitalistic economy' (McConnell and Brue, 1993B, p. 284). Thirty years after the Cambridge challenge to neoclassical theory, we were interested to discover how economists explain capital and the profit rate. As anticipated, we find that there is no consistent, widely accepted theory, signalling an ongoing crisis in mainstream economics.

In this paper, we choose to search for the theory of the profit rate in introductory economics textbooks.<sup>1</sup> The reason is twofold. First, it is at the introductory level that neophyte economists learn the intuitive explanation of the general theory. Upper-level and graduate courses, and ultimately research, build on this foundation. If the theory of the profit rate is confused at the beginner's level, this anticipates a problem at the level of high theory. (See also Aslanbeigui and Naples, 1996, p. 2)

Second, the inclusive nature of introductory texts gives us the opportunity of looking at the whole of received theory. Economists can make major contributions through

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<sup>1</sup> Because the introductory textbooks surveyed deal exclusively with neoclassical theory, the comments below do not concern such non-neoclassical theories of the profit rate as Marxian, Post-Keynesian, or Sraffian theory.

articles or books which address a piece of the theory. But in one textbook, scholars must bring together what economists often treat in disparate literatures or even separate introductory courses. The textbook author's need for comprehensiveness exposes inconsistencies in the theory of saving(s), profits, entrepreneurship, and the interest rate which may otherwise hide away in their separate academic domains. Moreover, academic articles can presuppose the neoclassical paradigm, while introductory texts must make assumptions explicit and justify them.

The absence of a commonly accepted theory of the rate of profit is indicated by the tremendously varied treatments of the theory *within* and *across* textbooks. The next generation of economists is being taught a mixture of neoclassical, Keynesian, and additional *ad hoc* theories of the profit rate.<sup>1</sup> This fundamentally differentiates profits from other factor incomes, like wages and rents, which are more uniformly treated.

The strange amalgam is often confusing, incomplete, and inconsistent. At times authors provide two contradictory explanations side-by-side, as if to allow the reader to choose; at others, contradictory theories are mixed together without attention to the resulting inconsistencies. The reader leaves the textbooks more confused about what determines the profit rate in neoclassical theory than when s/he began.

No textbook provides an internally consistent theory of the profit rate in either the short run or the long run. Since internal consistency is heralded as one of the hallmarks of neoclassical theory (see Friedman, 1953, pp. 3–26), the theory must be questioned.

Section 2 explains our methodology in choosing a sample of eight textbooks. We divide the theory of the profit rate in two. Section 3 describes the theory of short-run profits, often linked to entrepreneurship. Section 4 discusses the theory of the normal or long-run profit rate, typically equated with the interest rate. In conclusion, the paper explores the ramifications of these introductory treatments for the neoclassical theory of the profit rate.

## 2. Methodology

We chose our sample of the top introductory economics textbooks by surveying three major textbook publishers who perform their own market research.<sup>2</sup> As the information revealed to us is proprietary and closely guarded, we present their assessment in a general, rank-order format, with more precise statistics only where there was consensus among the publishers surveyed.

The three publishers agreed on the top three texts: McConnell and Brue; Baumol and Blinder; and Byrns and Stone. Together they account for 35–40% of the market—20% for McConnell and Brue. There is less agreement on how to rank the other texts, reflecting the fact that each remaining text accounts for approximately 5% of the 1.1–1.2 million book market. Therefore, small survey errors can easily change their rank-order. Clearly, Lipsey, Steiner, Purvis and Courant (hereafter Lipsey *et al.*) and Miller belong somewhere in the top six and seven respectively; Parkin, and Ruffin and Gregory, rank somewhere between sixth and tenth. Only one publisher put Samuelson and Nordhaus in the top 10, yet it too represents about 5% of the market. Given the importance of

<sup>1</sup> Following neoclassical theory, the textbooks do not distinguish between a theory of the source or cause of profit, and the theory of the allocation of profits as a return on capital, as non-neoclassical theories typically do.

<sup>2</sup> Our survey was conducted during spring, 1992. The top 4 textbooks have fairly stable market shares and rank orders; the remaining texts frequently change their rankings, since new editions outsell books which are in their third year.

Samuelson's text in the postwar period and his participation in the capital controversy of the early 1960s, we include Samuelson and Nordhaus in our study as well.

These eight books then represent 60–65% of the introductory economics textbook market. We have included both microeconomics and macroeconomics texts in the analysis, because interesting inconsistencies and discrepancies arise across the two sections.

### 3. Economic profits

All authors except one (Parkin) divide total profits into two distinct categories which they study separately: normal profits, assessed in both the short and long run, and economic profits, received only in the short run. This is not symmetric to the usual treatment of factor incomes. For instance, there is no special name for temporarily high wages reflecting labour scarcity: these are just rents.<sup>1</sup>

Economic profits are not just rents. For half of our sample, they are the return to a separate factor of production, entrepreneurship. Another three authors explain economic profits under several sub-headings, most notably as returns to innovation and risk-taking. Only one (Parkin) does not have a separate discussion of the determinants of economic profits in his chapter on the profit rate, briefly mentioning economic profits in other chapters.

Even those texts which recognise entrepreneurship as a resource *also* have additional sections discussing innovation and risk-taking as sources of economic profits related to the entrepreneurial factor. Like the texts, we begin with entrepreneurship and then turn to these additional/related explanations for economic profits.

#### 3.1. Entrepreneurship

There is no single uniform definition of what entrepreneurship is. Most of our sample (McConnell and Brue; Baumol and Blinder; Byrns and Stone; Ruffin and Gregory; and Miller) treat entrepreneurship as a factor of production, a resource which contributes to the economy's production possibility frontier (PPF), and therefore creates value and earns profits. Two texts (Lipsey *et al.* and Parkin) do not see entrepreneurship as a resource *per se*, and observe that the owner claims the firm's residual income; the word entrepreneur is not even included in their indices. Whether the entrepreneur 'creates' this residual income or merely claims it is left vague.

The remaining authors (Samuelson and Nordhaus) do not include entrepreneurship as a resource underlying the PPF. They insist that 'innovator(s) or entrepreneur(s) . . . should not be confused with managers' who 'run large and small companies, but do not own a significant part of the equity' (1992B, p. 279). But in another context, they argue that government 'can help [develop] entrepreneurship by setting up extension services for farmers, educating and training the work force, establishing management schools' (1992A, p. 367).<sup>2</sup> They thus try to straddle the two distinct notions of entrepreneur as capitalist, and entrepreneurship as human capital. When entrepreneurship is not human capital, nor a factor of production, it is unclear whether or how it creates value.

