Marshall's theory of value: the role of external economies

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The view that Marshall relied upon the assumption of 'external economies' in his attempt to reconcile the existence of 'competition' and decreasing long-run average costs continues to attract many supporters. However, it is argued here that in Marshall's writings, external economies were to play only a very minor role in the reconciliation exercise. Subsequent writers' emphasis on the role of external economies is shown to reflect a lack of understanding of the object of Marshall's (as opposed to the 'Marshallians' *) reconciliation problem.

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Introduction

This paper examines the role of external economies in Marshall's theory of value, and in particular their role in Marshall's reconciliation problem. The reconciliation problem arises in the context of the construction of an equilibrium framework which accommodates the existence of increasing returns to scale. In the published literature, widely diverging interpretations continue to arise as to the role Marshall intended external economies to play in this reconciliation exercise. These differing interpretations arise partially from apparent inconsistencies and ambiguities in Marshall's treatment of the problem. More importantly, however, the differing interpretations also reflect contrasting perceptions as to the precise nature of the object of Marshall's reconciliation exercise.

The following statement in a recently published paper by Prendergast (1992) characterises a popularly held interpretation of Marshall's reconciliation problem, together with the proposed 'solution':

By the time he published the first edition of his Principles, Marshall had formulated an ingenious theoretical solution to the problem of reconciling increasing returns and competition within the framework devised by Cournot. The solution involved the introduction of the concept of external economies which were viewed as the sole cause of increasing returns within a regime of competition. (Prendergast, 1992, p. 460, emphasis added)

This interpretation of Marshall's approach is to be found frequently in often disparate analytical investigations into the increasing returns process. For example, in Quinzii's (1992, pp. 4–5) recently completed analysis of increasing returns and 'efficiency', conducted within a general equilibrium framework, it is contended that Marshall

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introduced the 'ingenious assumption' that economies of scale were internal to the industry but external to each firm, allowing the supply function of each firm and the equilibrium price to be well defined. Similarly, Corsi's (1991, p. 50) analysis of increasing returns, formulated from a 'classical' perspective, includes the observation that Marshall was led to consider 'external economies as the only cause of decreasing costs of production'. This type of interpretation is frequently associated with the view that Marshall envisaged a situation where in long-run equilibrium a firm would be operating at the minimum point of a 'U' shaped average cost curve with no unexhausted internal economies. Increases in demand would be associated only with external economies, and 'competitive' conditions could prevail.

However, as Prendergast (1992) suggests, the popularly held view on the role of external economies in Marshall's theory of value is not shared by all Marshall's critics:

While recourse to the texts and to logic seem to suggest that external economies were central to Marshall's explanation of the downward-sloping supply curve, many commentators remain unconvinced. Their instinct seems to be that the purpose of the life-cycle was somehow to give internal economies a go. (Prendergast, 1992, p. 458)

The central argument of this paper is that recourse to the texts and to Marshall's logic in fact offers very little by way of support to the view that external economies played an essential role in Marshall's proposed 'solution' to the reconciliation problem. Indeed, the 'instinct' of some commentators that the life cycle of the firm analogy was employed by Marshall to allow for the existence of internal economies, is shown to have much in common with Marshall's own thinking. The paper emphasises that the 'external economy solution' interpretation most often emerges from a rather simplistic representation of the object of the reconciliation exercise in Marshall's Principles of Economics. In particular, the view that Marshall had in mind a concept resembling pure competition when deriving the supply function is shown to be clearly inconsistent with Marshall's own writing. Once this point is conceded, the theoretical role of external economies in the reconciliation exercise becomes much less compelling. The intended role of Marshall's biological life cycle analogy, together with its limitations, also becomes much more apparent.

The arguments outlined above are organised as follows in the remainder of this paper. Section 1 contains an outline of Marshall's approach to the analysis of external economies. The precise nature of the object of Marshall's reconciliation exercise is examined in Section 2. Section 3 examines the role of biological analogies in the proposed solution to the theoretical dilemma arising from scale economies. The paper's central conclusions are re-stated in Section 4.

1 Similar examples are not difficult to uncover. The same characterisation of the role of external economies in Marshall's analysis is found in Harris's (1988) comparative study of 'classical' and other representations of 'competition' and also in both Blitch (1983) and Thirlwall's (1987) depiction of the Young-Kaldor analysis of increasing returns and equilibrium.

2 Thirlwall (1987, p. 324) for example argued 'Marshall's reaction was to take refuge in the short-run assuming capacity as given and to treat increasing returns as externalities, preserving the U-shaped cost curve and the notions of the optimum sizes of firms and competitive equilibrium'.

3 Hereafter cited as Principles. Unless otherwise noted, all references to Principles (Marshall, 1920B) refer to the 8th edn as published by Macmillan in 1920 (1947 reprint).

4 Other notable critiques of aspects of the 'popular' interpretation of the object of Marshall's exercise include Andrews (1951), Wolfe (1954), Maxwell (1958) Newman (1960) and Leasby (1978). The detailed analysis of Whitaker (1975A, 1975B, 1982, 1989) also illustrates the deficiencies to be found in the suggested 'external economy solution' interpretation. The view that external economies played an inessential role in Marshall's reconciliation exercise was argued strongly by Robertson (1924, 1930) during the cost controversies of the late 1920s.
1. External economies and Marshall's theory of value

The inference that Marshall assigned the key role to external economies in his attempts to reconcile increasing returns and 'competitive' equilibrium emerges directly from Pigou (1913, 1927, 1928) and Sraffa's (1926) consequential contribution to the cost controversies of the late 1920s. It is an interpretation which was further promoted by Stigler's influential assessments, where it is argued that Marshall's chief purpose in creating the category of external economies was to explain the great historical reduction in production costs associated with increases of output and which were not accompanied by monopolisation.

