

Price Theory, Historically Considered: Smith, Ricardo, Marshall and Beyond

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Abstract

Terminology is important. Price theory as the name given to the study of the determination of prices in markets reached ascendancy around the middle of the last century, having been little used at the start of the century and fading from use by the century's end. Historically considering the theory of price determination from Smith to Ricardo, then to Marshall and beyond reveals not only how changing terminology is related to the changing nature of the theory, but also identifies changes in the purposes the theory is attempting to achieve. Successive formulations embed different conceptions of what is being explained, which are reflected in the name given to the subject matter. The process is far from a straightforward exercise in improving the theory, with losses in what can be explained detracting from the purported gains in universality or precision.

Keywords: Price theory, Adam Smith, David Ricardo, Alfred Marshall

1. Introduction

At the outset, let me clarify that the theory of price determination is being historically considered in terms of the sequential development of ideas., or as Stigler (1957, p. 1) puts it in historically considering perfect competition, ‘the evolution of the concept’, abstracting from the influence of economic and social conditions of the time. Perfect competition is put forward by Stigler as the modern refinement of a range of concepts of competition discussed by economists since well before Adam Smith. In a similar vein, price theory is the term used by Stigler and other economists in the middle of the last century to denote their refinement of the theory of value as the theory for determining prices (see, for example, Stigler and Boulding, 1952, Stigler, 1966 or Bain, 1972). A distinguishing feature of price theory is recognition of the variety of types of competition, or lack of competition, affecting price determination, along with a focus on the factors determining the type of competition that applies in particular markets.

The Ngram Viewer from Google Books shows frequency of use of the term, price theory, was rare at the beginning of the 20th century, reached its peak after the middle of the last century and has declined since, especially in the last few decades. Price theory as its meaning crystallised by the middle of the 20th century fit well with the mainstream conception of the theory of price determination of that era, but doesn’t fit so well with modern mainstream analysis and its preoccupation with perfect competition. Increasingly, discussion of the theory of price determination is more limited and occurs under broader themes, such as theory of the firm, microeconomic theory, general equilibrium theory or just economic theory.

To see the pattern by which the theory of price determination and its treatment of competition has developed, I juxtapose each revision of the theory of price determination against its precursors, focussing in particular on identifying changes in analytical structure and changes in the aspects of economic reality that the theory purports to explain.¹ I also note how claims for improved usefulness of the theory in understanding economic reality are grounded in the changing conception of what aspects of that reality are important, often expressed in terms of what constitutes the “economic problem”. I argue the claims for the improvement are shown to heavily depend for validity on changing the importance attached to explaining various aspects of economic reality.

¹ There are multiple dimensions over which different versions of the theory of price determination can be compared. Alternatives to the two dimensions of analytical structure and conceptualisation of economic reality include: whether or not the theory is dynamic, the degree of formalisation and assumptions about how economic agents are assumed to behave. Comparisons based on other dimensions would no doubt lead to different evaluations of whether the theory has improved as claimed by its proponents.

I start with Adam Smith. For Smith the “economic problem” is revealed in the title of his text, *An Inquiry into the Nature and Causes of the Wealth of Nations (TWN)*. By wealth he means the ability to provide the country’s population with goods and services. He identifies the division of labour as the fundamental driver of increases in output of goods and service through enhancing productivity. Thus, for Smith the “economic problem” is achieving a high and growing level of income per capita.

Prices play a key role in delivering the fruits of productivity enhancements to the population. Higher productivity is reflected in lower natural prices of commodities. Natural prices are those that provide for reproduction of existing economic relations when inputs to production are paid at their natural rates. According to Smith, perfect liberty ensures natural prices are centres of gravity around which market prices fluctuate due to temporary or accidental influences.

In distinguishing market from natural prices Smith adopts a scientific approach, focussing on fundamental (or universal) determinants of price. David Ricardo follows Smith with an analytical structure of natural prices determined by natural wage and profit rates, but he claims to advance Smith’s formulation by recognising capital as the embodiment of prior labour and by refining the analysis. Ricardo also separates the influence of natural wage and profit rates on the natural prices of commodities from the influence of rent. With capital stock reduced to indirect labour, Ricardo identifies an inverse relation between profit and wage rates when there is no rent, which he claims is an advantage for his analysis in explaining the distribution of income among workers, capitalists and landlords. Notably, this claim for advantage depends on redefining the “economic problem” as the distribution of income, a somewhat different economic problem than Smith’s problem of a high and expanding the output of goods and services to better provide for maintenance of the population.

Marshall’s analysis of price determination uses equilibrium between supply and demand based on the optimising behaviour of individual economic agents as its analytical structure. Producers (firms) maximise profits to determine the quantities of product they are willing to supply at each price and consumers (households) maximise utility to determine their demand for each product at any price. The factors determining the demand for a particular product are assumed sufficiently independent of the factors determining supply that the equilibrium price in a market is given by the intersection of separately derived demand and supply curves, hence Marshall’s famous scissors analogy.

For Marshall, and especially for his successors in the neoclassical tradition, the “economic problem” is conceived as understanding how the market process determines an efficient allocation of scarce resources. Equilibrium prices for the use of labour, capital and land replace Smith’s socially and

historically determined natural rates or Ricardo's technological determination of a pool of value produced on marginal land to be divided between labour and capital according to natural forces or social norms. Thus, Marshall and subsequent mainstream economists treat the distribution of income as an endogenous outcome of economic activity based on initial endowments, consumer preferences and technology, something quite different from the corresponding conceptualisations of Smith and Ricardo.

After Marshall, the focus on the efficiency of resource allocation through the market brought attention to bear on the role of competition, particularly the possibility that imperfect competition interferes with efficiency. The half century following Marshall's death saw intense scrutiny of alternative forms of market competition, including monopoly, oligopoly and monopolistic competition. Price theory became the accepted term for describing the analysis of price determination during this era. Interest in forms of competition other than perfect competition has subsequently faded and so has the use of price theory as a descriptor.

The next three sections review the theory of price determination presented by Smith, Ricardo and Marshall in sequence. Section 5 examines how the terminology of price theory came to describe the enterprise of price determination in economic theory in the wake of Marshall's contributions and how this terminology subsequently fell out of favour with a narrowing of mainstream theoretical focus to the model of perfectly competitive intertemporal general equilibrium. Section 6 discusses of the link between the changing conception of the "economic problem" and the analytical content of the theory of price determination. In the concluding section, I consider the gains and losses from the sequential refinements in the theory of price determination from the perspective of contributing to understanding economic reality in its full complexity.

2. Smith's theory of natural prices

In *TWN* Adam Smith (1937 [1776], p.lvii) seeks to explain the abundance of goods produced in a country primarily by 'the skill, dexterity, and judgment with which its labour is generally applied'. While the fertility of land and the abundance of capital stock are acknowledged as having influence, Smith's primary focus is on the extent of the division of labour and its impact on labour productivity. The division of labour is limited by the size of the market. As the market grows with accumulation of capital and expansion of the population, tasks become more specialised and productivity rises. Smith identifies trade, as enhanced by improved transportation, as further contributing to the expansion of the market, thereby contributing to national wealth.

The role of market exchange in driving the specialisation of labour leads Smith to analyse the determination of market prices. In Chapter VII, Book I of *TWN*, he takes a scientific approach by claiming natural prices as the theoretical foundation for market prices. Smith's natural prices are determined by applying the principle that each producer receives exactly the amount of revenue needed to cover its costs of production when labour, capital and land receive are paid at their respective natural rates, which generates a flow of revenues and expenditures allowing the existing pattern of market exchanges to be indefinitely reproduced.