<sup>1</sup> Thus labourers whose utility functions warrant labour-force entry at a wage below equilibrium earn what Marshall preferred to call a quasi-rent. The rent does not reflect their particular scarce productivity (like Ricardo's differential rent paid to higher-productivity land). Rather, like the consumers' surplus this rent derives from the fact that market averages rule, and these workers happen to deviate from the average.

<sup>2</sup> Compare this with Baumol's and Blinder's observation that 'No one really knows what features of economic organization and social psychology actually lead a community to adopt these goals' (1990B, p. 444) of entrepreneurship and the work ethic.

*3.1.1. Entrepreneurial ability: labour?* Most authors who recognise entrepreneurship as a factor of production (McConnell and Brue; Byrns and Stone; Miller; and Ruffin and Gregory) identify entrepreneurial ability as a special human resource, a talent for organising. Ruffin and Gregory suggest that 'the term *labor* . . . can be stretched to mean entrepreneurial labor as well' (1990, p. 33).<sup>1</sup> Why then is entrepreneurship treated separately from other kinds of human capital? Why does the entrepreneur receive extraordinary returns rather than wages that reflect a normal return on their human capital? None of the textbooks answers this question.

Some authors hint that entrepreneurship warrants separate consideration because it is a very scarce talent. But then, like Pavarotti's voice, the payment to such a factor would be a rent derived from scarcity—most of our sample discuss the case of scarce labour talents in their section on land rent. Byrns and Stone characterise economic profits as a 'pure rent to the firm's owners' (1992B, p. 368). But then why is this rent assessed as a return on their capital? Miller observes the insuperable difficulties in quantifying entrepreneurship in order to study the supply of and the demand for this factor, and therefore proposes focusing on its reward: profits.

Despite these authors' best efforts, 'entrepreneurship' inevitably returns to notions of human talents and skills without explaining why this type of human capital earns economic profits. We would suggest that entrepreneurial ability only garners profits (whatever their source) if the entrepreneur is the firm's owner.<sup>2</sup> At best there might be a synergy: a certain scarce type of human capital, in combination with the means of production, creates excess profits. Yet this is at odds with the marginalist method which treats factor contributions as additive, rather than as complementary. Complementarity makes it impossible to separate the marginal contribution of one factor from another. Total profits could no longer be divided into normal profits, explicable by capital invested alone, and economic profits, explicable by entrepreneurship.

*3.1.2 Entrepreneurship: if not labour, what is it?* Those who try not to define entrepreneurship as a special human resource have some difficulty clarifying its distinctness. Baumol and Blinder refer to entrepreneurship as a 'rather mysterious' factor of production. They claim that entrepreneurship is 'the *act* of starting new firms, introducing new products and technological innovations, and, in general, taking the risks that are necessary in seeking out business opportunities' (1990B, p. 402; repeated in glossary, p. G-3, emphasis added). But this '*action*' defines the *flow* of factor services, not the factor itself which provides the service. In their chapter on economic development, Baumol and Blinder are not as careful to avoid the human capital characterisation. They represent entrepreneurship as 'the leadership that . . . undertakes the daring industrial ventures' (*ibid.*, p. 444), defining entrepreneurship as a special human quality, a capacity to act rather than an action *per se*.

Samuelson and Nordhaus also attempt to avoid equating entrepreneurship and human capital, and do not list it among their factors of production. In their chapter on economic development, however, they include 'confront [labor] strife'<sup>3</sup> in the list of what 'owners

<sup>1</sup> In their chapter on economic profits, however, Ruffin and Gregory change course to treat entrepreneurship as one of the three factors of production separate from labour (1990, p. 743).

<sup>2</sup> McConnell and Brue observed that '[a] part of the entrepreneur's return . . . is called a *normal profit*' (1990, p. 621); then entrepreneur must be a synonym for capitalist.

<sup>3</sup> The previous edition of Samuelson's and Nordhaus' textbook explicitly stated 'confront labor strife' (1989, p. 899). Having dropped 'labor' in the present edition (1992A), the reader wonders how a manager's or owner's confronting of strife is any different from the behaviour of anyone else who lives in a stressful society.

or managers' with an 'entrepreneurial spirit' must do for a country to thrive (1992A, p. 367, emphasis added). Entrepreneurship is then just a euphemism for 'being a capitalist'.

Lipsey *et al.* and Parkin do not mention entrepreneurship at all. Profits are not value created by this factor. but simply whatever is left after other factors are paid their marginal revenue products. Economic profits accrue to the firm's owner. Byrns and Stone also treat economic profits as a residual, and McConnell and Brue describe the entrepreneur as the 'residual claimant' (1993B, p. 283). This is inconsistent with both texts' characterisation of entrepreneurship as a factor of production which contributes to value.

The range of definitions among introductory texts reflects the slipperiness of the concept of the entrepreneur as proposed by Frank Knight (1921). Early in his inquiry, Knight portrayed entrepreneurship as a special kind of human capital, like the first group of textbooks. He observed 'the tendency of . . . groups themselves to specialize, finding the individuals with the greatest managerial capacity of the requisite kinds and placing them in charge of the work of the group' (*ibid.*, p. 269). But Knight did recognise that this broad notion of entrepreneurship reduces to unique labour qualities, or human capital (hence the usefulness of management-training programmes). He therefore distanced himself from this inclusive approach, turning to a more limited definition of entrepreneurship:

It is the function of the operative in industry to deal with uncertainty as a matter of routine! . . . The responsible decision is not the concrete ordering of policy, but ordering an orderer as a 'laborer' to order it . . . in organized activity the *crucial* decision is the selection of men to make decisions, that any other sort of decision-making or exercise of judgment is automatically reduced to a routine function. (*ibid.*, p. 297)

Thus the quality of entrepreneurship enables owners to make a better choice of who will actively run the company. When stockholders choose the Board of Directors, who in turn choose the CEO, they have made the 'crucial' decision. Since they only get to choose because they own shares in the company, entrepreneurship and ownership are inextricably linked (*ibid.*, p. 304).

### 3.2. *Why do economic profits exist?*

Even the introductory texts which identify entrepreneurship as a factor of production have separate sections detailing the role of the immediate causes of economic profits: innovation and uncertainty.<sup>1</sup>

3.2.1. *Innovation.* Several texts cite Joseph Schumpeter on the importance of process- and/or product-innovations in providing economic advantages for a firm. Each entrepreneur innovates, and by so doing gives him/herself the possibility of running ahead of the crowd of other entrepreneurs. The successful innovator reaps economic profits.