Marshall's own depiction of the role of external economies is considered in this section. While the conceptualisation and role of external economies had yet to be fully developed, a brief overview of some of Marshall's early writings and correspondences relating to value theory may provide some useful insights into Marshall's thinking. This will be followed by an examination of the role of external economies in Marshall's Principles.

Marshall's early writings

The significance of the increasing returns dilemma to the satisfactory development of Marshall's value theory is captured in the following extract of a letter to A. W. Flux dated 7 March 1898:

My confidence in Cournot as an economist was shaken when I found that his mathematics re I.R. [Increasing Returns] led inevitably to things which do not exist and have no near relation to reality. One of the chief purposes of my Wander-jahre among factories, etc was to discover how Cournot's premises were wrong. The chief outcome of my work in this direction, which occupied me a good deal between 1870 and 1890, is in the 'Representative firm' theory ... (Pigou, 1925, pp. 406–407, Marshall's emphasis)

In his Essay on Value, written approximately 20 years before the first edition of his Principles, Marshall explicitly considers the possibility of downward sloping supply curves ('class D' commodities in particular). While Marshall 'tacitly' assumed that 'an increase in the economy of labour which results from the production on a large scale depends on an increase in the total amount produced', he does concede that the result may arise 'through the displacement of small manufactories' (Whitaker, 1975A, p. 151). However the sources of decreasing costs are not explicitly investigated, and the implications beyond questions relating to the stability of equilibrium arising from negatively sloped

1 Sraffa's depiction of the 'importance' of the role of external economies in Marshall's reconciliation exercise is stated more emphatically in Sraffa (1925), as translated in Maneschi (1986), and in a letter from Sraffa to Keynes dated June 1926, an extract of which can be found in Roncaglia (1978, p. 11). Roncaglia (1992) has recently argued that it was not Sraffa's purpose in his 1925 article to provide a fully-fledged interpretation and assessment of Marshall's Principles, but that the criticisms originated from his then recent appointment to a university lectureship and his dissatisfaction with dominant trends in academic teaching.

2 This argument is stated most directly in Stigler (1941, pp. 68–76), and was targeted explicitly against Robertson's (1930) claim that Marshall's 'solution' rested with the representative firm concept. A more recent statement of this position can be found in Stigler (1990, p. 60).

3 Marshall (1891, p. 69) had earlier claimed that Cournot's 'failure' contributed to the delay in the formal publication of most of his diagrams relating to value. See comments by Whitaker (1975A, p. 51). Cournot (1862, pp. 91–2) was certainly aware of the potential difficulties associated with decreasing costs, acknowledging that 'the effect of monopoly was not wholly extinct'. Marshall's criticisms were that Cournot failed to realise the magnitude of the logical difficulties, along with the absence of an investigation into the existence of forces which may counteract the tendency towards monopolisation induced by decreasing costs.

demand and supply curves are not directly considered. In his privately circulated Pure Theory of Domestic Values, the likelihood of increased industry concentration associated with increasing returns, particularly in manufacturing, is considered further. Here Marshall disputes the implication that the most important of the advantages of the division of labour can as a rule only be obtained by the concentration of large numbers of workmen in vast establishments:

an increase in the total amount of a commodity manufactured can scarcely fail to occasion increased economies in production, whether the task of production is distributed among a large number of small capitalists, or is concentrated in the hands of a comparatively small number of large firms. (Whitaker, 1975B, p. 198)

To the extent that Marshall envisaged the advantages available to small firms as arising from the general progress of industries, it could be argued that contained in Marshall’s conclusion is a clear distinction between external and internal economies. Importantly, the two sources of economies are seen to co-exist. The availability of external economies to small firms is seen to increase with the scale of industry output, a factor which also induces the average size of firms to increase, and therefore the accessibility of internal economies. ‘External economies’ are not perceived to be the sole explanation of decreasing long-run average costs, with ‘internal’ economies recognised to a greater extent than they were in Essay on Value.

The significance of internal economies was further emphasised in Marshall and Marshall (1879) where the division of labour process is more closely linked to large establishments. This recognition moved the Marshalls to consider factors which may limit the scale of production of firms, leading to the first direct discussion of the life cycle of the firm analogy. Importantly, as Prendergast (1992, p. 454) observes, in Marshall and Marshall (1879) ‘external’ economies are seen as reducing the average costs of both small and large firms, whereas in his earlier writings these economies could be interpreted as being a mechanism through which ‘small capitalists’ could benefit from advantages which would otherwise have been assumed to be available to large establishments.