When the price of any commodity is neither more nor less than what is sufficient to pay the rent of land, the wages of labour, and the profits of the stock employed in raising, preparing and bringing it to market, according to their natural rates, the commodity is then sold for what may be called its natural price. [*op cit.*, p.55]

Smith is aware the market price of a commodity may be above or below its natural price. Yet, 'The natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating.' [*op cit.*, p.58] The mechanism Smith relies on to drive market prices to their natural levels is perfect liberty, which is Smith's terminology for a state in which there are no obstacles to movement of labour or capital from one location or employment to another. With perfect liberty, the pursuit of individual self-interest causes the quantity produced to adjust to the level, 'which may be sufficient to supply, and no more than supply, that demand.' [*ibid*] However, Smith identifies several interferences with perfect liberty that can lead to market prices remaining above their natural level for long periods. These interferences include trade secrets, monopolies, exclusive privileges of corporations and restrictive regulations.

Perfect liberty also regulates the natural rates for the wages of labour, profits of stock and rent of land. Labour and capital shift among employments and locations in response to the opportunity to earn higher remuneration. The use of land is likewise shifted among crops or between husbandry and farming in response to opportunity for earning higher rent. However, Smith recognises that, even with perfect liberty, the rate applying to labour, capital and land each differ across different employments and locations, 'in every society this rate varies according to their circumstances, according to their riches or poverty, their advancing, stationary or declining condition.' [*op cit.*, p. 62] Explaining variation of the natural rates for labour, capital and land is the subject of Chapters VIII through XI, Book I of *TWN*.

At the beginning of Chapter VIII dealing with wages, Smith (*op cit.*, p. 64) observes, 'In that original state, before the appropriation of land and the accumulation of stock, the whole produce of labour belongs to the labourer.' Later, when land is private property, rent must be paid for its use. Likewise,

if farmers are to advance stock to maintain workers until harvest and manufacturers are to advance stock in terms of the maintenance of workers and the acquisition of materials during the production of commodities, they expect compensation in the form of the return of their stock with profit. Thus, wages naturally fall short of the value of the total produce from labour.

At the other extreme, wages can't be too low without threatening the continuation of production, 'A man must always live by his work, and his wages must at least be sufficient to maintain him.' [*op cit.*, p. 67] Further, if production is to continue beyond a generation, wages must be sufficient to maintain a family. Thus, Smith suggests reproduction of the system of economic relations sets a minimum for the level of wages in terms of purchasing power over commodities.

Smith observes circumstances in which the average wage rate persistently exceeds, 'the lowest which is consistent with common humanity.' [*op cit.*, p. 68] For example, wages are raised in a country where the demand for labour is expanding due to an increase in national wealth, pointing out that wages in the thriving economies of North America are higher than in the richer, but slower growing, economy of England and are much higher than in the rich, but stationary, economy of China. Smith further argues that in his era wages in Great Britain as a whole were generally above the minimum level consistent with reproduction of the population.

All this is to the good according to Smith, as 'No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable.' [*op cit.*, p. 79] High wages encourage expansion of the population, promotes industry among the existing labour force and further extends the division of labour. The rising population ultimately increases the labour force and causes downward pressure on wages, but is offset by rising labour demand if the economy continues to expand.

Smith starts his discussion of the profits of stock in Chapter IX by noting that the accumulation of capital stock has opposing effects on wages and profit rates, raising the former and lowering the latter. He then notes the difficulties in ascertaining the average annual rate of profit across all the trades in a nation and the impossibility of determining historical rates of profit with any degree of precision. Nonetheless, 'some notion of them may be formed from the rate of interest.' [*op cit.*, p. 88] The rate paid for the use of money is higher or lower as the rate that can be made from the use of it is higher or lower, 'The progress of interest, therefore, may lead us to form some notion of the progress of profit.' [*ibid*]

Smith's review of historical experience confirms the proposition that the accumulation of capital depresses interest rates. He notes a decline in English interest rates over the period from Henry VIII

onwards as England became richer, higher interest rates in poor Scotland than in rich England and many other comparisons showing lower interest or profit rates associated with higher wealth. He also finds a generally inverse association between interest rates and wage rates, but he notes counterexamples of the North American and West Indian colonies (where both interest and wages are high). Smith (*op cit.*, p. 93) generalises to suggest, 'The acquisition of new territories or of new branches of trade, may sometimes raise the profits of stock, and with them the interest of money, even in a country which is fast advancing in the acquisition of riches.' Thus, as with the tendency of wage rates to fall with the expansion of the population, Smith notes the rate of output growth as a factor working against the tendency of profits to fall with accumulation, suggesting the natural rates for labour and capital depend on the speed of expansion as well as on the level of population and stock.

There is little ambiguity in Smith's view concerning the course of land rent with the advance of national wealth. In the conclusion to Chapter XI of *TWN*, Smith (*op cit.*, p. 247) states, 'I shall conclude this very long chapter with observing that every improvement in the circumstances of the society tends either directly or indirectly to raise the real rent of land, to increase the real wealth of the landlord, his power of purchasing the labour, or the produce of labour of other people.' The real rent of land rises directly as, 'The landlord's share of the produce necessarily increases with the increase of the produce.' [*ibid.*] An indirect rise occurs when improvements in productive powers of labour lower the real price of manufactures, as the rude produce of land exchanges for a greater quantity of manufactures.

Chapter X of *TWN* is filled with examples of variations in natural rates for wages and profits attributed to compensating conditions or the circumstances of society. Institutions, culture, politics and history play central roles in the determination of natural rates for labour, capital and land, so they indirectly influence the prices of commodities. The analysis of the wealth of nations is thus extended to the role of social and historical factors, but in the process there is a blurring of the distinction between natural and market rates. The distinction between factors influencing natural rates and those accidents that alter only market rates may be clear to Smith, but is not easy to generalise.

If the potential confusion introduced by Smith's references to social and historical factors in explaining variation in wages, profits and rents is ignored, natural prices reveal the impact of fundamental forces determining productivity without accidental or temporary influences of time and place. In particular, an enhanced division of labour leads to generally lower natural prices of commodities, the necessaries, conveniences and amusements of human life, and improved

circumstances of society. However, Smith recognises that the division of labour does not proceed equally with all products and across all nations, meaning comparisons across time and place are facilitated by the identification of a universal standard of value.

Sowell (1979, p. 10, italics in the original) observes, 'Smith had not only a *theory* of value but a *measure* of value.' Smith's measure of value is the amount of labour commanded. At the beginning of Chapter V, Book I of *TWN* Smith (1937 [1776], p. 30) identifies labour as the original source of value in commodities due to the effort expended in production, 'The real price of every thing, what every thing really costs to the man who wants to acquire it, is the toil and trouble of acquiring it.' He then acknowledges commodities are more frequently exchanged for other commodities, particularly money. However, money (or nominal) prices are influenced by both the real price of the commodity and the value of the currency. Smith then argues the value of currency rises with rising demand as trade expands and falls with enhanced supplies, such as when, 'The discovery of mines in America diminished the value of gold and silver in Europe.' [*op cit.*, p. 34] Thus, 'Labour, therefore, it appears evidently, is the only universal, as well as the only accurate measure of value, or the only standard by which we can compare the values of different commodities at all times and at all places.' [*op cit.*, p. 36]²

Smith's formulation of price theory has an analytical structure in which natural prices are determined by the requirements for reproducing existing economic relationships while allowing for expanding the scale of the economy. The natural price of each commodity is such that each producer receives sufficient revenue for their output to enable them to cover the costs of labour, capital and land when each of these inputs is compensated at its natural rate. The natural wage provides the worker with sufficient income to sustain himself and his family at the level appropriate to local conditions. The natural rate of profit gives the capitalist sufficient income to sustain his economic role, which involves providing the stock of goods for both maintaining production and providing any increment to that stock to enable expansion of the economy. The natural rent of land is sufficient to sustain the landlord's economic role, which is productive only in terms of maintaining the fertility of the soil and ensuring his land is put to its most remunerative use.

