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Agriculture in the Economy: the evolution of economists' perceptions over three centuries

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This paper traces the perceptions of the agricultural sector held by economists over the last three centuries, with particular emphasis on how the evolution of these ideas has influenced the state of present-day thinking about the economic role of agriculture in developed and developing economies. The paper begins with the seventeenth and eighteenth centuries, leading to a consideration of the place of agriculture in the work of the major figures of classical political economy from Adam Smith to Marx. The rise of neo-classical economics, and its influence on twentieth century thinking, is discussed. In the contemporary period, particular attention is paid to agriculture in development theory, with an assessment of conflicting theoretical ideas about the role of the agricultural sector during the process of economic transformation and growth. The paper concludes with a consideration of the current state of economic thought about the role of agriculture in the economy, and makes some observations on likely future directions.

Agricultural economics as a distinguishable area of academic and technical study is one of the largest and most successful branches of applied economics. Historically this pre-eminence can be explained at least in part by the fundamental and continuing economic and social importance of the agricultural sector in the economy. Yet long before agricultural economics was recognisable as a distinct discipline, economists were speculating about the economic role of agriculture in food supply, employment, trade and growth. Indeed the evolution of economic thought as a whole has been importantly influenced by the perceptions of the major economic thinkers about the place and functions of agriculture in economic systems.

In this paper the emergence and elaboration of theories of the role of the agricultural sector¹ in the economy and in economic growth is discussed. The aim of the paper is to illuminate the way in which contemporary ideas in agricultural econo-

mics have evolved from their primitive origins in the seventeenth and eighteenth centuries, through the great flowering of classical political economy of the nineteenth century, to the major theorists of the present day. In keeping with the evolutionary theme, the treatment in the paper is broadly chronological, but not entirely so; the discussion is grouped in sequence around major thinkers and schools of thought, but these overlap in time to some extent, especially in the modern (post World War II) period. In fact in the latter period a strictly sequential treatment is both more difficult to maintain and less informative than one based on the dominant issues, ideologies and areas of interest of economists concerned with agriculture in the contemporary world.

It should be noted that this paper is not a literature review, nor a survey. The bibliography, though long, is by no means exhaustive or comprehensive. In particular, the paper concentrates on theory, and pays little attention to the empirical experience of particular countries. Of course it is impossible to speak of Mao without mentioning China, or of Marx, Lenin or Kautsky without invoking Russia. Discussion of dependency theory or the staples thesis necessarily involves allusion to Latin America or Canada. But

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1. Loosely defined synonymously with "farm sector", "rural sector" and "primary sector" to comprise crop and livestock production, fishing and forestry, whether for own consumption, exchange or sale.

the focus throughout is on broad schools of thought and intellectual traditions rather than on specific geographic, social or political circumstances. It is hoped that readers may be stimulated to pursue for themselves a more detailed empirical insight into areas of particular interest.

Naturally the choice of writers and works to include is a subjective process, and one person's account of significant contributions over so broad a sweep of subject matter is unlikely to match another's. In general an attempt has been made to include works and writers that have been influential in their own time, whatever judgment history may subsequently have passed on their contribution. Of course recognition of importance becomes more problematical the closer one comes to the present time.

Finally, for pragmatic reasons this paper does not encompass contributions to the literature that are not available in English, hence few references are made to non-English-language sources.

1. The Earliest Years

In the European countries of the Middle Ages, agriculture was the dominant area of economic activity, providing the major share of gross output of the economy, and giving employment to a large section of the population. It is perhaps surprising, then, that the mercantile "school", the first recognisable and systematic body of economic thought,² was concerned mostly with issues of trade, national unity and sovereignty, and had little specific to say about agriculture. The mercantilists were interested in the importance of the accumulation of wealth and of the maintenance of a favourable balance of trade through regulation of imports, exports and capital transactions.³ Their concerns, administrative and legal as much as economic, were to elaborate a rational basis for economic life which served the interests of crown, nobility, merchants, the court and the professions. In this schema the agricultural sector played little part, except as a source of foodstuffs and other primary commodities which entered the mercantile system, which contributed to a favourable balance of trade or which were necessary for national self-sufficiency. It was simply

expected that the peasantry would strive to produce as great an output as possible.⁴