The following general conclusions can be seen to emerge from Marshall’s early writings on value. Firstly, Marshall’s equilibrium framework could not be satisfactorily completed in the absence of explicit incorporation of the effects of falling long-run average costs, arising from both internal and external economies. As Hicks (1989, p. 11) remarked, ‘we may reckon Marshall to have been the founder of the (modern) anti-CRS (constant returns to scale) school’. Secondly, as his analysis progressed from the Essay on Value, Marshall increasingly recognised that the division of labour process signalled the importance of decreasing costs associated with large-scale production by individual establishments. Therefore, industry structures comprised of ‘small capitalists’ could not generally be associated with industries where increasing returns were significant. This in turn necessitated an investigation into the factors which would limit the tendency towards monopoly. Most importantly, Marshall’s value theory analysis was moving further and further away from the notion that decreasing long-run average costs could be identified exclusively, or even predominantly, with sources external to the individual firm. From Marshall’s early writings it becomes apparent that the equilibrium framework being constructed was not to be confined to the analysis of ‘competitive’ conditions.

1 Reproduced in Whitaker (1975B, pp. 186–236), and printed for private circulation in 1879, but written in the mid 1870s (see Whitaker, 1975A, pp. 57–66).
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External economies in Marshall's Principles

The publication of Marshall's *Principles* saw further clarification of the distinction between 'internal' and 'external' economies.¹ External economies are defined as those dependent on the general development of the industry, while internal economies are dependent on the resources of the individual houses of business engaged in it, on their organisation and the efficiency of their management. Three major classes of internal economies are isolated; those generated through increased subdivision of labour, increased specialisation of the managerial function, and those arising as a result of creative innovations in the organisational and mechanical aspects of production. It is possible to isolate two general types of external economies in *Principles*. Firstly there are economies arising from 'the use of specialised skill and machinery' depending on 'the aggregate volume of production in the neighbourhood' are one type. The other type included 'especially those connected with the growth of knowledge and the progress of the arts' and which depend on the 'aggregate volume of production in the whole civilised world' (*Principles*, pp. 265–266).

As outlined earlier, many critics of Marshall's theory of value have contended that Marshall's usage of the category of external economies was to enable him to explain the existence of decreasing long-run average costs and at the same time contain the analysis to the consideration of static competitive equilibrium conditions. Those critics seeking to support such an interpretation often point to the following passage in *Principles* which, when considered in isolation, would appear to offer verification:

we have seen how the economies which result from a high industrial organisation often depend only to a small extent on the resources of individual firms. Those internal economies which each establishment has to arrange for itself are frequently very small as compared with those external economies which result from the general progress of the industrial environment. (*Principles*, p. 441, Marshall's emphasis)

In making this statement, Marshall uses a footnote to refer his readers back to his discussion of industrial organisation in Book IV of *Principles*. In this context, the general conclusion reached by Marshall in Book IV is worth noting:

The general argument of the present Book shows that an increase in the aggregate volume of production of anything will generally increase the size, and therefore the internal economies possessed by such a representative firm; that it will always increase the external economies to which the firm has access; and thus will enable it to manufacture at a less proportionate cost of labour and sacrifice than before. (*Principles*, p. 318)

Clearly Marshall does not wish to imply that the existence of external economies limits firm size or the extent to which internal economies may be realised. Significantly, the conviction that the solution to the reconciliation problem could be uncovered through the existence of external economies is also absent from Chapter XII of Book V and Appendix H of *Principles*, where the dilemma presented by increasing returns to the theory of long-period normal equilibrium is most directly analysed. Nor does the 'external economy solution' emerge from his later discussion of returns to scale in *Industry and Trade*, where it is observed:

¹ In *Principles*, the law of increasing returns is defined as a relation of quantities; 'An increase of labour and capital leads generally to improved organisation, which increases the efficiency of the work of labour and capital... Increasing Return is a relation between a quantity of effort and sacrifice on the one hand, and a quantity of product on the other' (*Principles*, pp. 318, 319). Excluded are 'any economies that may result from substantive new inventions' (*Principles*, p. 460).
But with the growth of capital, the development of machinery, and the improvement of the means of communication, the importance of internal economies has increased steadily and fast, while some of the old external economies have declined in importance; and many of those which have risen in their place are national, or even cosmopolitan, rather than local. (Marshall, 1920A, p.167, emphasis added)

This passage clearly illustrates that Marshall, like Adam Smith before him, intended his investigation of increasing returns to proceed within the context of the analysis of economic progress. Throughout Marshall’s Principles, both internal and external economies were depicted as leading sources of economic progress, and his analysis would have been incomplete if either category of economies had been excluded from his theoretical structure.

Therefore, while there is evidence from Marshall’s writings to support the view that Marshall saw the existence of external economies as playing an important role in the explanation of downward sloping (long-run) supply curves, the existence of significant internal economies was not assumed away by Marshall. Accordingly, the belief that Marshall relied exclusively on the assumption of external economies in the construction of his long-run supply curves cannot claim textual support from Marshall’s published works.

2. Marshall’s reconciliation exercise and ‘competitive equilibrium’

The view that external economies played an essential role in Marshall’s explanation of declining long-run supply curves is normally identified with the notion that Marshall’s reconciliation exercise involved the co-existence of increasing returns and competitive equilibrium. Schumpeter (1942, p. 78) for example claimed that ‘he [Marshall] as well as Wicksell framed his general conclusions on the pattern of perfect competition so as to suggest, much as the classics did, that perfect competition was the rule’ (emphasis added). Similarly, Samuelson (1967, p. 111) accuses Marshall of trying ‘to treat at the same time cases of less-than-perfect and of perfect competition’. However, in this section it is emphasised that the concept of ‘competitive equilibrium’ had very little to do with Marshall’s analysis of increasing returns. Once this point is established, it can be seen why in terms of Marshall’s logic, external economies did not play an essential role in the theoretical resolution of Marshall’s reconciliation exercise.