Smith applies this analytical structure to address his conceptualisation of the "economic problem", which is enhancing national product. Key to achieving growth are the profits of capitalists, which are

² Smith (1937 [1776], p. 35) also considers corn as an alternative standard of value and finds advantages for corn as compared to silver, stating, 'Equal quantities of labour will at distant times be purchased more nearly with equal quantities of corn, the subsistence of the labourer, than with equal quantities of gold and silver, or perhaps of any other commodity.' However, he then notes the price of corn is subject to substantial variations from year to year as compared to labour, reinforcing his conclusion regarding labour as the accurate measure of value.

largely put into expanding the stock of capital. Increases in capital stock increase the demand for labour and the wage rate, which encourages expansion of the population. A constraint on further growth is the need to extend the margin of cultivation, which lowers labour productivity in agriculture and the raises the cost of subsistence. Against this constraint is the effect of expansion of the capital stock and the population on the size of the market and, thereby, on the division of labour, which raises labour productivity. Smith (*op cit.*, p. 86) notes with regard to the competing impact of rising money wage of labour and the rising productivity of labour in industry, 'There are many commodities, therefore, which, in consequence of these improvements, come to be produced by so much less labour than before, that the increase in its price is more than compensated by the diminution of its quantity.'

3. Ricardo's labour theory of value

David Ricardo starts the *Principles of Political Economy (PPET)* with the proposition that over the different stages of society there is a pattern of variation in the distribution of income among the three classes of labourer, capitalist and landowner. He then states, 'To determine the laws which regulate this distribution is the principal problem in Political Economy: much as the science has been improved by the writings Turgot, Stuart, Smith, Say, Sismondi, and others, they afford very little information respecting the natural course of rent, profit and wages.' [Ricardo, 1973 [1821], p. 3] The discussion in the section above suggests this statement is based on a deficient reading of Smith. Nonetheless, Ricardo goes on to fault several aspects of Smith's analysis and suggests modifications, which do enable him to more clearly analyse income distribution.

Ricardo (*op cit.*, p. 7) accepts Smith's distinction between natural and market prices and praises Smith, 'who so accurately defined the original source of exchangeable value, and who was bound in consistency to maintain that all things became more or less valuable in proportion as more or less labour was bestowed on their production'. However, he then faults Smith for adopting as a standard measure of value, 'not the quantity of labour bestowed on the production of any object, but the quantity it can command in the market: as if these were equivalent expressions'. [*ibid*] Ricardo provides a counterexample where an improvement in productivity doubles output per unit of labour but doesn't double the money wage so the worker doesn't command twice as much output from his labour time.³

³ Here, Ricardo seems to ignore Smith's distinction between market and natural prices. Smith's natural price only covers the cost of labour and other inputs at their natural rates, so a rise in labour productivity without

Ricardo builds on Smith's analysis of embodied labour by explicitly recognising circulating and fixed capital as outputs of labour, with this indirect labour adding to the direct labour bestowed on the commodity in production. The exchange value of the commodity increases from use of indirect labour as with direct labour, but by an amount greater than that due to an equivalent increase in direct labour, 'to compensate for the greater length which must elapse before the most valuable can be brought to market.' [*op cit.*, p. 21] Thus, the use of circulating and fixed capital in the production process interferes with the proportional relationship between labour bestowed and the necessary (or natural) price of a commodity.⁴

The timing difference in the application of direct and indirect labour implies the exchange value of commodities varies with the distribution of income between wages and profit. However, Ricardo (*op cit.*, pp. 22-23) uses numerical examples to argue the impact of profit on exchange values is in practice low and he concludes that the relative amount of labour bestowed in production is the main determinant of exchange values or natural prices expressed in terms of other commodities, 'In estimating, then, the causes of the variations in the value of commodities, ... I shall consider all the great variations which take place in the relative value of commodities to be produced by the greater or less quantity of labour which may be required from time to time to produce them.'⁵

Having reached this conclusion, Ricardo immediately offers qualifications that apply once fixed capital becomes widely employed in production. Qualifications that arise due to the different ratios of fixed to circulating capital and, especially, the different durability of the fixed capital used in producing various commodities. He therefore rules out using embodied labour (direct and indirect) as an invariable standard of value. Yet, Ricardo (*op cit.*, p. 29) joins Smith in recognising the usefulness for economic analysis of having an invariable standard of value, thus, 'To facilitate, then, the object of the inquiry, although I fully allow that money made of gold is subject to the variations of most other things, I shall suppose it to be invariable, and therefore all alterations in price to be occasioned by some alteration in the value of the commodity of which I am speaking.'

Adoption of gold as a standard of value allows Ricardo to discuss the impact of changes in wages on natural prices of commodities, something that would not be possible with labour as the invariable standard of value and the value of any commodity depending solely on the amount of direct and

any adjustment in the natural wage would be reflected in a lower natural price of the commodity and a lower amount of labour commanded by the natural price.

⁴ This point is acknowledged by Smith in explaining determinants of the wages of labour in Chapter VIII, Book I of *TWN*, but he glosses over its significance for his discussion of exchange value.

⁵ Stigler (1965) writes of Ricardo's 93 percent labour theory of value, although Coleman (1990) suggests an error in Ricardo's reasoning means he underestimates the impact of profits on the exchange value of commodities.

indirect labour bestowed in its production. In particular, Ricardo uses the relationship between the wage rate and the natural price of corn in analysing the impact on income distribution of expansion of the stock of capital and the population. Thus, Ricardo's switch to using gold as an invariable standard of value is a change in analytical structure that is connected to his changed conceptualisation of the economic problem.⁶

Armed with gold as an invariable standard of value, Ricardo proceeds to consider each of Smith's elements of natural price, namely, wages, profits and rent. He starts with the rent of land in Chapter II of *PPET*. Ricardo follows Smith in recognising differential rent as being a consequence of the varying fertility of land combined with the uniform natural price for each agricultural commodity. However, Ricardo argues the phenomenon of differential rent undermines Smith's argument that rent increases the natural prices of commodities, particularly corn. As Ricardo (*op cit.*, p. 38) notes, 'The value of corn is regulated by the quantity of labour bestowed on its production on that quality of land, or with that quantity of capital, which yields no rent.' Thus, rent can't be a cause of the high price of corn, but must instead be an effect.⁷

In spite of the apparent disagreement about cause and effect, Ricardo's analysis of rent and the natural price of corn closely parallels Smith's analysis. Ricardo agrees with Smith that expansion of population and the stock of capital increase the natural price of corn because of the reduced productivity of labour on less fertile land or the lower increase in yield from additional application of capital and labour to intra-marginal land as the margin of cultivation is extended. They also agree this rise in the price of corn raises the rent of land and the income of landlords, both absolutely and as a share of the output of land. Ricardo explicitly recognises the potentially offsetting effects on the price of corn and, possibly rents, of improvements in agricultural methods that raise the productivity of labour in production of corn, while Smith implicitly takes a similar position in his historical discussion of the influences on the rent of land of different types in Chapter XI, Book 1 of *TWN*.⁸

⁶ Modern representations of Ricardo's analysis in the form of the one-commodity, "corn", model don't require an invariable standard of value and, thereby, avoid Ricardo's apparent contradiction between accepting labour as the dominant determinant of exchange value but rejecting it as an invariable standard of value.