For Schumpeter, the owner of small firms is the innovator; under joint-stock companies, the innovative drive is lost, and large firms eschew the risks associated with ongoing innovation. However, the textbook discussions seem to link innovation with corporations rather than small firms, without reducing innovation to the consequent

<sup>1</sup> A frequently cited explanation of economic profits is monopoly. In these texts, monopoly is treated as a derivative of innovation which, if successfully protected from imitation, will contribute to profits (or properly, capitalised rents) in the long period.

institutionalised and predictable process Schumpeter foresaw. Several texts allude to the entrepreneur who builds up large firms and amasses wealth, figures like Rockefeller and Ford (Ruffin and Gregory, 1990, p. 760). The reader is left to wonder whether the imperfect competition implied by the existence of such large firms is to be competed away in the long run along with economic profits, or whether this discussion presupposes a very different theory of competition.

The link between economic profits and innovation is questionable. It is not clear that the innovator reaps any or all economic profits, even assuming that innovation creates value. In large firms, there is no single innovator. A staff of researchers (in science facilities and in production sites) discover new possibilities, and a management group develops a series of possible investment strategies based in part on that research. The staff who discovered the economic opportunities do not get the economic profits their ideas contribute to, unless supervisors choose to pay them a share of the economic profits as bonuses. Economic profits do not automatically accrue to those who innovate. Yet marginal productivity theory argues that factors earn their marginal revenue products.

Moreover, it is questionable whether the recipient of economic profits plays any innovative role. The stockbrokers who get economic profits have only contributed to innovation to the extent that they have actually voted for the Board of Directors (many do not vote), and their wise choice of the Board led to a wise innovation strategy and/or a wise CEO for the company who hired effective staff. If there is consensus on the market that this risk was worth taking, the value of stockholders' equity will reflect capitalised economic profits. But this consensus means that new stockholders who choose to buy into the company will not earn economic profits for picking the right contender among all innovating companies, despite the fact that the returns to innovation have not yet been realised. If there is no market consensus, the original (innovating) stockholders will be forced to hold their stocks until the benefits of innovation are realised to get all the economic profits. If they sell out, the economic profits will not be captured by them but by the new owners who put their capital at risk by being committed to planned innovations when the market is doubtful about the outcome. Innovation by itself does not explain the distribution of economic profits.

*3.2.2. Risk/uncertainty.* Uncertainty is often treated as an independent 'source' of economic profits, which takes us out of the realm of perfect information that frames the introductory texts' discussion of factor incomes. Many texts mistakenly use risk and uncertainty interchangeably. Two (McConnell and Brue; and Byrns and Stone) differentiate insurable risk—regarding events which firms can 'reliably predict' (Byrns and Stone, 1992B, p. 369), such as the weather—from uninsurable 'risk', *viz.*, uncertainty. They follow Frank Knight, who, they observe, insisted that uncertainty 'makes it impossible to anticipate pure economic profits or losses' (1921, p. 369).

Others (Lipsey *et al.*; Ruffin and Gregory; Parkin; and Samuelson and Nordhaus) argue that stockholders and/or financiers will assign a 'risk premium' to investments which they expect to have a higher variance of earnings. That is, risk-averse investors must be compensated for increasing their probability of failing to earn at least normal profits from any venture. This presupposes that investors can assess risk accurately, rather than suffering from herd propensities to excessively under- or over-assess it. Baumol and Blinder point out that this assumption is not obvious. If investors tend to be bullish, those who invest in risky stocks will earn *lower* than average returns, having in effect to pay for the privilege of putting their capital at risk. There is no guarantee of any

given 'risk premium'.<sup>1</sup> Despite investors' 'requirement' of a return on investment, companies may not have the capacity to pay out such a return.

Cross-section evidence is most frequently provided by the authors to justify the positive effect of risk on economic profits; e.g., oil-drilling firms have lower price/earnings ratios than the average firm because of the larger random element in successful drilling (Baumol and Blinder, 1991B, p. 420).<sup>2</sup> But if the expected profit rate is higher because owners are bearing risk, what exactly is at risk, the investor's capital? If so, why does the rational investor not buy a few shares of every firm in the industry, hedge his/her risk, and expect above-average profits while not bearing inordinate risk? Cross-section risk becomes insurable through diversification, yet it is argued that there is still a premium for bearing such risk.

Furthermore, such risk premia reflect guesses that may be totally inaccurate in light of investors' ignorance about the future. This ignorance is not mentioned by the authors who favour risk premia. Lipsey *et al.* assert that the firm 'will not carry on production unless it is compensated for the risk' (1990B, p. 180), despite the fact that the actual risks involved are unknowable in advance.

The risk argument for economic profits has the following unexamined implication for time-series comparisons as well. There should be higher average profits where and when there is greater uncertainty and greater possibility of failure. In other words, the average of bigger winners and bigger losers should be an even bigger net positive for those who invested: enterprise is akin to high-stakes gambling, and the bigger the gamble, the more gamblers benefit on average. Uncertainty is then a source of economic profits.

Yet over the post World War II period the business failure rate has been highest in the last 10 years when the profit rate was substantially below its peak of the mid 1960s. The econometric evidence for 1953–1993 indicates an inverse relationship between the ratio of profits to equity and business failures, rather than the positive relationship implied by the risk (uncertainty) explanation for the creation of economic profits (see Naples, 1996).

### 3.3. Summary

Of our eight texts, three (McConnell and Brue; Miller; and Ruffin and Gregory) pursue what Knight tried to avoid—they reduce entrepreneurship to human capital. This violates the notion that entrepreneurship is a special, unique factor which creates value. Another three (Baumol and Blinder; Byrns and Stone; and Samuelson and Nordhaus) struggle not to do the same, although not without inconsistent treatments of entrepreneurship as both a human resource and yet not reducible to a human resource. But if entrepreneurship is not a labour input, its measurement is an open question. In fact, there is no specification of the market for entrepreneurial services, or in particular the position and slope of the associated supply curve. Nor is it clear how the value that entrepreneurship receives as economic profits was created.

Regardless of the definition of entrepreneurship, its income, economic profits, only exists in disequilibrium (Kaldor, 1934). In the long run, reproducible conditions are copied by other firms while nonreproducible conditions are considered to garner rents instead of profits, which often become capitalised in the value of the company's stock. Moreover, all agents have perfect information, and no entrepreneurial services are

<sup>1</sup> Baumol and Blinder also observe that investors need not be risk-averse, gambling may in fact be enjoyable.

<sup>2</sup> Ruffin and Gregory are the only authors to present the debate about the evidence that profits are higher in risky industries. They cite a study which suggests that the risk-profit correlation is spurious, since the higher risk industries also happened to be more oligopolistic (1990, p. 759).

needed or possible.<sup>1</sup> Of all the factors of production, only entrepreneurship becomes defunct in neoclassical long-run equilibrium.