Marshall’s value theory in Book V of Principles is constructed within the framework of the equilibrium of normal demand and supply schedules. Contrary to subsequent interpretations, Marshall explicitly warns against the association between ‘normal’ and ‘competitive’ conditions:

Another misunderstanding to be guarded against arises from the notion that only those economic results are normal, which are due to the undisturbed action of free competition. But the term has often to be applied to conditions in which perfectly free competition does not exist, and can hardly even be supposed to exist; and even where free competition is most dominant, the normal conditions of every fact and tendency will include vital elements which are not part of competition nor even akin to it. (Principles, p. 35)¹

¹ The distinction between ‘normal’ and ‘competitive’ in Principles is to be contrasted to that contained in Economics of Industry, where normal results were associated with those which competition would bring about in the long-run. Whitaker (1975A, p. 73) notes that an 1886 printing of Economics of Industry is annotated for an envisaged revision: ‘Be careful to strike out everything w³, implies that normal value=competitive value’. 
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In Marshall’s *Principles* it is essential to distinguish between the type of market structure being discussed during the first few chapters of Book V and the later discussion of manufacturing industries. In Chapter Three of Book V, Marshall makes what he explicitly terms a *provisional* assumption of ‘much free competition’, in which the forces of demand and supply have free play amongst independently acting buyers and sellers. All participants have sufficient knowledge of what others are doing to prevent them from taking a lower or paying a higher price than others are doing. As a result of these assumptions ‘there is only one price in the market at one and the same time’ (*Principles*, pp. 341–342). This type of model is applied to his simple example of a fishing industry undergoing a once-and-for-all change in demand.

Marshall emphasises clearly that such assumptions must be seen to be only *provisional*; ‘we will have to inquire further, how far these assumptions are in accordance with the actual facts of life’ (*Principles*, p. 341). Significantly, Marshall went on to argue emphatically that conditions which may be associated with free competition are inconsistent with the analysis of industries characterised by increasing returns:

In fact when the production of a commodity conforms to the law of increasing returns in such a way as to give very great advantage to large producers, it is apt to fall almost exclusively into the hands of a few large firms ... and then the normal marginal supply price cannot be isolated in the plan just referred to ... The production of such a commodity really partakes in a great measure of the nature of a monopoly; and its price is likely to be so much influenced by the incidents of the campaign between rival producers, each struggling for an extension of territory, as scarcely to have a true normal level. (*Principles*, p. 397)

In his direct discussion of manufacturing and large-scale production in *Principles*, Marshall plainly encompasses a market structure more complex than that described in the provisional assumption of free competition. Here Marshall’s analysis draws heavily on a distinction between what could be termed general and particular markets:

This may be expressed by saying that when we are considering an individual producer, we must couple his supply curve—not with the general demand curve for his commodity in a wide market, but—with the particular demand curve of his own special market. *And this particular demand curve will generally be very steep;* perhaps as steep as his own supply curve is likely to be, even when an increased output will give him an important increase of internal economies. (*Principles*, p. 458, emphasis added)

It can be seen quite clearly here that once Marshall’s analysis escapes from the provisional assumptions of ‘free’ competition it makes no sense at all to speak of the forces of demand and supply achieving an industry equilibrium characterised by the existence of only one price in the market at one and the same time. Firms can no longer be assumed to be passive price takers with perfectly elastic demand curves. Equilibrium in the industry did not imply that each individual firm in the industry was itself in equilibrium. It is this context, and not under the provisional assumptions of free competition, that Marshall attempted to construct his industry supply schedule. This schedule was meant to capture, within a static equilibrium framework, the presence of the ‘market imperfections’ corresponding to the increasing returns process.¹

¹ As Liebhafsky’s (1955) study highlights, the links between Marshall’s analysis and the later development of the theory of imperfect competition can be discovered more clearly in Marshall’s much neglected *Industry and Trade*, particularly in Marshall’s (1920A, p. 397) discussion of ‘conditional monopoly’ where ‘though monopoly and free competition are ideally wide apart, yet in practice they shade into one another by imperceptible degrees’. A fuller discussion of what became known later as the theory of imperfect competition and oligopoly was promised in a ‘second volume’ by Marshall, which unfortunately failed to materialise (see *Principles*, p. 849, and Whitaker, 1990B).
In interpreting the relationship between competition and increasing returns in *Principles*, it is crucial to observe that, even within the confines of 'free competition', the market structure being analysed differs markedly from the large numbers, homogeneous product concept originating with Pigou and subsequently formalised by writers such as Edgeworth, Pareto, J. B. Clark and Knight. The assumption of perfect knowledge, which Marshall associates with 'perfect competition', is explicitly excluded from Marshall's definition of free competition (see *Principles*, p. 540). Instead, free competition was associated by Marshall more closely with freedom of entry and availability of information. While characterised by a large number of competitors, these encompass 'competitors with businesses of all sizes' (*Principles*, p. 397). In *Principles*, 'competition' was essentially seen as a behavioural activity rather than as a market structure. In this respect Marshall's concept of competition more closely resembled that of Adam Smith than that of his contemporaries. As O'Brien's (1990) account of Marshall's industrial analysis highlights, this led Marshall to place emphasis on the key role of 'industrial facts', an approach which defied the simple modelling which came to be associated with the work of his immediate followers who directed economic theory and methodology sharply in an apriorist direction.