⁷ Ricardo misrepresents Smith on this point, at least in part. In Chapter XI of *TWN* dealing with the rent of land, Smith (1937 [1776], p. 145-6) states, 'Rent, it is to be observed, therefore enters into the composition of the price of commodities in a different way from wages and profit. High or low wages and profit, are causes of high or low price; high or low rent is the effect of it.' However, Smith is not consistently clear as to causation. For example, in the discussion of natural and market prices, Smith (*op cit.*, p.62) states, 'The natural price itself varies with the natural rate of each of its component parts, wages, profit and rent', making no distinction in causation among rent, wages and profit.

⁸ The difference between Ricardo and Smith on the nature and extent of improvements in labour productivity in agriculture is discussed at length in Section 6 below.

After removing rent from Smith's triumvirate of rent, wages and profit that determine the natural price of commodities in Chapter IV of *PPET*, Ricardo turns his attention to the analysis of wages in Chapter V. Here, the analysis closely parallels Smith's analysis in Chapter VIII, Book I of *TWN*. The market wage is drawn to its natural level, which is, in turn, a level appropriate to the subsistence of the worker and his family. As with Smith, the regulator returning the market wage to its natural level is population growth or decline. Also, as with Smith, expansion of the capital stock can sustain a market rate above the natural level for an indefinite period, 'for no sooner may the impulse which an increased capital gives to an increased demand for labour be obeyed, than another increase of capital may produce the same effect; and thus, if the increase in capital be constant and gradual, the demand for labour may give a continued stimulus to an increase of people.' [*op cit.*, p. 53]

Ricardo (*op cit.*, p. 71) follows Smith in arguing for a tendency of the rate of profit to fall with accumulation of the stock of capital, 'The natural tendency of profits is then to fall; for, in the progress of society and wealth, the additional quantity of food required is obtained by the sacrifice of more and more labour.' Ricardo also follows Smith in recognising that this tendency is offset by improvements in machinery and agricultural science, which raise the productivity of labour. However, Ricardo (*op cit.*, p. 75) emphasises more clearly than does Smith that such improvements are temporary, 'wages may temporarily rise, and the producers may consume more than their accustomed proportion; but the stimulus which will thus be given to population will speedily reduce the labourers to their usual consumption.' Ricardo then suggests profits fall as a result, 'as more labourers are employed in proportion to the whole produce retained by the farmer, the value of a greater proportion of the whole produce will be absorbed by wages, and consequently the value of a smaller proportion will be devoted to profits.' [*ibid.*]

Ricardo (*op cit.*, p. 260) also follows Smith in denying the importance of demand as other than a temporary influence on price. In the opening passage of Chapter XXX, The Influence of Demand and Supply on Prices, of *PPET* Ricardo states, 'It is the cost of production which must ultimately regulate the prices of commodities, and not, as has been often said, the proportion between the supply and demand'. The only acknowledged exception is for monopolised commodities, 'but the prices of commodities which are subject to competition, and whose quantity may be increased in any moderate degree, will ultimately depend, not on the state of supply and demand, but on the increased or decreased cost of their production.' [*op cit.*, p. 262] Ricardo thus stays with Smith in treating natural prices as cost determined.

4. Marshall's theory of equilibrium prices

Alfred Marshall (1920, p. v) portrays the first edition of his *Principles of Economics (PE)* as an updating of the work of his precursors, 'This treatise is an attempt to present a modern version of old doctrines with the aid of new work, and with reference to new problems, of our own age.' Yet, the analytical structure of his formulation of price theory breaks sharply from that of Smith and Ricardo, shifting the focus from social and natural influences on price to the influence of individual behaviour. There is also a noticeable shift in emphasis from analysing problems of growth and income distribution to analysing problems of the composition of output and the organisation of industry.

By the time of writing the preface for the Eighth Edition of *PE* some 30 years later, Marshall (*op cit.*, p. xiii) seems to have altered his stance, at least in part, noting, 'in the present age, the opening out of new countries, aided by low transport charges on land and sea, has almost suspended the tendency to Diminishing Return, in that sense in which the term was used by Malthus and Ricardo'. Marshall (*op cit.*, p. xiv) notes the resulting rise in the wages English workers and falling share of land rent in total income from property and states, 'Increasing stress has been laid in successive editions up to the present on these facts'. He then notes successive editions have also laid increasing stress on a different implication of diminishing returns, the tendency of the application of effort by individual agents to become less profitable beyond some point and, 'the complementary fact that this margin is not uniform and absolute: it varies with the conditions of the problem in hand, and in particular with reference to the period of time to which reference is being made.' [*ibid.*]

In the introductory chapter to Book I of *PE* Marshall (*op cit.*, p. 1) says of economics, 'Thus it is on one side a study of wealth; and on the other, and more important side, a part of the study of man.' Smith's emphasis on economics as the study of the causes of the wealth and Ricardo's emphasis on the distribution of income is displaced by an emphasis on the "more important" study of human behaviour. Analytical purpose takes prominence over focussing on a particular economic problem, which is consistent with Marshall's (*op cit.*, p. xi) aim to have *PE* serve, 'as a general introduction to the study of economic science.' Science to Marshall (*op cit.*, p. 25) involves a systematic process of generalisation, 'A science progresses by increasing the number and exactness of its laws; by subjecting them to tests of ever increasing severity; and by enlarging their scope until a single broad law contains and supersedes a number of narrower laws, which have been shown to be special instances of it.'

Marshall rejects the classical formulation of price theory in which natural forces (fertility of soil, technology and social norms) determine natural prices. Instead, for Marshall (*op cit.*, p. 28, italics in original) the laws of economics are based on human behaviour, 'we may say that the course of

action which may be expected *under certain conditions* from members of an industrial group is the *normal action* of the members of that group relatively to those conditions.’ Nonetheless, Marshall goes on to distinguish between normal prices and market prices in a manner that closely parallels the distinction between natural prices and market prices in classical price theory. He states, ‘when “normal” prices are contrasted with temporary or market prices, the term refers to the dominance in the long run of certain tendencies under given conditions.’ [*op cit.*, p. 30, emphasis marks in original]

Marshall (*ibid.*) treats the laws of economics as conditional, noting economics, ‘undertakes to study the effects which will be produced by certain causes, not absolutely, but subject to the condition that *other things are equal*, and that the causes are able to work out their effect undisturbed.’ The laws of economics are thereby exempted from the direct test of historical time as, ‘the tendencies which are being described will not have a sufficiently “long run” in which to work themselves out fully.’ This difficulty will occupy our attention later on.’ [*ibid.*, emphasis marks in original]

Central to the analytical structure of Marshall’s formulation of price theory are the law of demand and the corresponding analysis of supply. In Book III of *PE*, Marshall develops the law of demand from observations on the wants of consumers and their satisfaction. The key proposition is, ‘*the law of satiable wants or of diminishing utility* thus: - The *total utility* of a thing to anyone (that is, the total pleasure or benefit it yields him) increases with every increase in his stock of it, but not as fast as his stock increases.’ [*op cit.*, p. 78-9, italics in original] Diminishing marginal utility leads Marshall (*op cit.*, p. 84, italics in original) to the ‘one general *law of demand*: - The greater the amount to be sold, the smaller must be the price at which it is offered in order that it might find purchasers; or, in other words, the amount demanded increases with a fall in price and diminishes with a rise in price.’ As with other laws, the law of demand is conditional, the inverse relation between price and the quantity demanded applying only, ‘*during a given time and under given conditions.*’ [*ibid.*, italics in original]

Marshall’s (*op cit.*, p. 116, emphasis marks in original) treatment of production in Book IV of *PE* starts by drawing a parallel between supply and demand, noting, ‘While demand is based on the desire to obtain commodities, supply depends mainly on the overcoming of the unwillingness to undergo “discommodities.” These fall generally under two heads: - labour, and the sacrifice involved in putting off consumption.’ Regarding labour he then notes, ‘the marginal disutility of labour increases with every increase in its amount.’ [*op cit.*, p. 117] By implication an increasing supply of work and of goods made by that work requires an increase in the wage rate and a rising cost of the goods.