Notwithstanding the mercantilists' preoccupation with matters other than agriculture, the beginnings of a positive analysis of the role of agriculture in economic systems can be traced to an important figure in the seventeenth century debate about money, wealth and trade. Sir William Petty's finest work, *A Treatise of Taxes and Contributions*, published in 1662, provided in its opening pages what was probably the first formal statement of the conditions for viability of an economic system, namely that the total product of agricultural labour be sufficient for the subsistence of the total population.⁵ Alternatively this can be stated as a requirement that average product and average consumption in the agricultural sector be so related that the surplus provides the necessary consumption goods for that part of the population that does not work in agriculture, including those that do not work at all.⁶ This fundamental insight set the scene for the treatment of agriculture in the classical political economy that was to follow, and indeed, as will be seen, is the logical precursor of the two-sector models of the present day.

It is worth noting, too, that Petty was one of the earliest writers to speculate about a theory of value. The classical questions of what determines values, prices

2. For an outline of earlier stages in the development of economics, see Schumpeter's classic history of economic analysis (Schumpeter 1954).

3. Strictly, the mercantilists were not a "school", although Adam Smith referred to the "mercantile or commercial system" as one of the two great branches of political economy. See Smith (1776), Introduction and Chs. 1-8 of Book IV of *Wealth of Nations* (Cannan 1937). See also Heckscher (1935).

4. So, for example, the Austrian mercantilist Phillip von Hornick wrote in 1684 a list of "rules of national economy" which included "To inspect the country's soil with the greatest care, and not to leave the agricultural possibilities of a single corner or clod of earth unconsidered." (Quoted in Fufeld 1982, p. 13). See also Dobb (1925, p. 209 ff.) and Buck (1964, pp. 48-52).

5. See Petty (1662), especially Chs. 1-4 of *A Treatise of Taxes and Contributions*, in Hull (1963, pp. 18-47).

and the distribution of income were approached by Petty in a way that emphasised the fundamental importance of land and labour. The rent of agricultural land, according to his analysis, was determined by the excess of its produce over the cost of its cultivation, paid in corn, and the monetary value of this excess was measured by the amount of silver which a miner, working for the same time as the corn farmer, would have remaining after meeting his own expenses. He suggested that the rent of agricultural land was determined not by its fertility as the later political economists were to propose, but by the density of the population dependent on it for food.⁷

Nevertheless the mercantilist view was that wealth derived from industry and trade rather than from agriculture, a view summed up by Petty when he wrote:

There is much more to be gained by Manufacture than Husbandry, and by Merchandize than Manufacture.⁸

Under these circumstances it is scarcely surprising that regulatory policies in pursuit of mercantilist principles did not favour the development of a healthy agricultural sector in those economies, such as England and France, where these principles were influential.

2. The Physiocrats

Economic conditions in France in the eighteenth century were ideal for the emergence of an intellectual revolt against mercantilism and a refocussing of interest on agriculture. During the reign of Louis XIV the French rural sector had declined as a result of the crippling land taxes which were used to finance the war of the Spanish Succession, the religious struggle against the Huguenots and the opulent life of Versailles, and the situation grew worse under Louis XV. The physiocrats advocated the sweeping aside of mercantilist regulations, the institution of a simplified tax system based on the “unproductive” landowners rather than the “productive” farmers, and the revitalisation of the countryside.

The major figure amongst the physiocratic school was Francois Quesnay, a physician. It is perhaps not surprising that he saw an analogy between the circulatory systems of the body and financial trans-

actions in society. Just as blood pumped to the furthest extremes of the body returns in due course to the heart, so also does money pass from one economic agent to another and another and back again in the economy.⁹ Quesnay’s famous *Tableau Economique* of 1758 (Kuczynski and Meek 1972), seen in its time as the greatest achievement of the physiocrats, was the first formal statement of the circular flow of income, a notion which has continued to be a theoretical cornerstone of economics to the present day.