The view that Marshall's reconciliation problem was associated with the construction of industry supply schedules under conditions resembling pure competition emerges not from a careful reading of Marshall's *Principles*, but from the value theory debates in the decades following *Principles*, being most prominent in Sraffa's (1926) contribution where 'competitive conditions' are frequently referred to.

3. Biological analogies, economic dynamics and the reconciliation exercise

It has been argued that there is no textual evidence from Marshall's *Principles* to suggest that the existence of external economies arrests the tendency towards monopolisation arising from the exploitation of unexhausted internal economies. This section begins with an account of the role played by Marshall's life cycle of the firm biological analogy and representative firm concept in the reconciliation exercise. This is followed by a consideration of the relationship between Marshall's life cycle analogy and external economies conjectured by Prendergast (1992). Finally some of the weaknesses conceded by Marshall as existing in his proposed solution are highlighted.

The life cycle of the firm

It is not surprising that Marshall should have turned to biological analogies in his attempts to incorporate the operation of returns to scale into his theoretical system. In the Preface to *Principles* (p. xiv) Marshall stated his now famous claim that the Mecca of the economist lies in economic biology rather than economic dynamics, while in Appendix B Marshall discussed the significance of the great stride forward in the speculations of biology to the growth of economic science.

The biological analogy of the life cycle of the firm was explicitly introduced by Marshall in an attempt to explain why increasing returns to scale are unlikely to result in

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1 See Stigler (1957), McNulty (1967) and O'Brien (1990). As is well known, increasing returns associated with the division of labour played a pivotal role in Smith's theory of economic progress. There the co-existence of competition and increasing returns was not challenged. Indeed, as Richardson (1975) highlights, it was competition that provided the force that drove producers to seek out and exploit the opportunities provided by increasing returns and specialisation. In such a setting increasing returns do not inevitably lead to increased concentration, but, as Richardson argues, are likely instead to be associated with specialisation and interdependence.
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the monopolisation of an industry. The analogy is required to confront the ‘shortcoming’ in Cournot’s analysis referred to above in Marshall’s letter to Flux, and reflects yet again Marshall’s insistence on the importance of recognising the existence of internal economies. The most direct statement of Marshall’s biological analogy is to be found in the following passage from Principles where the growth of business is likened to the growth of trees in a forest:

But here we may read a lesson from the young trees of the forest as they struggle upwards through the benumbing shade of their older rivals. Many succumb on the way, and a few only survive; those few become stronger every year, they get a larger share of light and air with every increase of their height, and at last in their turn they tower above their neighbours, and seem as though they would grow on for ever . . . but they do not. One tree will last longer in full vigour and attain a greater size than another; but sooner or later age tells on them all. Though the taller ones have a better access to light and air than their rivals, they gradually lose vitality; and one after another they give their place to others . . . (Principles, pp. 315–316)

Analogously, Marshall argues that the full life of a firm seldom lasts very long, as the firm is likely ‘ere long quickly to decay’ having lost the exceptional energy which enabled it to rise (Principles, p. 287). It is nature, by pressing ‘on the private business by limiting the length of the life of its original founders, and by limiting even more narrowly the part of their lives in which their faculties retain full vigor’ which Marshall argues breaks the nexus between increasing returns and the tendency towards monopoly (Principles, p. 316).

From the 6th edition of Principles published in 1910, Marshall added a significant qualification to the ‘trees in the forest’ analogy by acknowledging the growing importance of joint-stock companies. This qualification by Marshall has been interpreted by critics such as Hague (1958, pp. 684–685) to represent a significant weakening in Marshall’s commitment to his life cycle analogy. Marshall was forced to concede that because of the ‘great recent development of vast joint-stock companies’, his ‘general rule’ of eventual stagnation ‘is far from universal’. As a result such an organisation could under ‘favourable circumstances . . . secure a permanent and prominent place in the work of production’ (Principles, p. 316). Similarly, in Industry and Trade, where joint-stock companies command a much more significant role in Marshall’s scheme, it was conceded that such entities tend not to dwindle materially with age, and as a result do not face the same order of difficulties as the smaller nineteenth century firms did on the score of maintaining their vigour unimpaired (Marshall, 1920A, pp. 315–316).

However, it is significant to note that in Principles Marshall did not consider that the ‘qualification’ necessitated by the emergence of joint-stock companies substantially altered his general proposition. Instead he argued that it was ‘likely’ that the joint-stock company would eventually lose much of its ‘progressive force’ such that ‘the advantages are no longer exclusively on its side in its competition with younger and smaller rivals’ (p. 316). The reluctance in Principles to concede the importance of the joint-stock company qualification serves to underline the significance of the life cycle analogy to Marshall’s theoretical structure. The limited applicability of the chosen biological analogy would have been a more obvious target for his later critics if its central role in Marshall’s

1 This analogy originates directly from Marshall and Marshall (1879, pp. 141–142) in a form very similar to that which can be found in Principles.
representation of the reconciliation exercise had been more fully understood.\(^1\) Assertions made by commentators such as Levine (1980), Mirowski (1984, 1989) and Thomas (1991)\(^2\) that Marshall’s biological references were not intended to play an operational role in his long-period analysis, reflect the critics’ own convictions rather than those contained in Marshall’s writings.