However, Marshall then suggests this simple method of analysis is based on the assumption the number of workers is fixed, whereas the number of workers in a trade responds to average earnings.

Complexities regarding the use of labour, land and capital in production, including the sacrifice of consumption to finance increased investment, occupy Marshall for many pages in the remaining chapters of Book IV. Much attention is paid to the difficulties or advantages of expansion of production. With regards to agriculture, Marshall (*op cit.*, p. 127) notes increases in productivity over time with improved methods of cultivation, but concludes, 'whatever may be the future developments of the arts of agriculture, a continued increase in the application of capital and labour to land must eventually result in a diminution of the extra produce which can be obtained by a given extra amount of capital and labour.' Outside of agriculture, Marshall (*op cit.*, p. 265) suggests the law of increasing returns applies, such that, 'An increase of labour and capital leads to improved organisation, which increases the efficiency of labour and capital.'

Book V of *PE* is devoted to putting together the pieces of Marshall's analytical structure, the determination of equilibrium prices through the interaction of supply and demand. Normal action for an individual producer or consumer is achieving their best outcome from given external conditions, which implies equating marginal gains with marginal losses from any action. For producers the best outcome is taken to be the one that maximises profit, while the best outcome for consumers is the one that maximises utility. This puts the normal actions of consumers on an equal footing with those of producers, compared to the classical approach in which the costs to producers alone are considered as determining prices and the role of demand is treated as indirect and generally unimportant. According to Marshall the equivalence of the influence of supply and demand is self-evident, 'We might as reasonably dispute whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper, as whether value is governed by utility or cost of production.' [*op cit.*, p. 290]

Marshall distinguishes among four time periods in his analysis of equilibrium prices: temporary, short period, long period and secular. Temporary equilibrium occurs when fixed quantities of commodities distributed in various bundles among individuals are exchanged in the market until each individual has executed any trade that leads to a preferred bundle. In the short period, producers have fixed plant and equipment, but can alter their use of labour and raw materials to achieve an output level consistent with each maximising its profit for prices that are considered normal for the short-period conditions. In the long period, producers can acquire or dispose of plant and equipment to alter their productive capacity to the level consistent with maximising profit for prices that are normal to the long period, meaning prices obtaining without any constraints on the

organisation of production. Finally, secular movements in normal prices occur in response to 'the gradual growth of knowledge, of population, of capital, and the changing conditions of demand and supply from one generation to another.' [*op cit.*, p. 315]

In Marshall's (*ibid.*) long period, 'Supply means what can be produced by plant, which itself can be remuneratively produced and applied within the given time'. This adjustment of plant capacity to equalise profits throughout the economy also features in the determination of natural prices in the analytical structures of Smith and Ricardo. However, both Smith and Ricardo include growth or decline of national population and accumulation of capital in the determination of natural prices, while Marshall considers these factors as influencing secular movements in long-period normal prices. Technical change in the form of an enhanced division of labour is an endogenous element in Smith's analytical structure, while technical change is generally exogenous in Marshall's analytical structure as it is in Ricardo's.⁹

Book VI of *PE* is devoted to the application of price theory to the distribution of income in the long period, starting in Chapter I with a review of the treatment of the distribution of income by his predecessors, including Smith and Ricardo. Here, Marshall argues neither Smith nor Ricardo believed the distribution of income to be based on a naïve version of the iron law of wages being driven to the level of the bare necessities of life. Marshall (*op cit.*, p. 420) contrasts Smith's position to the earlier surplus approach to determining the natural rates of wages and of profits proposed by the Physiocrats, 'he goes a good way to explaining how they are determined by the ever-fluctuating conditions of supply and demand.' Marshall (*op cit.*, p. 421) also notes, 'Ricardo was not only aware that the necessary or natural limit to wages was fixed by no iron law, but is determined by the local conditions of each time and place'. Marshall (*op cit.*, p. 423) then concludes, 'It has now become certain that the problem of distribution is much more complicated than it was thought to be by earlier economists, and that no solution of it which claims to be simple can be true.'

The complications affecting the distribution of income alluded to by Marshall are addressed in the remainder of Book VI. The role of demand in determining prices for labour, capital and land is repeatedly stressed, as is the proposition that demand for inputs is derived from the demand for commodities produced with the aid of the input. The impact of demand is especially strong when, in the short period, the available quantities of inputs are fixed and when the focus is on the incomes of

⁹ Labour-enhancing technical change is implicitly included as a determinant of natural price in Ricardo's labour theory of value, as it is the quantity of embodied labour that determines the relative exchange value of any commodity. However, Ricardo doesn't follow Smith in viewing the division of labour as directly tied to the size of the market and, thus, as an endogenous element in his analysis of the impact of expansion on prices.

specialised trades for labour, specific types of machinery for capital, or land of particular location or suitability for certain uses.

Over time supply adjusts to demand in Marshall's analytical structure. In the short period, workers shift among employers and locations in response to differences in earnings, while businessmen shift their outputs between customers and markets in response to price differences. In the long period, workers change occupations in response to earnings potentials and businesses change industries in response to profit prospects. Even the size of population and the stock of capital are eventually affected,

There is a constant tendency towards a position of normal equilibrium, in which the supply of each of these agents shall stand in a relation to the demand for its services, as to give to those who have provided the supply a sufficient reward for their efforts and sacrifices. If the conditions of the country remained stationary sufficiently long, this tendency would realise itself in such an adjustment of supply to demand, that both machines and human beings would earn generally an amount that corresponded fairly with their cost of rearing and training, conventional necessities as well as those things which are strictly necessary being reckoned for. [*op cit.*, p. 479-80]

Thus, Marshall is suggesting secular movements tend to bring the normal wage rate into line with the cost of reproduction of labour, making appropriate allowance for a conventional standard of living, a position not dissimilar from that of Smith and Ricardo.

Marshall's interpretation allows him to neatly fit the classical concept of a natural price into his schema of temporary, short-period, long-period and secular equilibrium prices. The temporary equilibrium price is such as to adjust the quantity demanded of a commodity to the supply without any allowance for the response of the level of production to price. Production adapts over time to differences between prices and production costs, with plant and equipment fixed in the short period but adjusting over the long period to just the right level required to bring expected cost into balance with expected revenue. The equilibrium price of a commodity thus gravitates to its natural price in the long run through a process that equates price and average cost as well as price and marginal cost.¹⁰ Further adjustments in labour force and capital stock result in secular trends for wage and profit rates towards their natural levels.