Moreover, *no one* suggests a marginal productivity analysis of the demand for entrepreneurship, although the marginal revenue product determines the demand for every other factor in either the short run or long run. The fact that entrepreneurship does not fit into the marginal productivity framework further underlines the awkwardness of the concept.

At best, entrepreneurship is just another word for capitalistic behaviour. The remaining two texts (Lipsey *et al.*, and Parkin) ignore Knight's nuance—the 'crucial choice' owners make in hiring their next-in-command—and give entrepreneurship no role in their explanation of the economic profits accruing to the firm.

Risk and innovation are advanced as theories of economic profit compatible with entrepreneurship as an economic resource. The corporate entrepreneur/capitalist does not actually choose to innovate, since the choice is usually made inside the firm. The risk argument is counterintuitive as an explanation for the profit rate over time (higher profits expected when your capital is at greater risk), and is invalidated by econometric research on business failures. No textbook presents a consistent theory of economic profits.

#### 4. Normal rate of profit

In the long run, the normal rate of profit and the rate of interest are equal and determined simultaneously. In general equilibrium theory, the rate of profit-interest is found by dividing interest earnings by the value of 'capital' (Hausman, 1981, p. 34). The rental prices of capital goods are determined simultaneously with all other prices. The value of 'capital' is calculated by a simple summation of the value of capital goods. Total normal profits or interest income are then the sum of all rental prices minus depreciation.

General equilibrium models are highly abstract and lack empirical content, which may explain why they are not included in introductory textbooks. Instead, the authors treat the rate of profit-interest in a partial equilibrium, supply-demand framework, under the rubric of factor pricing. The individual firm is assumed to buy resources (including capital goods) and sell products in competitive markets.

In their treatments of capital as a factor of production, all textbooks formally distinguish financial from physical capital. Four (McConnell and Brue; Baumol and Blinder; Miller; and Ruffin and Gregory) focus their attention on financial capital. Another three (Lipsey *et al.*; Byrns and Stone; and Samuelson and Nordhaus) discuss physical capital but assume the existence of a parallel financial market. Parkin's market combines the two: the demand side represents physical capital but the supply side represents the supply of wealth and/or savings.

In these texts, the distinction between financial and physical capital is more superficial than substantive. Abstracting from the government and consumers, the demand for financial capital (loanable funds) depends on the marginal revenue product of the capital goods that the funds permit firms to acquire. There is a simple linear mapping from the

<sup>1</sup> Miller speaks of a long-run 'normal return on the owner's entrepreneurial abilities', a notion which is difficult to sustain (1991B, p. 433). If these 'abilities' reflect human capital invested, the normal return is on that investment, not on the abilities; the abilities *per se* earn rents if they are scarce, which no competitive process will equalise over the long run to some 'normal' rate. Miller also departs from the norm by listing Marxian exploitation as a source of economic profits. However, his equation of labour and labour power is not Marxian.



demand for physical capital to the demand for loanable funds;<sup>1</sup> on the supply side, sources of finance internal to the firm (e.g. accumulated capital consumption allowances, retained earnings) are ignored. The supply of capital, therefore, becomes identical to the saving(s) of the households.

The financial and physical capital markets converge even more when it is further assumed that capital can be aggregated in monetary units, implicitly suggesting putty-capital. It is 'convenient' to present the quantity of capital in monetary units in order to add up different types of capital goods (Parkin, 1990, p. 448). At the same time, however, this raises the problem of circularity. To find the long-run value of aggregate capital we need to know the rate of profit-interest. But the equilibrium rate of profit-interest cannot be determined unless we have a value magnitude for the capital demanded. All textbooks treat the subject as if the Cambridge Controversy which generated much heat and debate did not occur.<sup>2</sup> Only Samuelson and Nordhaus insure themselves, at least partially, by assuming homogeneous capital.<sup>3</sup>

For all but two authors (Lipsey *et al.*; and McConnell and Brue), the basic structure of the model is the same. The profit-interest rate is determined by the supply of and the demand for capital (financial or physical). The rate of return<sup>4</sup> on investment, which is based on the marginal revenue product of capital goods purchased, is compared to the rate of interest. At a lower interest rate, more investments are lucrative, hence, the demand for capital is negatively sloped. The willingness of savers to provide savings at different rates of interest determines the supply side of the market. In cases where there is a distinction between short run (more accurately, momentary period) and long run, the shape of the supply curve varies from vertical to upward sloping.

Despite the existence of similarities in the basic model which determines the rate of profit-interest, significant differences emerge when the authors try to explain the slope of the demand curve, and the character of the supply curve. The variations are surveyed below.

#### 4.1. Demand: why is it downward sloping?

4.1.1. *Neoclassical: diminishing marginal productivity of capital.* Three authors (Byrns and Stone; Lipsey *et al.*; and Samuelson and Nordhaus) hold that the demand for capital as a factor of production has a negative slope because of diminishing marginal productivity. The aggregate demand for capital is a simple horizontal summation of all the individual marginal productivity curves which are also assumed to be downward sloping in the long run. As successive units of capital are applied to each company's fixed factors, the productivity of the incremental units diminishes, reflecting congestion. The fixed factors are generally assumed to include labour as well as land.

This approach is problematic. Diminishing returns result because individual firms face fixed factors in the long run. The authors, however, assume simultaneously that in the long run all factors are variable for the individual firm. To resolve the inconsistency, they

<sup>1</sup> Consequently, the demand for loanable funds is often imprecisely called a derived demand. Derived demand refers to the derivation of input demands from the consumer demand for output.

<sup>2</sup> See Harcourt (1972) and Hausman (1981) for excellent summaries and discussions of the Cambridge Controversy.

<sup>3</sup> In their previous edition (1989), Samuelson and Nordhaus use a Fisherian, intertemporal model to explain a structure of interest rates without resorting to the assumption of homogeneous capital. This appendix has been dropped from the recent edition (1992B).

<sup>4</sup> To be consistent with the textbooks, we shall call the various profit rates along the demand curve for capital rates of return, but we shall call the equilibrium rate of return the (normal) rate of profit-interest.

could perhaps follow Knight (or Kaldor) in arguing that the individual firm does have a fixed factor in the long run: entrepreneurship.

The supply of entrepreneur qualities in society is one of the chief factors in determining the number and size of its productive units . . . most of the other factors tend toward greater economy with increasing size in the establishment, and . . . the chief limitation on size is the capacity of the leadership (Knight, 1921, p. 283.<sup>1</sup>)

But when they state that in the long run all factors are variable for the firm, the textbook authors contradict their own treatment of the long-run demand for capital.