The *Tableau* depicted a three-sector model in which the role of agriculture was explicit, reflecting the essential importance of agriculture in the eighteenth century economy and in the physiocrats’ thinking. Farmers, landowners and artisans were seen as exchanging goods and services; corresponding financial flows were specified, enabling the model to be presented in real or monetary terms. Farmers paid artisans for capital goods, outlaid working capital on their own costs of production, and paid rent to landowners, who in turn bought foodstuffs from farmers and manufactures from the artisans. The latter sector spent its income on purchases from agriculture. Appropriate lags were built in. The magnitudes in the *Tableau* were so

6. The latter were referred to by Petty as “super-numeraries”, as in the following passage which gives the flavour of his thinking: “. . . if there be 1000 men in a Territory, and if 100 of these can raise necessary food and raiment for the whole 1000: if 200 more make as much commodities, as other Nations will give either their commodities or money for, and if 400 more be employed in the ornaments, pleasure and magnificence of the whole: if there be 200 Governours, Divines, Lawyers, Physicians, Merchants, and Retailers, making in all 900 the question is, since there is food enough for this supernumary 100 also, how should they come by it? . . . it will be certainly the safer way to afford them the superfluity which would otherwise be lost and wasted, or wantonly spent: Or in case there be no overplus, then ’tis fit to retrench a little from the delicacy of others . . .”; see Hull (1963, pp. 30-1).

7. See Petty (1662), *Political Arithmetick* Ch. 4, in Hull (1963, pp. 286-7).

8. *ibid.* p. 256.

9. This sort of analogy between biological and social systems can be traced at least as far back as Thomas Hobbes and other seventeenth century philosophers.

arranged that a stable equilibrium existed. The model clearly laid the theoretical foundations on which modern input-output analysis and social accounting matrices are built.¹⁰

The physiocrats believed that only agriculture was capable of producing a surplus, a *produit net* of the soil that in principle would be a precondition for growth in the economy.¹¹ The suggestion that wealth derived only from the land was elaborated, for example, by Jacques Turgot in his *Reflections on the Formation and Distribution of Wealth* of 1766:

As soon as the labour of the Husbandman [*i.e.* farmer] produces more than his wants, he can, with the surplus which nature accords him as a pure gift above the wages of his toil, purchase the labour of other members of society. The latter, in selling to him, only obtain a livelihood; but the Husbandman, besides his subsistence, collects an independent and disposable wealth, which he has not purchased and which he sells. He is therefore, the unique source of the wealth which, by its circulation, animates all the industry of society, because he is the only one whose labour produces more than the wages of his labour.¹²

In Quesnay's *Tableau*, however, there was no growth, since the agricultural surplus was entirely absorbed by the industrial sector, which was labelled as "sterile", meaning simply that it produced no net additions to income. Thus in this respect the *Tableau* could be seen as one of the first models of agricultural stagnation. Nevertheless the physiocratic system was clear that an increase in output was possible but that it could arise only through raising the level of the agricultural surplus to a point where a larger sum was available for capital formation than was necessary to meet the requirements of replacing fixed capital and of providing working capital. The physiocrats argued that an increase in the surplus could stem from improvements in agricultural productivity, a reduction in agricultural taxation, a fall in the rate of interest or a deregulation of trade.

Turgot also went on to distinguish stages of economic growth from primitive society comprising only "Cultivators" and "Artisans" to a more advanced stage where a class of "Proprietors" emerged who appropriated the surplus produced by the farmers. The proprietors, according to Turgot's exposition, could arrange to have

their land cultivated by wage labourers, slaves, share-croppers, or most desirably, by renting the land to "intelligent and rich Cultivators",¹³ *i.e.* to tenant farmers who had the expertise and capital to improve the productivity of the soil. Turgot further postulated the emergence of an entrepreneurial class in a developed capitalist economy. His writings on the nature of economic growth can be seen as an important parallel to his more famous contemporary, Adam Smith, and as a forerunner to Marx and to the growth-stage theorists of modern times.

3. Classical Political Economy

The role of the agricultural sector in the mature classicism of Adam Smith, Thomas Malthus and David Ricardo was fundamental. Despite the fact that in the Britain of the late eighteenth and early nineteenth centuries manufacturing industry was contributing a continually increasing share to the gross output of the economy, the absolute significance of agriculture in economic and social life remained undiminished. This fact permeated the writings of the classical economists on a wide range of subjects from class conflict to the causes of depression. But it was in two main areas that their discussions of the agricultural

10. See, respectively, Phillips (1955) who showed how the *Tableau* itself may be interpreted as a simple input-output model, and Stone (1985) who demonstrated that the *Tableau* belongs to the class of social accounting matrices, which focus on links between the structure of production and the distribution of income.