¹⁰ Andrews (2015, p. 277) argues against the equivalence of Smith's natural price and Marshall's long-run equilibrium, or normal, price, 'Smith's natural price is an entirely different theoretical object than Marshall's normal price. The alleged equivalence of natural price and long-run price was Marshall's creation.' Smith's recognition of permanence and asymmetry in the deviations of market prices from corresponding natural

The adjustment process in Marshall's interpretation of the natural price as the long-run equilibrium price involves changing the level of production. All inputs to production are variable in the long run and are adjusted to the level producing a minimum level of average cost for each output level. Whether average cost remains constant, rises or falls over the course of the adjustment process therefore reflects the nature of returns of scale in production. Here, Marshall encounters the "reconciliation problem", with increasing returns to scale at the firm level implying a downward sloping marginal cost curve that is inconsistent with perfectly competitive equilibrium.¹¹

Marshall deals with the "reconciliation problem" in two ways, first by making at least some aspects of returns to scale external to the firm and, second, by limiting the lifetime during which firms grow. If increasing returns are due to the development of the industry and not dependent on the scale of output of the individual firm, each firm may face average cost that increases with the level of its own output but decreases with the aggregate output of the industry. In this case, each firm may be in perfectly competitive equilibrium with price equal marginal cost while the industry supply curve is still downward sloping.

The argument for the finite longevity of firms, at least for the period in which they are vigorous and capable of rapid growth, is presented by Marshall in Chapter XIII of Book IV of *PE* using his famous "trees in the forest" analogy. Marshall traces the process of growth of a firm run by an able man with good fortune, who is able to recruit capable subordinates and obtain increasing capital, partly through his own hard work and spare living and partly through access to credit. For this man, 'The increase in the scale of his business increases rapidly the advantages he has over his competitors, and lowers the price at which he can afford to sell', and 'if it could endure for a hundred years, he and one or two like him would divide between them the whole of that branch of industry in which he is engaged.' [*op. cit.*, p. 263] Such domination doesn't generally occur because, 'Nature still presses on the private business by limiting the life of its original founders, and by limiting even more narrowly that part of their lives in which their faculties retain full vigour.' [*op. cit.*, p. 263-4] Further, a joint-stock company, 'may secure a permanent and prominent place in production. But it is likely to have lost so much of its elasticity and progressive force, that the advantages are no longer exclusively on its side in its competition with younger and smaller rivals.' [*op. cit.*, p. 264]

prices further argues against interpreting Smith's natural prices as proxies for long-period average values of market prices.

¹¹ Hart (1991, p. 34) identifies the reconciliation problem as arising from, 'the logical difficulties associated with reconciling the existence of increasing returns with the attainment of equilibrium in the context of normal supply and demand conditions'.

5. Beyond Marshall: The rise and fall of price theory

Neither of Marshall's two ways of dealing with the reconciliation problem have gathered much support. Piero Sraffa (1926, p. 540) criticises Marshall's reliance on external economies of scale, noting, 'Those economies which are external from the individual firm, but internal as regards the industry in its aggregate, constitute precisely the class which is most seldom to be met.' For Sraffa (*op. cit.*, p. 542) the only reasonable course is, 'to abandon the path of free competition and turn in the opposite direction, namely, towards monopoly.'

Marshall's use of the trees in the forest analogy has not been so much attacked as subverted. Pigou (1928), Marshall's successor in the Chair of Political Economy at Cambridge, interprets the Marshall's representative firm as a firm operating in profit-maximising equilibrium with the same access to technology and inputs as all other firms, implying that all firms are identical.¹² If all firms are identical, there is no scope for limiting the firm's lifetime and preventing imperfect competition due to the domination of the industry by a small number of firms.

Sraffa's recommended course of abandoning the path of free competition in favour of monopoly preceded a wave of research on the theory of price determination under imperfect competition. Joan Robinson directly took up Sraffa's challenge and published *The Economics of Imperfect Competition* in 1933.¹³ Independently of Sraffa's encouragement, Edward Chamberlin developed an analytical framework in his *The Theory of Monopolistic Competition* that mixed Sraffa's suggested focus on monopoly with Pigou's device of treating all firms in an industry as identical.¹⁴ By 1935, John Hicks (1935, p.1) was devoting his annual survey of economic theory exclusively to the theory of monopoly, noting 'The last five or six years have seen the appearance of at least four important works specially devoted to the subject – those of Dr. Zeuthen, Dr. Schneider, Professor Chamberlin, and Mrs. Robinson; while there is, I think, no theoretical subject which has received more attention

¹² For a rehabilitation of Marshall's conception of the representative firm as a firm with a balancing of advantages and disadvantages in an industry in flux see Metcalfe (2007).

¹³ In the Foreword to the first edition of *The Economics of Imperfect Competition*, Robinson (1969 [1933], xiii) states, 'In general I have endeavoured to build on the foundations laid by Marshall and Professor Pigou. ... Of more recent work, my chief debt is to Mr. Piero Sraffa's article in the *Economic Journal* of December 1926, to Mr. E. A. G. Robinson's *Structure of Competitive Industry* and to Mr. G. F. Shove's articles in the *Economic Journal* of June 1928 and March 1930.'

¹⁴ Chamberlin (1948 [1933], p.5, n.4) acknowledges similarities of his analysis to that in Sraffa's 1926 *Economic Journal* article, but indicates 'At the time when Professor Sraffa's article appeared, the present study, submitted as a doctor's thesis at Harvard University, April 1, 1927, was virtually completed.'

in recent volumes of the chief economic journals than the theory of monopoly and imperfect competition.’

Increased attention to imperfect competition in the theory of price determination encouraged a shift in terminology. Price determination no longer was determined by equality between price and average of cost as in the natural prices of Smith and Ricardo or by equality between price and marginal cost as in the supply and demand determination of market price by Marshall. The wedge between price and cost that became the focus of the analysis of imperfect competition, undermined the use of the terminology, theory of value, as a name for the subject of price determination.

According to Google Books Ngram Viewer, frequency of mention of the phrase, price theory, increased more than tenfold from 1920 to 1960. In contrast, use of the phrase, theory of value, increased only by about 50%. In these four decades, dominance of use of theory of value over price theory decreased from about twenty to one to only about three to one.¹⁵

Book titles also reflected the shifting content of the study of the theory of price determination. George Stigler published what was perhaps the first advanced textbook on the theory of price determination in 1942 under the title, *The Theory of Competitive Price* (Stigler, 1942). He then revised the book in 1946 under the title, *The Theory of Price* (Stigler, 1946), adding chapters on pricing under monopoly and oligopoly.¹⁶ When a collection of key articles on price determination was published in 1952 in the American Economic Association series of republished articles on economics, it was titled *Readings in Price Theory* (Stigler and Boulding, 1952). The bulk of the articles deal with either imperfect competition or the relation of costs to returns to scale.

According to Google Books Ngram viewer, the annual peak in mentions of price theory occurred in 1969. By 1980 mentions had fallen about 30% and by 2000 the decline was almost 70% from the 1969 level. Interest in price determination under imperfect competition remained high, especially interest in the application of game theory to price setting in oligopoly. However, general equilibrium analysis was gradually displacing partial equilibrium analysis as the focus of the frontier of economic theory and intertemporal general equilibrium analysis invariably treats markets as perfectly competitive.

¹⁵ Data from Google Books Ngram Viewer sourced on 8 December 2019.

¹⁶ David Kamerschen and Deepa Sridhar (2009) in an examination of the shifting content of the five versions of Stigler’s text support Stigler’s claim that the additional chapters in the first edition of *Theory of Price* were part of the original plan, noting there was no revision to the first two parts taken over from *Theory of Competitive Price*.