*4.1.2. Keynesian: rank-ordered investment projects.* Four authors (McConnell and Brue; Baumol and Blinder; Miller; and Ruffin and Gregory) make a different argument for the negative slope of the demand for capital. For these authors, firms face given investment projects with different expected rates of return. Investors rank-order the heterogeneous projects, adopting only those with rates of return which exceed the interest rate. When the interest rate falls, projects with lower rates of return become worthwhile.

This explanation can only succeed for a short-run model. In the long run, it is untenable to assume heterogeneous projects and returns because capital of higher productivity can be reproduced in other plants and firms, so the rates of return become equalised to the normal profit rate across investment projects. If the projects cannot be reproduced, then the higher rates of return earned by the inframarginal firms must be considered as economic rent reflecting monopoly advantage rather than normal profit.

*4.1.3. Mixed Keynesian and neoclassical.* Two textbooks treat capital as simultaneously homogeneous and heterogeneous. Parkin first makes an argument based on homogeneous capital. He then introduces heterogeneous capital in order to arrive at a continuous, downward sloping demand for capital. This is not necessary, since the usual assumption of perfect divisibility would suffice. Byrns and Stone mention both homogeneous capital and heterogeneous projects as possibilities but decide neither to choose between them nor to combine them. The two are simply different alternatives and it is up to the reader to decide which is preferable.

#### *4.2. Supply: existence? definition? slope? explanation?*

On the demand side of the capital market, there was consensus among our authors on the existence of the demand curve as well as on its slope, although they gave divergent answers to the question of why the demand for capital is downward sloping. On the supply side of the market, there seems to be no consensus on the following four questions: (i) Does the long-run capital market have its own supply-side? (ii) What exactly is supplied? (iii) What is the slope of the supply curve? And finally, (iv) Why does the supply curve have this slope? We can briefly summarise the answers to the first three questions here. Responses to the fourth question are so varied that we treat them in detail below.

(i) While seven authors do draw a supply curve for the capital market, for McConnell and Brue the supply side does not exist. Their model is discussed below.

<sup>1</sup> Kaldor has made similar remarks with respect to what he calls the 'co-ordinating factor': 'You cannot increase the supply of co-ordinating ability available to an enterprise alongside an increase in the supply of other factors, as it is the essence of co-ordination that every single decision should be made on a comparison with all the other decisions already made or likely to be made; it must therefore pass through a single brain' (1934, p. 67). See Cohen (1983) on the subject.

(ii) The definitions of what is supplied varies substantially across authors. For some, it means the actual flow of finance from households as savers (Baumol and Blinder; Byrns and Stone; Miller; and Ruffin and Gregory).<sup>1</sup> For Parkin, the supply of 'capital' is the total stock of accumulated savings, or simply wealth. Samuelson & Nordhaus change the identity of the supply of 'capital' as they move from the short run to the long run. The fixed short-run supply of capital goods, which is a physical stock inherited from the past, changes into the supply of *desired* savings in the long run.

(iii) Of the seven authors who draw a supply curve, only Lipsey *et al.* do not draw it as upward sloping. Like Samuelson & Nordhaus, Lipsey *et al.* provide a fixed short-run supply of physical capital. But their long-run model only offers shifts in the short-run curve which are exogenous, not predictable responses to a change in the long run rate of interest.

(iv) The supply of 'capital' changes its character dramatically across authors and theories, as detailed in the three following sections.

*4.2.1. Neoclassical: saving(s), time preference and the interest rate.* Six authors assume a positively sloped supply of finance capital which they interpret as a supply of savings, although the 'savings' in question have three distinct identities: current saving, accumulated savings from the past, or desired accumulation of savings. Four of the six (Byrns and Stone; Miller; Parkin; and Samuelson and Nordhaus) assume a positively-sloped, interest-rate sensitive saving(s) function reflecting a positive rate of time preference. The first two authors provide a simple Fisherian, impatience explanation: savers should be rewarded for delaying consumption from today to tomorrow. Like Fisher, Byrns and Stone, and Miller discuss the flow of current saving, not the stock of accumulated savings or wealth.

The last two texts add a new twist. Parkin tells us on the one hand that the supply of capital is upward sloping because people save more at higher interest rates. The graph for the supply function, on the other hand, depicts the stock of accumulated past savings. This is no longer today's choice determining tomorrow's flow of consumption in the Fisherian sense.<sup>2</sup> Similarly, although Samuelson and Nordhaus claim to hold to Fisher, there are inconsistencies. In the short run, supply is what we have inherited from the past, a stock and not a flow. But in the long run, we have a curve for the stock of 'desired savings', the actual accumulated savings at any point in time being different from those desired.

Some of the authors do realise that an increase in the interest rate may engender both substitution and income effects for savers. Byrns and Stone, Miller, and Parkin explain the slope of the savings function in terms of the substitution effect resulting from an increase in the interest rate: the opportunity cost of not saving is higher at higher interest rates. Baumol and Blinder, and Miller, argue for a negative income effect: 'At higher interest rates, households receive a higher yield on savings, permitting them to save less to achieve any given target' (Miller, 1991B, footnote 3, p. 427). Baumol and Blinder (who do not mention the substitution effect but still draw an upward sloping supply

<sup>1</sup> For Baumol and Blinder, the supply of loanable funds comes from the lenders who include among them banks. A monetary institution is combined with real savers (firms and households) in another add-and-mix approach.

<sup>2</sup> In 1983 the Joint Economic Committee of the US Congress reported that 1.0% of the US population owns 46% of all corporate stock. To extrapolate from Fisher's saving function to accumulated savings, it must be *possible* for the very rich to consume their wealth in one year (i.e., to use it to buy food, clothing, shelter, vacations). This stretches the imagination.

curve) explain further that 'this argument applies to savers . . . with a fixed accumulation goal' (1991B, p. 410).<sup>1</sup> The income effect is absent from Byrns' and Stone's account.

Those who nevertheless believe that the supply of finance capital is a positive function of the interest rate in the long run do not offer a satisfactory explanation as to why. Baumol and Blinder just appeal to intuition: 'Loans will look better to lenders when they bear higher interest rates, so it is natural to think of the supply schedule for loans as being upward sloping' (*ibid.*, p. 409). Ruffin and Gregory note that 'a larger quantity of loanable funds will be saved . . . at high interest rates than at low interest rates, *ceteris paribus*' (1990, p. 746). This is proof by assertion; it describes the supply curve but does not explain its slope.

4.2.2. *Expanded Keynesian: saving and income.* The interest-sensitivity of household saving becomes nonexistent and/or secondary in the macroeconomics sections where *all* authors offer a Keynesian saving function whose main determinant is disposable income. Some do expand it by introducing qualifying factors such as wealth, life cycle, permanent income, expectations, prices, inflation, indebtedness and so on. Only three texts (Parkin; Miller; and Samuelson and Nordhaus) mention, however, that the interest rate can have *any* impact on saving at the macro level.<sup>2</sup> It is indeed peculiar that a saving function which is independent of the interest rate in the macro section should suddenly become critically dependent on the interest rate in the micro section.