The representative firm

If accepted, Marshall’s life cycle theory of firms’ analogy clearly implied that a position of long-period equilibrium for an industry coincided with a situation in which individual firms are at disequilibrium. In Marshall’s terminology, some businesses will be rising and others falling (Principles, p. 378). Therefore the notion of the ‘marginal’ or ‘equilibrium’ firm can have no operational role for the derivation of long-period normal supply conditions. It is in this context that Marshall introduced the concept of the representative firm:

We will have to analyse carefully the normal costs of producing a commodity, relatively to a given aggregate volume of production; and for this purpose we will have to study the expenses of a representative producer for that volume of output. (Principles, p. 317, Marshall’s emphasis)\(^3\)

The representative firm is ‘representative’ of an industry in the sense that it has ‘normal access to the economies, external and internal, which belong to the aggregate volume of production’ (Principles, p. 317, emphasis added). It can be seen as corresponding to the miniature of an industry, and it is its marginal costs that are used when the long-period supply price is being discussed (Principles, p. 460). The representative firm therefore can be seen as a device which selects the appropriate tree to illustrate the general conditions of the forest, and ceases to perform the role allocated to it by Marshall if the biological analogy is rejected.

It is essential to counter the claim, first stated directly by Robbins (1928, p. 387), that Marshall’s representative firm and Pigou’s (1928) equilibrium firm are essentially identical concepts. This rather unfortunate misconception has as its origin Pigou’s (1927, p. 195) argument that ‘the representative firm must be conceived as one for which, under competitive conditions, there is, at each scale of aggregate output, a certain optimum size, trespass beyond which yields no further internal economies.’ Clearly, the equilibrium firm emerging from Pigou’s analysis, which was assumed to be in equilibrium whenever the industry as a whole was in equilibrium, together with the associated ‘U’ shaped long-run average cost curves, represent a significant point of departure from Marshall’s thinking. Similarly, a clearer understanding of Marshall’s reconciliation

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\(^1\) Robbins (1928, p. 386) noted that he could find only ‘one or two instances’ of the usage of the associated ‘representative firm’ since Marshall, an observation repeated subsequently by Wolfe (1954, p. 337). Contemporaries such as Silberling (1924, p. 438) for example, argued that the concept was ‘misleading and superfluous’. Robertson (1930) alone clung steadfastly to Marshall’s biological analogy, re-enforcing (\(?)\) its applicability with additional analogies including ‘bones and the skeleton’, ‘water drops and the waves’ and ‘colour of animals’. Shove (1930, p. 115) added a ‘cluster of variable stars’ to Robertson’s imposing list.


\(^3\) The ‘representative producing business’ is also referred to in Industry and Trade (see for example Marshall, 1920A, p. 181).
exercise would cast doubt on the notions that the representative firm concept was merely conceived as an ‘afterthought’ by Marshall, adding nothing to the explanation of the long-run supply schedule.\footnote{This claim was made initially by Robbins (1928, p. 386). A more recent example is to be found in Williams (1978, p. 100). Evidence claimed to support this view is that the representative firm did not figure in the first edition of Principles. This claim is disputed by Guillebaud (1942, p. 332), who emphasises that the idea was already present in the first edition. As is evidenced by Marshall’s letter to Flux, the concept had clearly occupied Marshall’s mind for some time prior to the first edition of Principles.}

**Biological analogies and external economies**

In a recent paper, Prendergast (1992) has argued that external economies played an essential role in the reconciliation exercise in combination with the life cycle analogy in Marshall’s Principles. In order to present Marshall’s argument, Prendergast (p. 458) begins by assuming the absence of external economies and (unspecified) ‘market imperfections’, while firms’ internal economies are not fully exploited. An increase in demand is introduced which, within a given life cycle, temporarily increases the rate of growth of firms thereby increasing the maximum size of firms in an industry and their access to internal economies. Because these firms are condemned to eventual decay through the life cycle, the gains they made would be lost unless new firms can grow to the same level. In the absence of external economies, Prendergast argues that no mechanism exists to ensure this result once the industry has finally adjusted to the increase in demand.\footnote{This conclusion is related to Sraffa’s (1930) criticisms of Robertson (1930), where Sraffa argued that the life cycle analogy is inconsistent in that it is introduced to explain constraints to the growth of firms in one equilibrium, but at the same time allows them to be larger at another equilibrium point.} However, the existence of external economies associated with the increased industry output would enable the objective conditions of production conditions facing new firms to change, and the size of the representative firm may be different even after the industry has fully adjusted to the increase in demand and the life cycle returned to ‘normal’.

Within the context of Marshall’s life cycle analogy, a role for external economies along the lines hypothesised by Prendergast is feasible. However, Prendergast’s representation is called into question when the reverse situation is considered, i.e. a reduction in demand. Would the internal and external economies previously exploited dissipate as a result of reductions in output? This is precisely the question posed by Marshall when the question of ‘irreversibilities’ associated with increasing returns is considered in Appendix H of Principles.