11. The physiocrats were clear that wealth consisted in real (agricultural) output and not simply in the volume of money: "the total money stock of an agricultural nation is only about equal to the net product or annual revenue of its landed property, for when it stands in this proportion it is more than sufficient for the nation's use. A greater quantity of money would not be a useful item of wealth for the state at all. Although taxes are paid in money, it is not money which provides them: it is the wealth annually regenerated from the land." (*Extract from the Royal Economic Maxims of Monsieur de Sully*, p. 17; see Kuczynski and Meek 1972, p. 17n).

12. Turgot (1776), *Reflections* ..., para 7; see Groenewegen (1977, p. 46).

13. *ibid.* para 26; see Groenewegen (1977, p. 55).

sector became most explicit. These were, firstly, their speculations about the structure of production, exchange and accumulation, and secondly, the peculiar contribution of agriculture in the development of a theory of value.

The classical origins of a model of production and growth are to be found in Adam Smith's *Wealth of Nations* of 1776. Smith proposed a model comprising two sectors, agriculture and manufacturing, with three factors of production, land, labour and capital. These inputs were owned respectively by landlords who earned rent, labourers who were paid wages, and capitalists who made profits. The system reached equilibrium through the unfettered interplay of supply and demand; Smith argued that behaviour driven by selfish and acquisitive motives, would, thanks to the famous "Invisible Hand", lead to an outcome favourable to all. The role of government in Smith's *laissez-faire* system was limited to the provision of defence, the maintenance of law, order and justice, and the establishment of certain public institutions and related works.

The level of output in the economy depended on the number of workers and on their productivity, which in turn depended on the degree of specialisation possible in production. The major division of labour in a commercial society was between rural agricultural labour and urban manufacturing labour but, within these groups, there was greater scope for a further division of labour in the manufacturing than in the agricultural sector:

The nature of agriculture, indeed, does not admit of so many divisions of labour, nor of so complete a separation of one business from another, as manufactures.¹⁴

Unlike the physiocrats, Smith saw possibilities for growth existing in manufacturing as well as in agriculture. Indeed he attached great importance to the manufacturing sector as a source of accelerated productivity growth, partly because of the greater possibilities for specialisation of labour there, partly because of its high rates of saving, and partly because the demand for manufactures was less readily satiated than the demand for agricultural goods.

The crucial aspect of Smith's model for the subsequent development of growth theory was its emphasis on the accumulation of capital. In simple terms his model can be laid out as follows. An initial capital stock, measured as a certain quantity of corn, was available at the start of the agricultural year. Each labourer was paid in corn which he used for food and for seed. If the wage rate (in terms of corn) were to rise, or if any corn were removed from the system to non-agricultural (unproductive) use, the amount of capital available to finance next year's output would be reduced. The stock of wage goods carried forward would also fall, allowing fewer labourers to be employed in the succeeding period. A positive growth rate in the economy depended on productivity increases which were sufficient to outstrip the drain on the system caused by a rising agricultural wage rate and/or the diversion of corn to consumption in the non-agricultural sector.

Having stated the model in these simple one-sector terms, however, it must also be noted that its connection with agriculture was to some extent incidental. The productive sector happened to be the agricultural industry, and the unit of account happened to be corn, but it is clear that the model could have been formulated for a different industry or in more general terms without fundamentally changing its analytical content.

Adam Smith, like Turgot, was also interested in the progress of development from a primitive to a specialised economy. In this respect he emphasised the natural order of development from an agrarian to an industrial state by pointing out that initially capital employed in agriculture was most productive, followed by capital in manufacturing, so that investment possibilities in agriculture would be exploited first in an economy free of regulation or government direction:

... most men will choose to employ their capitals rather in the improvement and cultivation of land, than either in manufactures or in foreign trade.¹⁵

14. Smith (1776), *Wealth of Nations*, Book 1, Ch. 1; see Cannan (1937, p. 6).

He also discussed in simple pragmatic terms the notion of intersectoral relationships in a developed economy, showing how the terms of trade between the manufacturing and agricultural sectors might be determined:

The inhabitants of the town draw from the country the rude produce which constitutes both the materials of their work and the fund of their subsistence; and they pay for this rude produce by sending back to the country a certain portion of it manufactured and prepared for immediate use. The trade which is carried on by these two different sets of people, consists ultimately in a certain quantity of rude produce exchanged for a certain quantity of manufactured produce. The dearer the latter, therefore, the cheaper the former; and whatever tends in any country to raise the price of manufactured produce, tends to lower that of the rude produce of the land, and thereby to discourage agriculture.¹⁶

Later Malthus was also to see capital accumulation as the source of increased prosperity and growth, though he went further than Smith in analysing the occurrence of imbalances in the circulation of money and commodities which led to gluts and depressions in the capitalist system. However, Malthus is more widely remembered today for his theory of population, in which he postulated that the biological capacity of the human race to reproduce exceeds its physical capacity to expand the supply of food, and hence that the limit to the growth of agricultural production provides the ultimate constraint to the increase of human population. His well-known contrast between the geometric increase in population and the arithmetic increase in food supply is still referred to as the "Malthusian nightmare".

The theoretical and empirical weaknesses of Malthus' reasoning about population growth need not concern us here. But what of the role of agriculture in his theory? He argued that growth in agricultural output was slow because the supply of land was limited, and improvements in agricultural technology could not come fast enough to offset the declining productivity of new lands brought into production. The basis for this assertion was an imprecisely formulated "Law of Diminishing Returns", not the static Law of Variable Proportions that had been earlier proposed by Ricardo, but a suggestion that

successive technical improvements in agriculture would become less productive as they were exploited over time:

It may be expected, indeed, that in civilised and improved countries, the accumulation of capital, the division of labour, and the invention of machinery, will extend the bounds of production; but we know from experience, that the effect of these causes, which are quite astonishing in reference to some of the *conveniences* and *luxuries* of life, are very much less efficient in producing an increase of *food*; and although the saving of labour and an improved system of husbandry may be the means of pushing cultivation upon much poorer lands than could otherwise be worked, yet the increased quantities of the necessities of life so obtained can never be such as to supersede, for any length of time, the operation of the preventive and positive checks to population.¹⁷

These are essentially concepts of decreasing returns to scale in agriculture with technological change, but Malthus provided no rigorous theoretical or empirical substantiation of them. Ultimately the essential aspects of Malthus' contribution, which help to explain both its enormous impact and its crucial shortcomings, were contained in his assertions about population rather than in his interpretation of the nature of agriculture.

It is worth noting that much of what Malthus wrote about both population and agriculture had been anticipated half a century earlier by Sir James Steuart, the first volumes of whose *Inquiry into the Principles of Political Oeconomy* appeared in 1767 (Skinner 1966). Following Petty, he advanced a theory of agricultural surplus, but took it considerably further than his predecessors had done. He proposed a two-sector model in which farmers produced a surplus of foodstuffs and "free-hands" produced "luxuries"; the reciprocal demands of these two classes provided the basis for an exchange economy. Although Steuart's work has been almost entirely ignored, partly through its being overshadowed by the more or less contemporaneous *Wealth of Nations*, he deserves

15. *ibid.* Book III, Ch. 1; see Cannan (1937, pp. 357-8).

16. *ibid.* Book IV, Ch. 9; see Cannan (1937, p. 650).

17. Malthus (1830), *A Summary View of the Principle of Population*; see Flew (1970, p. 244).

credit for being amongst the first to recognise formally the interactions between population and food supply in economic development (see further Sen 1957, pp. 32-49).

The second area of this paper's interest in classical economics is the development of a theory of value. From an agricultural viewpoint, the starting point can be the theory of rent developed not by Adam Smith but by Malthus and more especially by Ricardo. Indeed, although Smith wrestled with concepts that could be taken to foreshadow both a labour theory and a utilitarian theory of value, his essential position in this matter was that value was determined by costs of production. Despite its descriptive appeal, this position proved to be an unsatisfactory one from a theoretical point of view in that the wages, rent and profits that went to make up production costs were not themselves independently explained in Smith's analysis.