4.2.3. *Other.* Two texts (McConnell and Brue, and Lipsey *et al.*) do not offer a long-run supply of finance capital interpreted as a supply of savings. McConnell and Brue adopt a Keynesian approach in ignoring the long run entirely. In their unique analysis, Lipsey *et al.* treat the long run as a sequence of short-run positions. Physical capital rather than finance capital constitutes the supply side of the capital market. The short-run supply of capital goods, fixed independently of the interest rate, perpetually shifts as capital accumulates. They do not explain why or how physical capital accumulates, nor do they make clear why the quantity of capital is exogenous to the system.

#### 4.3. *Equilibrium: equalisation of normal profit rate and interest rate*

Several inconsistencies emerge once long-run microeconomic equilibrium is examined, and when it is compared with authors' macroeconomic analyses of interest-rate determination. We shall first describe the equilibrium models, then explore these criticisms.

4.3.1. *Microeconomic equilibrium: normal profit rate, interest rate.* The intersection of supply and demand curves determines either the equilibrium rate of interest or the normal profit rate (which textbooks often label the rate of return on capital) depending on the author. Four authors (Byrns and Stone; Baumol and Blinder; Miller; and Ruffin and Gregory) believe the interest rate ( $i$ ) to be determined in the loanable funds market. This will then determine how much capital will be bought and what its normal profit rate ( $r^*$ ) will be (see Fig. 1).

<sup>1</sup> Parkin's discussion of the income effect is very confusing since he mistakenly equates a positive effect on income with a positive income effect: 'an increase in interest rates increases incomes, so the income effect is positive'; 'the higher a person's income, the higher is the level of current consumption and the higher are the levels of future consumption and of saving' (1990, p. 449).

<sup>2</sup> Samuelson and Nordhaus discount the importance of interest rates: 'from year to year, the major determinant of changes in consumption is actual disposable income' (1992A, p. 111).

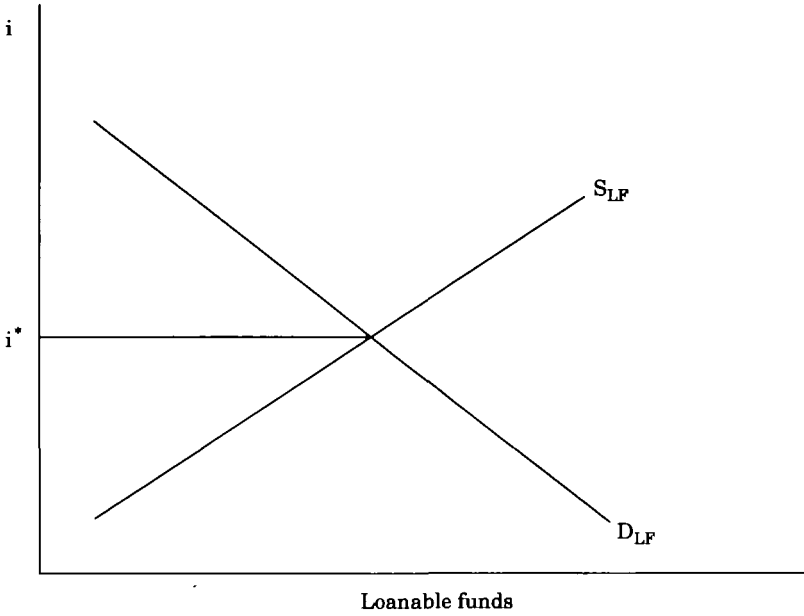


Fig. 1. Loanable Funds market.

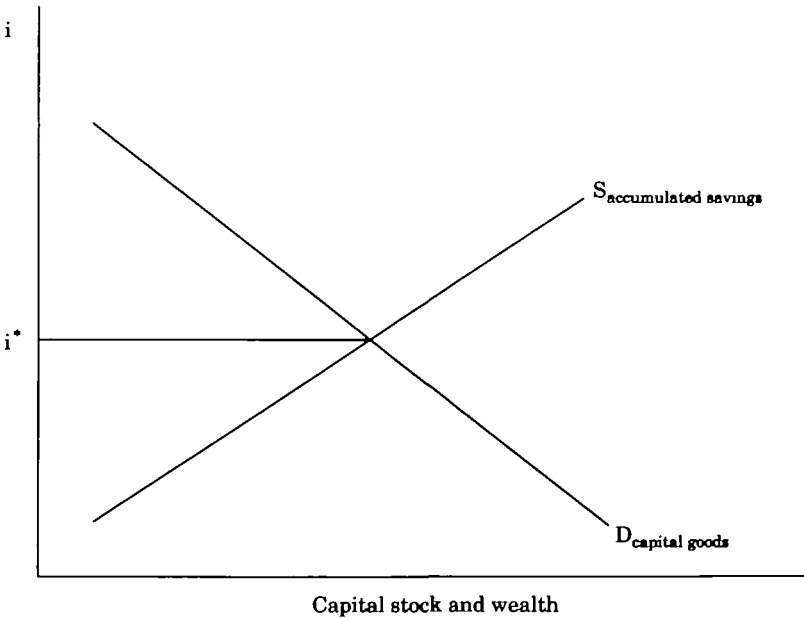


Fig. 2. Mixed physical/financial capital market.

Parkin's mixed physical/financial capital markets determine the average interest rate; there is no mention of the rate of return on capital or normal profit rate. This interest rate allocates capital across industries (see Fig. 2).

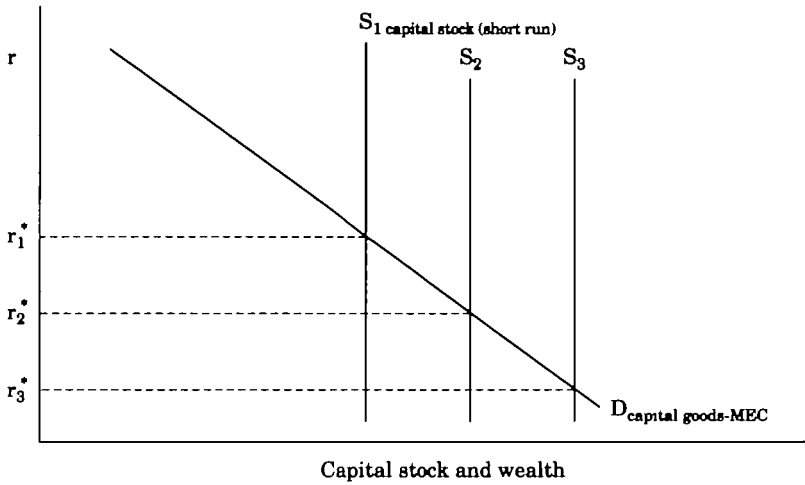


Fig. 3. Lipsey *et al.*'s model.