There is little evidence from Marshall’s own writings to suggest that the ‘solution’ attributed to him by Prendergast was proposed or even formally considered by Marshall. Indeed Marshall’s perception of the logical difficulties associated with the construction of a long-run supply curve in the presence of increasing returns takes us beyond the difficulties referred to in Prendergast’s argument. In Principles, Marshall clearly recognises (most explicitly in Appendix H) that the existence of increasing returns, irrespective of their origins, encompasses dynamic and irreversible processes which defy adequate analysis in a static equilibrium framework.\footnote{The significance of this aspect of Marshall’s examination of movements along the long-run supply curve is only seriously considered by Prendergast in the concluding section of her paper. Issues relating to Marshall’s representation of external economies are discussed further in Prendergast (1993).} It is in this respect that Marshall’s appeared most concerned about the ability of his biological analogy to provide a satisfactory ‘solution’ to the reconciliation problem.
Limitations to Marshall’s proposed solution

From the discussion above, it can be concluded that Marshall considered that a tendency towards monopolisation was inevitably the conclusion to emerge from an analysis of increasing returns founded purely on static equilibrium analysis. The limits to monopolisation were seemingly to be found in the organic process of life and decay. The life cycle of the firm analogy, together with the representative firm concept, appeared to have provided Marshall with an avenue through which both internal and external economies could be incorporated into a static demand–supply equilibrium framework. However, in Principles Marshall frequently alluded to some serious limitations confronting his proposed ‘solution’. At the centre of Marshall’s discontent with his proposed solution was an unresolved conflict between notions of static equilibrium and the dynamic/organic realities of economic processes. It is this conflict which lies at the heart of Marshall’s reconciliation problem.

Marshall’s views on the relationship between biological processes and static equilibrium analysis are most directly identified in his methodological writings:

Consider, for instance, the balancing of demand and supply. The words ‘balance’ and ‘equilibrium’ belong originally to the older science, physics; whence they have been taken over by biology. In the earlier stages of economics, we think of demand and supply as crude forces pressing against one another, and tending towards a mechanical equilibrium; but in the later stages, the balance or equilibrium is conceived not as between crude mechanical forces, but as between the organic forces of life and decay. (Marshall, 1898, p. 318)

It is clear that Marshall intended his biological analogies to capture the effects of what he recognised to be dynamic economic processes. Static solutions derived from mechanical notions of equilibrium were seen as affording starting points in a rude and imperfect approach to dynamic solutions. Marshall (1898) cautioned that dynamic analysis was required because when a force moves a thing on which it acts, it changes the force which that thing afterwards exercises. However, he was to abandon the search for the ‘higher level of analysis’ incorporating dynamic issues on the grounds that dynamic solutions of economic problems were ‘unattainable’. It was for this reason that Marshall surmised that the Mecca of the economist was to be found in economic biology rather than economic dynamics.

In Principles, the difficulties associated with representing the outcomes of dynamic/organic processes within an equilibrium framework are identified directly with the increasing returns process, and the long-run industry supply schedule (derived from the representative firm) in particular. Shifts in the demand curve through time imply movements along a long-run supply curve. However, as the following passage from Principles concedes, movements along such a curve lack operational meaning:

It must however be admitted that this theory is out of touch with real conditions of life, in so far as it assumes that, if the normal production of a commodity increases and afterwards again diminishes to its old amount, the demand price and the supply price will return to their old positions for that amount . . . For, when any casual disturbance has caused a great increase in the production of any commodity, and thereby has led to the introduction of extensive economies, these economies are not readily lost. Developments of mechanical appliances, of division of labour and of the means of transport, and improved organisation of all kinds, when they have been once obtained are not readily abandoned. (Principles, pp. 807,808)\footnote{The possibility of ‘irreversibilities’ because of the existence of returns to scale was raised initially in Pure Theory, where Marshall warned that extensive economies were not readily lost as ‘developments of mechanical appliances, of division of labour and of organisation of transport, when they have been once obtained are not readily abandoned’ (Whitaker, 1975B, p. 202). The significance of the difficulties arising from irreversibilities appears to be somewhat understated in Whitaker (1990A, p. 41), where it is concluded ‘Marshall’s stress on the irreversibility of the long-period industry supply curve in Case C (sustained internal economies present, output heterogeneous) does not raise severe conceptual difficulties.’}
The difficulties referred to in this passage are not dependent on the source of returns to scale. What is called into question is the ability of static equilibrium analysis, even when assisted with ‘advances from biology’, to capture adequately the dynamic implications of the increasing returns process.

Some readers of Marshall’s Principles have argued that to a substantial extent Marshall was effectively able to bridge the divide between mechanical notions of equilibrium and organic/dynamic economic processes proceeding in historical time. This view is perhaps stated most articulately in the following extract from Shackle’s (1965) summary of Marshall’s method:

Marshall’s peculiar triumph is his creation of a unity out of the conceptions of equilibrium and of evolution. Equilibrium he conceives in a sophisticated, profoundly thought-out form... Equilibrium is a state of adjustment to circumstances, but it is a fiction, Marshall's own and declared fiction, for it is an adjustment that would be attained if the very endeavour to reach it did not reveal fresh possibilities, give fresh command of resources, and prepare the way for inevitable, natural, organic further change. (Shackle, 1965, p. 36, emphasis added)

However a sense of ‘triumph’ over the creation of a unity out of the conceptions of equilibrium and evolution is not celebrated in Marshall’s Principles. Instead, the conflict between the two conceptions in the end threatened the operational validity of the theoretical structure being constructed, particularly when questions relating to long-period normal values were being considered. While it is important to acknowledge Marshall’s awareness of the organic nature of economic progress and analytical problems associated with time irreversibilities,¹ it is equally important not to understate the extent to which Marshall failed to move beyond a static equilibrating theoretical system. Despite the frequent warnings and qualifications compelled by an appreciation of the importance of irreversible evolutionary processes, the equilibrium framework remained a very important element of Marshall’s theoretical structure.