If any justification for ignoring imperfect competition is offered by general equilibrium theorists, it tends to follow that used by John Hicks in the Introduction to *Value and Capital*, his seminal contribution to the modern theory of general equilibrium.

One limitation to our analysis will soon become very obvious, and I had better own up to it at once. We shall proceed throughout under the assumption of perfect competition; that is to say, we shall almost always neglect the influence on supply which may arise from calculations made by sellers about the influence on prices of the sales they make themselves. (Similarly for demand.) In fact many supplies and demands are probably influenced to some extent by such calculations; it may be they are influenced to a very important extent. However, it is very difficult to make much allowance for this influence in any other than the simplest problems; so that, although the analysis of this book would certainly be improved if more attention were paid to imperfect competition, I have thought it best to leave this over for the present. [Hicks, 1946 [1939], p.7]

Not only Hicks, but his successors continue to “leave this over”, with the only notable change in the treatment of competition being that neoclassical theorists no longer bother to apologise for assuming the universal existence of perfect competition (or the absence of economies of scale). In his seminal formalisation of intertemporal general equilibrium price theory, Gerard Debreu (1959, p.35, italics in original) simply states, ‘*The value of an action a relative to a price system p is the inner product $p \cdot a$.*’ There is no discussion of competition, perfect or otherwise. The statement that actions in the form of buying or selling quantities of commodities lead to expenditure or revenue equal to price times quantity implies that prices are constant with respect to quantities from the perspective of the decision maker. Why prices can be taken as independent of quantities and what would happen otherwise are not discussed.

Hicks chose the title, *Value and Capital*, for his subtitled, *Inquiry into Some Fundamental Principles of Economic Theory*, while Debreu chose *Theory of Value* for his subtitled, *Axiomatic Analysis of Economic Equilibrium*. At the time of writing of both volumes, price theory was in ascendancy as the name for the subject of the theory of price determination, but price theory was generally understood to include analysis of price determination with imperfect competition that generates price exceeding marginal cost. Neither Hicks nor Debreu engaged with the possibility that there might be a difference between price and marginal cost in equilibrium, which allowed them to avoid

of the difficulties this would have entailed for the stability of equilibrium and the optimality properties of equilibrium prices.¹⁷

6. Discussion

Intertemporal general equilibrium determination of prices with perfect competition can be viewed as the culmination of a centuries-long quest to provide a logically coherent theory to support Adam Smith's "invisible hand" proposition that the pursuit of self-interest by autonomous individuals results in a socially beneficial pattern of production and consumption. Having each individual's marginal rate of substitution equated to a common price ratio satisfies the condition for a Pareto optimum in exchange. Similarly, having for the price ratio for any two commodities the ratio of marginal productivity of each input in the production of those commodities satisfies the efficiency condition that a reallocation of inputs in producing the commodities can't increase the output of one commodity without reducing the output of the other. Finally, having the ratio of marginal productivity of each input in the production of any two commodities (the marginal rate of transformation) equal to the same price ratio that is equal to the marginal rate of substitution between the commodities for all individuals satisfies a necessary condition for Pareto optimal distribution of resources in production.

Of course, there is much more than the invisible hand in Smith's explanation of the *Nature and Causes of the Wealth of Nations*. Indeed, the invisible hand doesn't get an explicit mention until the discussion on restraints on imports from foreign countries in Chapter II of Book IV, although the positive role of unfettered competition in market transactions features as early as the discussion of natural and market prices in Chapter VII of Book I.

Ricardo's theory of price determination advances the treatment of capital from that given in Smith's version. Smith treats capital as an accumulation of the stock of goods (consumption goods advanced to workers, materials and machinery) used to enable the current production process, while Ricardo treats capital as the output of prior labour such that current production (at least on marginal land) is fully attributable to direct and indirect labour. With this modification to Smith's analytical structure, Ricardo is able to logically demonstrate an inverse relationship between profits and wages under

¹⁷ Both titles hark back to the name commonly given to subject of the determination of prices in classical economics, but neither author makes any attempt to link their analysis to that of Smith or Ricardo. Instead, their analyses are firmly rooted in the neoclassical approach of Marshall, Walras and Pareto who focus on the problem of allocating scarce resources among competing uses.

given production conditions.¹⁸ Ricardo's analysis further demonstrates that proportional growth in population and the capital stock leads to a combination of a falling profit rate and rising rents. Smith reaches similar conclusions, but based on imprecise arguments supported by historical observation.

Smith and Ricardo diverge in their conclusions regarding the impact of economic growth on wages, with Smith being a qualified optimist and Ricardo a less-qualified pessimist. Both point to a floor for the wage rate created by requirements for maintenance of the labour force, including the worker and their family (to provide a continuation of the labour force over time). In this sense, they both have subsistence determining the natural wage rate. They both also suggest rising wage rates increase population growth, pointing to an endogenous mechanism regulating wage rates. However, they part company when it comes to analysing the impact of economic growth on labour productivity and the cost of subsistence.

After reviewing Smith's analysis of the positive impact of specialisation on labour productivity, Arrow (1979, p.154) suggests the analysis leads Smith, 'to develop the hypothesis that the division of labor in turn leads to and is sustained by the growth of an economy, of a market system.'¹⁹ In this sense, Smith has elements of an endogenous theory of economic growth, where growth results in an enhanced division of labour driving increases in labour productivity and further economic growth. Smith's discussion of the course of land rents in Chapter XI of *TWN* emphasises increasing labour productivity in agriculture through application of new methods as an offset to the negative impact of extension of the margin of cultivation with expansion of the population and capital. In contrast, Ricardo's analysis of economic growth has no endogenous offset to the impact of diminishing returns to agricultural labour as the margin of cultivation extends to less fertile lands.²⁰

In *PE* Marshall shifts the focus of economics from analysing the particular problems of economic growth or income distribution to a general consideration of the behaviour of individuals in the ordinary business of life, particularly those activities where wants and efforts are expressed in terms of money prices. Equilibrium prices are the result of normal actions of consumers and producers.

¹⁸ Sylos-Labini (1998, p. 4) points to a causal link between the change in analytical structure and the change in conceptualisation of the economic problem, 'Ricardo's analytical apparatus is different from Smith's since it is concerned with different economic problems.'

¹⁹ Arrow (1979) identifies a fundamental difference in the way Smith and Ricardo treat the causes of the specialisation of labour. Smith has the process occurring due to specialising production tasks among homogenous workers, while Ricardo and, subsequently, Marshall, Walras and Jevons have the process occurring due to gains from exploiting the heterogeneity among inputs to production. Ricardo stresses the heterogeneity of resource endowments in his analysis of international trade, whilst the more modern authors stress the heterogeneity of individual talents.

²⁰ Ricardo's discussion of rent in Chapter II of *PPET* recognises the effect of agricultural improvements as raising the yield from application of given amounts of labour and capital to land under cultivation. However, he doesn't draw a causal connection to the process of expansion of the population and capital stock.

Determining the composition of output and the organisation of production effectively becomes the “economic problem” to be explained by the interaction of demand and supply in the market.

Of course, the composition of output and, particularly, the organisation of production are elements in any analysis of economic growth or the distribution of income. Marshall views the wide applicability of his analytical structure as a virtue. His formulation of price theory is designed to apply to different time periods, different locations and different environments in terms of social, cultural, political and natural conditions. However, this universality serves to obscure its application to the “economic problem” of either Smith or Ricardo, who consider the laws of economics under the specific social, cultural, political and natural conditions of their time.