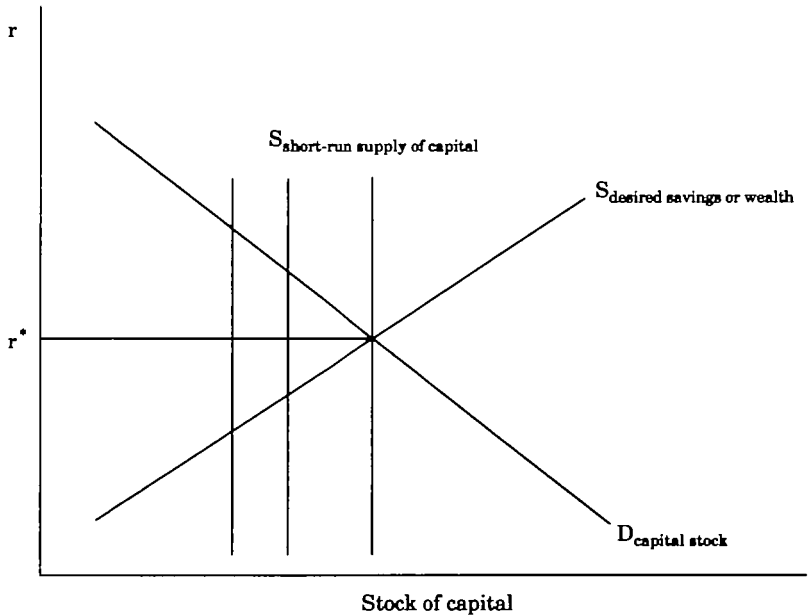


Fig. 4. Samuelson's and Nordhaus's model.

Lipsey *et al.*, and Samuelson and Nordhaus, have similar treatments for short-run equilibrium (see Figs. 3 and 4). The short-run equilibrium rate of return on capital is determined in the capital market, and the interest rate in some parallel market. It is not specified, however, whether the associated market is the money market or that of loanable funds. The interest rate and the rate of return will be equalised by arbitrage.

Lipsey *et al.* and Samuelson and Nordhaus diverge in the long run. For Lipsey *et al.* the short-run supply shifts steadily; the equilibrium rate of return (normal profit rate) and therefore the equilibrium interest rate fall as a result (see Figs. 3 and 4). There does not

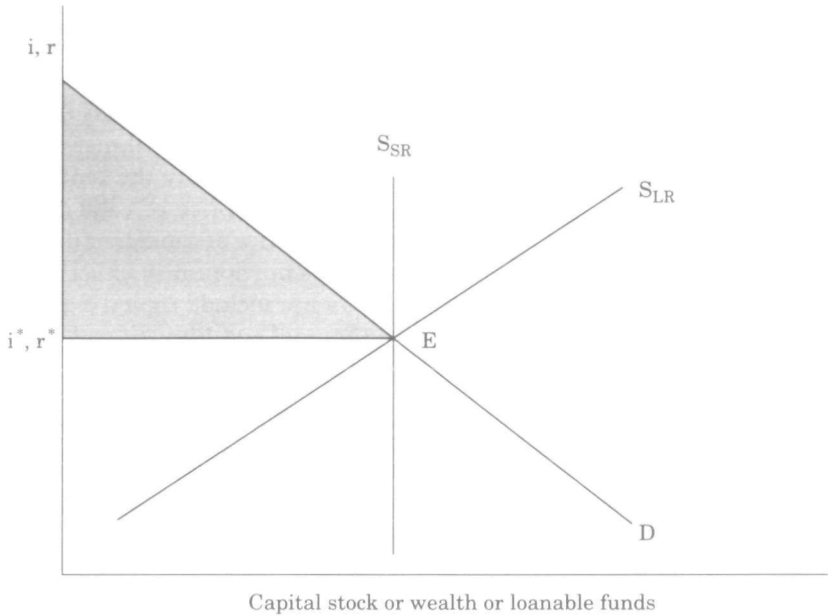


Fig. 5. Combined model.

seem to be anything preventing its declining to zero, unless there is a change in technology which increases the productivity of capital. Samuelson and Nordhaus are in a class entirely of their own. At a higher interest rate, savers *desire* to save more but *actual* savings can increase only slowly. As capital accumulates, the rate of interest falls and with it the gap between desired and actual savings. The economy will stop at an equilibrium profit-interest rate where *net saving* is equal to zero (assuming zero population growth and fixed technology).

Despite these disparities, the equilibrium model of all seven can be represented on the same graph (see Fig. 5). Here the equilibrium profit-interest rate is determined by the intersection of demand and supply, no matter what the underlying theory is. There remains a problem common to all of these theories. How do we interpret the shaded area, bordered by that equilibrium profit-interest rate, the vertical axis, and the demand curve? This consumer surplus belongs to the consumer of capital, the firm. Any rate of return over and above the normal rate is usually referred to as economic profit. But all economic profits are supposed to disappear in the long run. The downward-sloping demand for capital is one feature of the theory on which all authors agree. It is however known to be inconsistent with a marginal productivity theory of the distribution of income, by which total product is exhausted by the contributions of labour, land, and capital. There is no room for economic profits, hence the firm's consumer surplus presents an anomaly.

All authors draw a downward sloping demand curve for physical capital, or loanable funds to be used to purchase physical capital. The rate of return and the interest rate are on the vertical axis for that curve. Yet when they turn to the question of the equilibrium choice of factors by the firm, the questions of the factor income or 'price' of capital which is appropriate for allocative decisions is not so obvious. Most authors argue that the rational firm will choose factors such that

$$MRP_L/W = MRP_r/\text{Rent} = \text{etc.}$$

How is the factor capital to be included in this equation? This interesting question has surprisingly diverse answers. Only one textbook (Byrns and Stone) puts the interest rate in the denominator, which is the variable determined in the capital market. Miller uses the price of machines in the denominator, Ruffin and Gregory the rental price of the capital. McConnell and Brue, and Lipsey *et al.* use the price of capital ( $P_c$ ), without explaining whether by this they understand the rental price of capital, or the interest rate, or the price of capital goods. (This notation,  $P_c$  does not appear in either's discussion of the capital market). Samuelson and Nordhaus do not include capital explicitly, leaving it in the 'etc.' category; the other two authors (Baumol and Blinder; and Parkin) do not discuss this issue explicitly.