As Thomas (1991) and Hodgson (1993) have convincingly demonstrated, when Marshall turned for inspiration to biology it was more to the social and biological theorist Herbert Spencer, rather than to Darwin or other social philosophers whose work contained more fertile representations of organic processes than was the case with Spencer.² Significantly, Hodgson (1993) portrays Spencer’s thinking as essentially mechanistic, despite frequent allusion to ‘organism’. To a significant extent Spencer’s methodological approach is reflected in Marshall’s long-period analysis, particularly in the context of the reconciliation exercise. However, a satisfactory solution to Marshall’s difficulties surrounding the treatment of economic events which were continuous in time would have required a reversal of what Robinson (1974) and Groenewegen (1982) have observed as an increasing tendency for ‘equilibrium’ to triumph over ‘history’ as Marshall’s work developed from his earlier methodological contributions and through successive editions of Principles.

Amongst the participants in the value theory controversies in the decades following Marshall’s Principles, Allyn Young alone appears to have discerned the fundamental

¹ The linkages between the various ‘evolutionary’ approaches to economic theorising and Marshall’s references to organic processes and time irreversibilities are considered in Foster (1993). However, as Shove (1942) highlighted so emphatically, Marshall’s economic biology was almost totally neglected by the ‘Marshallians’ and their followers, with the mechanical approach dominating mainstream economics.

² The extent to which Marshall’s later writings were influenced by Hegel is of particular significance; see Whitaker (1977) and Groenewegen (1990) for comments.
difficulty confronting Marshall’s analytical framework arising from the existence of returns to scale economies:

No analysis of the forces making for economic equilibrium, forces which we might say are tangential at any moment of time, will serve to illumine this field, for movements away from equilibrium, departures from previous trends, are characteristic of it. Not much is to be gained by probing into it to see how increasing returns show themselves in the costs of individual firms and in the prices at which they offer their products. (Young, 1928, p. 533)

Sraffa (1926) had perceptively associated Marshall’s theoretical difficulties with a misinterpretation of the role of the laws of return in ‘classical’ theory. However, by narrowing the object of the reconciliation exercise to that of ‘competitive equilibrium’, Sraffa overlooked the significance of the methodological weaknesses accompanying the theoretical shortcomings found in Marshall’s theory of value. Recourse to Marshall’s writings and logic would suggest it was these methodological difficulties which were at the centre of Marshall’s reconciliation exercise.

4. Concluding comments

It would be difficult to conclude that Marshall satisfactorily achieved his aim of capturing the effects of increasing returns within an equilibrium framework. The forced recognition that the emerging joint-stock companies could escape the inevitable decay imposed by his life cycle analogy severely challenged the relevance of Marshall’s ‘solution’ to the reconciliation problem. Moreover, the inability of the equilibrium framework to incorporate the time irreversibilities associated with increasing returns challenged the viability of the theoretical structure he had constructed. What is of importance is how the dilemma posed by Marshall was interpreted and confronted by his immediate followers and later architects of equilibrium frameworks.

It has been argued in this paper that the nature of Marshall’s reconciliation exercise has been significantly misunderstood by a large number of Marshall’s critics. The widespread and persistent association of the reconciliation exercise with ‘competitive equilibrium’ conditions represents the most fundamental of these misconceptions. From his own writings it is evident that the long-run supply curve constructed by Marshall was devised to incorporate the market ‘imperfections’ inevitably emanating from the existence of increasing returns. Once this point is conceded the theoretical imperative of assuming the absence of internal economies as an element of the downward sloping long-run supply curve is curtailed.

External economies in Marshall’s Principles represent a leading source of industrial advance; however, such economies do not moderate the tendency towards monopoly occasioned by the exploitation of internal economies by individual firms. In this setting the central role of Marshall’s biological analogy and representative firm may be understood more readily. These concepts were clearly introduced by Marshall to explain why internal economies did not inevitably lead to monopoly (thus addressing Cournot’s ‘shortcoming’), and to enable the construction of a long-period industry supply curve where both external and internal economies were to be found.

1 For an exposition and further development of this aspect of Sraffa’s critique of the Marshallian theory of value, see Sylos-Labini (1985) and Bharadwaj (1978). These expositions run counter to Blaug’s (1962, p. 399) judgement that Marshall’s ‘analysis of the laws of return bought order and meaning to the theories of Smith, Ricardo, Marx’. 
Marshall’s theory of value

The notion that the reconciliation problem could be resolved through an appeal to external economies does not originate from Marshall, but rather from Pigou and his supporters, who had increasingly become attracted to the notion of pure competition in their analysis. By changing the nature of the reconciliation exercise, the important dynamic issues alluded to in Marshall’s Principles were subtly consigned to the background. Static competitive equilibrium analysis prevailed, effectively removing from the mainstream of economic analysis a consideration of the causes and implications of increasing returns.

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