Malthus viewed rent as a just return to the contribution made to production by the landlords, of whom he was a constant defender in their struggle with the capitalists over repeal of the Corn Laws. Malthus postulated that rent was determined by soil fertility:

rent is the natural result of a most inestimable quality in the soil, which God has bestowed on man – the quality of being able to maintain more persons than are necessary to work it.¹⁸

The most fertile land would have the lowest costs of production and therefore the highest surplus of price over profit and wage costs. Increased agricultural production, stimulated by high profits, economic prosperity and/or population growth would lead to increased rents on existing land, since the bringing of less fertile land into production would raise agricultural prices as a result of its higher costs. High rents were therefore seen by Malthus both as a consequence and an indicator of economic prosperity:

that quality of land which, by the laws of our being, must terminate in rent, appears to be a boon most important to the happiness of mankind.¹⁹

although it must be remembered that, for Malthus, prosperity of the proprietor class was the only prosperity that really mattered.²⁰

A more rigorous theory of rent and profit was worked out by Ricardo in his *Principles of Political Economy and Taxation*, first published in 1817. Like Malthus, Ricardo saw differences in soil fertility as giving rise to rent; he postulated that competition between land users would equalise the rate of profit in agricultural production between parcels of land of differing fertility. Rent, as a residual after profits and wages, would be higher on more fertile land, and would decline to zero on the last unit of (lowest fertility) land brought into production. Ricardo's model of distributive shares in agriculture was thus complete: the fertility of the marginal unit of land (the "no-rent land") determined the overall rate of profit, wages were forced to subsistence levels, and rents on land across the whole spectrum of fertility were determined as a residual. By invoking intersectoral competition to equalise rates of profit, Ricardo's model was readily extended from agriculture to encompass a manufacturing sector as well.

But what ultimately determined value in the Ricardian system? He wrote:

If the quantity of labour realised in commodities regulate their exchangeable value, every increase of the quantity of labour must augment the value of that commodity on which it is exercised, as every diminution must lower it.²¹

He had no doubt about the importance of this proposition:

That this is really the foundation of the exchangeable value of all things, excepting those that cannot be increased by human industry, is a doctrine of the utmost importance in political economy.²²

He developed his labour theory of value by stating first that commodity prices were

18. Malthus (1836), *Principles* . . . , Ch. III, Sect. I, pp. 147-8.

19. *ibid.* Ch. III, Sect. IX, p. 217.

20. Note, however, that Malthus argued for a wider distribution of landed property, and was in addition by no means unconcerned about the welfare of the working class.

21. Ricardo (1821), *Principles* . . . , Ch. 1, Sect. 1, p. 7.

22. *loc cit.*

strictly proportional to the labour embodied in them during the production process. Natural resources such as land were provided by nature and were not a social cost of production, whilst capital such as machinery could be seen as embodying the product of past labour. Thus the essential value of commodities could in the end be reduced to terms of labour, and a labour theory of value might then help to explain the pattern of relative prices in the economy.

This raises again the question of distribution and growth. Ricardo's theory of rent, wages and profits, together with his version of a labour theory of value, provided the basis for his conclusions about the distribution of incomes between the principal groups in society, and for his analysis of the likely path of economic growth. In the latter respect, he suggested that the increased demand for food resulting from an increasing population would be satisfied only under diminishing returns in agriculture, either because of the continuing decline in the fertility of new lands brought into production, or because of short-run diminishing returns due to increased capital and labour applied to a fixed stock of already cultivated land. These diminishing returns resulted in declining profits per worker in agriculture, with at the same time an increasing capital requirement per worker to maintain levels of output. The net result was a fall in the rate of profit on capital, the variable that provided the motive for investment. Hence Ricardo's model of growth led inexorably to the conclusion that, despite sporadic offsetting effects as the introduction of improved types of machinery or new "discoveries in the science of agriculture", the rate of profit would eventually fall to zero, capital accumulation would come to an end, and the economy would reach a stationary state.²³

Ricardo's growth model was a carefully formulated and logically consistent system, but its insistence that the rate of profit in the economy as a whole was determined by the labour cost in agriculture (*i.e.* the cost of producing wage goods) limited its application. Furthermore, it proved difficult to relax some of its important simplifications, for example to allow for more than one

kind of land, labour or capital, or to encompass differing capital/labour ratios or differing production periods for different products in the economy.

One of Ricardo's other lasting contributions to economic science was the Theory of Comparative Cost, which enabled a rationalisation to be proposed for international specialisation of production. Although one of the products used to illustrate Ricardo's analysis was a rural commodity (wine), and although the principle of comparative advantage has had considerable bearing on the subsequent emergence of patterns of agricultural trade and development, this aspect of Ricardian theory was not specifically directed at agriculture. Likewise, with one exception, the remaining economists of the classical period – Say, Bentham, Senior, Bastiat and others – either were preoccupied with theories not involving agriculture as such (in particular with laying the foundations for a utilitarian theory of value), or added little to the views of agriculture that have been discussed above.