**4.3.2. Macroeconomic equilibrium: interest rate.** In their macro sections, *all* our textbooks explain the determination of the interest rate in Keynesian monetary terms. Firms and households determine the liquidity preference (demand side) whereas the Fed or Central Bank and the financial intermediaries determine the quantity of money (supply side). This interest rate determines the quantity of money held and/or borrowed by the public, as well as the level of investment, given the state of expectations.

**4.3.3. Inconsistencies.** *All* authors (except for McConnell and Brue) have two unconnected and inconsistent theories of the interest rate. In their macro theory, the interest rate is determined in the Keynesian money market. In the Keynesian framework, the interest rate affects portfolio choices but has little effect on the level of saving, which is dependent on disposable income. Because the interest rate does not link saving and investment automatically, increased thriftiness on the part of savers can lead to decreased GDP and income.

In the micro theories of six authors, however, the profit-interest rate is determined in the markets for finance capital and/or loanable funds. Here, in direct contrast to the macro section, increased savings (thriftiness) necessarily increase long-run capital expenditure through a reduction in the interest rate.

It was Keynes's belief that interest as the return to not hoarding and interest as the return to waiting were competing theories and could not be held simultaneously. Our authors apparently disagree. They may argue that Keynes's money-market theory of interest is short-run, whereas the neoclassical capital or loanable-funds market explains the long-term interest rate. But certain difficulties remain. There is, first, the question of behavioural differences: how could savers be interest-conscious in the long run but not in the short run?

Second, the actors in the (long-run) market for loanable funds are different from those in the (short-run) money market. In the long run, firms demand capital/funds, and households supply capital/funds. In the short run, households and firms both demand money, while banks and the Fed supply money. In moving from the short run to the long run, households enter the supply side of the market, from which they were absent before. And the Fed leaves the market altogether, apparently replaced by households. Like the entrepreneur, the Fed vanishes from economic effectiveness in the long run.

Third, it is not at all clear that the authors who use the loanable-funds approach interpret it as a long-run model. They generally posit a structure of interest rates, depending on time to maturity, and *risk*. In the perfectly informed world of the long run,



there should be no room for risk or uncertainty. Lipsey *et al.* argue that risk premia become a component of opportunity cost, and are assessed even in the long run; for them, normal profits 'refer to the opportunity costs of capital and risk taking' (1990B, p. 181). Parkin similarly describes his loanable-funds market as setting the interest rate on assets with average risk; a rise in average risk levels would then shift the supply of funds back, causing the interest rate to rise.<sup>1</sup> If risk premia reflect uncertainty about future profits, they should not be of concern in the neoclassical long run under perfect competition and perfect information.<sup>2</sup> The textbook treatment of profits does not trace the inconsistency of this addition with the theory of the long run.

The only consistent treatment in our sample comes from McConnell and Brue, but they ignore the long run. The assumption of a Keynesian saving function is in complete harmony with the rest of their model as is the extension of the Keynesian interest rate to their discussion of capital. McConnell and Brue's approach is not problem-free, however, because it implies that the interest rate (which determines the normal profit rate) is a purely monetary phenomenon. It is ironic that in a free-market economy, monetary authorities (government institutions) would be seen as the ultimate allocators of resources, rather than the private sector, whether firms or households.

#### 4.4. Summary

Four points emerge from the textbook treatments of the theory of capital and normal profits: (i) there is more variety in the treatment of the source of an upward sloping supply of capital/saving(s)/wealth than for any other element of the theory of profits, short run or long run; (ii) the area under the demand curve for capital/funds under long-period equilibrium presents an anomaly, since economic profits are to have been eroded; (iii) the textbooks make a meaningful slip in treating the 'price of capital' rather than the normal profit rate or interest rate as the cost of capital relevant for firms' equilibrium choice of factors; and (iv) the authors juxtapose the long-run full-employment model of neoclassical economics with Keynes's short-run model of involuntary unemployment. The result is a confused, self-contradictory, and often incomplete whole. On the one hand, we have the neoclassical theory of profit-interest rate determination, and on the other, the Keynesian money-market model. Although mutually inconsistent, there is little attempt to reconcile the two competing theories. The neoclassical theory holds that the interest rate and the equilibrium rate of return or normal profit rate are real phenomena, determined in the market for real wealth. The Keynesian approach implies that the interest rate is a monetary phenomenon, determined in the market for paper claims on wealth.

### 5. Conclusion

The introductory textbooks that we have surveyed demonstrate the failure of their authors to provide a coherent theory of the rate of profit in the short run or long run, fundamental as this may be. As we have shown, the authors fail to define consistently, explain how to measure, or specify the supply of both entrepreneurship and capital. Yet these are the purported sources of short-run and long-run profits, respectively.

<sup>1</sup> This is remarkably like Keynes's own discussion of lenders' risk, which he employed to explain cyclical movements in interest, not the long period.

<sup>2</sup> It is not clear what 'long run' would mean under imperfect competition (oligopoly), since the existence of oligopoly implies that inter-industry capital mobility cannot equalise oligopolists' profit rates.

Moreover, there is a tremendous variety in the theories of the profit rate, which fundamentally differentiates it from wages and rents. There seems to be a reluctance to admit that there is a theoretical problem. Certainly different models are presented without being explicitly characterised as competing and inconsistent. While macroeconomics texts almost invariably identify and discuss debates among schools, controversies are rarely treated as such in microeconomics texts.<sup>1</sup> This practice demonstrates the profession's unwillingness to acknowledge that there is *no* single neoclassical theory of the profit rate and that there is still debate on this fundamental issue.<sup>2</sup>

We argue that the internal inconsistency of the textbook presentations as well as their variety have common roots in the capital controversy. The authors completely ignore the problems of circularity in aggregating capital, the non-monotonic relationship between the quantity (value) of capital and the interest rate, and reswitching. Yet we contend that it is their efforts to avoid these problems which leads them to present various *ad hoc*, inconsistent models.

We conclude that 30 years after the capital controversy the neoclassical theory of the profit rate remains murky. The absence of a coherent explanation for the profit rate represents a fundamental failure for the neoclassical model. It is time that we economists turned our attention to non-neoclassical, nonequilibrium alternatives.

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<sup>1</sup> Yet, as Calvin Kent has observed, the 'word *profit* causes more controversy in economic education than perhaps any other word' (1989, p. 158).

<sup>2</sup> In the wake of McConnell's successful unseating of the encyclopaedic Samuelson text in the late 1970s, publishers have pressured textbook authors to streamline their books. This inhibition of qualifying appendices or footnotes as too technical and confusing for undergraduates may explain why textbook authors do not go into more detail regarding different theories of profits or problems with them. Streamlining does not, however, excuse authors from presenting competing theories as if they all held simultaneously.

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