In spite of the differences in analytical structure and conceptualisation of the “economic problem”, Marshall’s position on the secular tendency of the earnings of labour to move towards the cost of reproducing workers is not dissimilar from the positions of Smith and Ricardo regarding the tendency of labour earnings to move towards the requirements for subsistence, where subsistence is understood to provide a conventional standard of living. Yet, Marshall doesn’t follow Smith and Ricardo in using a naturally or socially determined wage rate in governing the distribution of income between labour and capital, nor does the wage rate govern the impact of population growth and capital accumulation on the secular movements of profit rates and land rents. Instead, when Marshall discusses the effects of progress on the distribution of income he emphasises specific historical factors interplaying with his universal science of economic behaviour.

The differences among Smith, Ricardo and Marshall show clearly in their respective analyses of the impact of economic expansion on the price of corn. Ricardo argues the price of corn necessarily rises due to extension of the margin of cultivation to less fertile land and intensification of the use of capital on fertile land. The use of machinery and the advance of agricultural science at best provide temporary relief. Smith puts greater weight on the offsetting forces, arguing for relative constancy in the price of corn over time, as expansion to the less fertile margin of cultivation is offset by the larger market leading to an enhanced division of labour. Marshall’s position is similar to that of Smith’s in terms of viewing diminishing returns as being offset by other developments. As with the secular trend of the wage rate, Marshall attributes the secular trend of the corn price to one-off historical events, such as the repeal of the Corn Laws in England and the expansion of agricultural production in the newly developed lands of the Americas.²¹

²¹ Smith (*op cit.* pp. 251-258) provides data on the price of corn in terms of the primary type of grain food in England, wheat, covering the period from 1202 to 1764. The data when converted into money in use at the time of Smith’s writing show much fluctuation but no clear trend. Ricardo had a few more decades of

Marshall's approach to price theory dominated mainstream economics for decades, at least in the English-speaking world. *PE* appeared in eight editions between 1890 and 1920 and was reprinted regularly thereafter. Most importantly, Marshall's reorientation of the economic problem from classical concerns with the generation and distribution of income to the efficient allocation of given resources under fixed technology and consumer preferences has stuck. However, his use of multiple time periods as a means of using static analysis to deal with dynamic adjustment processes never really took hold and has been displaced by intertemporal general equilibrium analysis.

Intertemporal general equilibrium treats the economy as a closed system, which precludes consideration of the type of evolutionary processes suggested by Smith's analysis of the division of labour or that constitute Marshall's Mecca.²² Prices have no independent influence on economic outcomes, unlike the influence of subsistence wages in classical economics or the influence of firm price strategies in models of imperfect competition. Instead, prices are an internal mechanism that equate the values of various buyers and sellers of a commodity. Economics may have progressed in logical coherence and universality, but arguably declined in scope and meaning.²³

7. Conclusions

By jointly considering the analytical structure and conceptualisation of the "economic problem" across sequential theories of price determination, the development of the theory is seen to involve more than just a unidirectional movement towards improved understanding of the forces determining prices. Each formulation has advantages for understanding aspects of price determination identified as essential by its proponents, but doesn't necessarily contribute to understanding other aspects of price determination identified as essential by precursors. Ricardo's

experience, including the period of the Napoleonic War when wheat prices were extremely high. Marshall had an additional century of experience to review, during which the price of wheat in England generally dropped in money terms and in relation to wages, particularly after the repeal of the Corn Laws in 1846, but he nonetheless relies on diminishing returns in agriculture to eventually force up the price of wheat. In the period since the Marshall's time, wheat prices when measured relative to a price index of manufactured goods, and relative to money wage rates, have fallen dramatically (see Bloch and Sapsford, 2013, Table 2a, p.184). Thus, Smith, Ricardo and Marshall all seem to have been unduly pessimistic regarding the impact of economic growth on basic food prices.

²² 'The Mecca of the economist lies in economic biology rather than economic dynamics. But biological conceptions are more complex than those of mechanics; a volume on Foundations must therefore give a relatively large place to mechanical analogies; and frequent use is made of the term "equilibrium," which suggests something of a statical analogy.' (Marshall, 1920, p. xii, quotation marks in original)

²³ A similar point is made by Keith Tribe (2015, p. 2, quotation marks in original), 'Today, 'economic' argument prevails everywhere over political or ethical argument, but the sense of 'economy' this implies is a remarkably attenuated and impoverished one: its meaning has been cheapened.'

formulation of price theory has advantages over that of Smith in understanding the connection between prices and income distribution, but is arguably inferior in understanding the connection between prices and economic growth. Likewise, Marshall's formulation has advantages over those of Smith and Ricardo in understanding how prices influence the organisation of production and the composition of output, but is arguably inferior in understanding the connection between prices and either income distribution or economic growth.²⁴

Marshall left behind problems of logical coherence in his treatment of both time and increasing returns to scale under conditions of perfect competition. In response, analysis of imperfect competition blossomed, which coincided with widespread adoption of price theory as the name for the subject of the theory of price determination. However, attempts to incorporate imperfect competition analysis into the theory of intertemporal general equilibrium have not proceeded very far.

Topics of prime concern under the subject heading of price theory, particularly increasing returns to scale and imperfect competition, no longer feature prominently in discourse on the theory of price determination. Instead, we have a general equilibrium theory that explicitly treats all prices as beyond the influence of individual buyers and sellers as well as a partial equilibrium analysis of supply and demand that almost invariably makes the same assumption. Increasing returns at the level of the individual enterprise are inconsistent with equilibrium under perfect competition and are thus largely ignored along with the analysis of imperfect competition. Both increasing returns to scale and imperfect competition have been relegated to specialist studies in industrial economics, labour economics, international trade or economic growth.

Modern textbook treatments of price determination generally ignore the classical contributions of Smith and Ricardo as well as more modern theories based on the work of Marx, Veblen, Schumpeter, Kalecki and Sraffa among others. While price determination under imperfect competition is still covered, only the theory of price determination under perfect competition is linked to the grand scheme of intertemporal general equilibrium analysis. Logical coherence and universality have dominated relevance to current economic issues as theoretical objectives for the economic mainstream. Not surprisingly, mainstream economics has struggled to contribute to deep understanding the processes of economic growth and the distribution of income, where imperfections of competition and disruptions of equilibrium play central roles.

²⁴ Dasgupta (1985, p. vii) makes a similar point when he suggests the history of economic thought, 'could be seen as consisting of "epochs", each epoch giving rise to a new set of questions, and hence to new theories for answering them.'

In defence of the concept of perfect competition being unrealistic compared to newer models of imperfect competition, Stigler (1957, p.17) argues, 'the concept of perfect competition has defeated its newer rivals in the decisive area: the day-to-day work of the economic theorist.' Using acceptance in theoretical practice as evidence of the validity of a theory is nothing more than a circular defence of orthodoxy. The problem with perfect competition in particular and intertemporal general equilibrium in general is not simply the lack of realism of assumptions that Stigler poses. Rather, it is the logical inconsistency of those assumptions with the existence of economies of scale and innovative activity, which even the mainstream recognises are key drivers of economic growth and the distribution of income.

The modern mainstream approach to price theory is deeply flawed. Perfectly competitive intertemporal general equilibrium is too narrow in scope. The modern economy is characterised by imperfect competition, incomplete knowledge, uncertainty and disruptive structural change. Smith, Ricardo and Marshall did not define the "economic problem" to fit the assumptions of their theories, neither should we. The time has come to resume the study of price theory in its full scope.

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