The exception was John Stuart Mill, whose major work *Principles of Political Economy* was first published in 1848. Mill's views on utilitarianism and social reform are well known. But in developing his account of growth in the economy he also provided an analysis of agriculture that extended the theories of Malthus and Ricardo. He regarded the notion of diminishing returns in agriculture as fundamental:

After a certain, and not very advanced, stage in the progress of agriculture, it is the law of production from the land, that in any given state of agricultural skill and knowledge, by

23. In Ricardo's words: "The natural tendency of profits is 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. This tendency ... is happily checked at repeated intervals by the improvements in machinery connected with the production of necessaries, as well as by discoveries in the science of agriculture, which enables us to relinquish a portion of labour before required, and therefore to lower the price of the prime necessary of the labourer. The rise in the price of necessaries and in the wages of labour is, however, limited; for as soon as wages should be equal ... to ... the whole receipts of the farmer, there must be an end of accumulation"; *ibid.* Ch. 6, p. 71.

increasing the labour, the produce is not increased in an equal degree; doubling the labour does not double the produce; . . . This general law of agricultural industry is the most important proposition in political economy.²⁴

But he went further than his predecessors in discussing the forces offsetting diminishing returns in agriculture, forces which he brought together under the “general and somewhat vague expression” of “the progress of civilisation”.²⁵ The most significant influence was technological advance in agriculture enabling an increase in yield for a given quantity of labour, or reduction in labour input per unit of output. But he extended his account to include developments in the means of communication, mechanical improvements in manufacturing which, for example, would tend to lower the price of agricultural implements, improvements in government, and advances in the educational level of both the rich and the labouring classes. All of these factors could, according to Mill, hold in check the universal tendency to diminishing returns in the agricultural industry.

In addition Mill speculated about the nature of farming systems, believing that methods of large-scale industrial production would have little application in agriculture:

The question between the large and the small systems of production as applied to agriculture . . . stands, in many respects, on different grounds from the general question between great and small industrial establishments . . . The superiority of the large system in agriculture is by no means so clearly established as in manufactures.²⁵

One reason for this that he noted was the limitation on the division of labour in agriculture set by the time-specific characteristic of tasks in farming:

Agriculture . . . is not susceptible to so great a division of occupations as many branches of manufactures, because its different operations cannot possibly be simultaneous. One man cannot be always ploughing, another sowing, and another reaping. A workman who only practised one agricultural operation would be idle eleven months of the year.²⁷

These considerations led Mill to support the notion of the family farm, thereby running counter to the views being developed at roughly the same time by Marx, but providing a link with the attitude to agri-

culture which grew out of the neoclassical orthodoxy that was to follow.

4. The Early Neoclassicals

The marginal revolution and the rise of neoclassical economics originated in the almost simultaneous publication of three major works. William Stanley Jevons’ *Theory of Political Economy*, and Carl Menger’s *Principles of Economics*, both published in 1871, contained the first rigorous expositions of the theory of marginal utility, its implications for a theory of value and exchange, and the process of price formation in competitive markets. Leon Walras’ *Elements of Pure Economics*, which appeared in 1874, extended these ideas into a symmetrical theory of production, consumption and exchange to produce a complete statement of general equilibrium in an economic system. The neoclassical model of a competitive market containing households which sold productive factors and purchased consumption goods in order to maximise their utility, and firms which were controlled by entrepreneurs who combined factors to produce consumption goods in order to maximise their profits, bore in its original exposition no explicit relation to agriculture. None of the three works mentioned above paid any attention to agriculture, apart from an occasional allusion by way of illustration. Yet the very generality of the neoclassical model meant it could be applied to anything and everything, and of course this included the demand for farm products, the production of agricultural commodities and the nature of agricultural markets.

It also needs to be remembered that the original neoclassical theory was essentially static. Apart from one or two superficial references to capital accumulation, it said nothing about growth. Thus one of the primary stimuli to thinking about the role

24. Mill (1871), *Principles* . . . , Book 1, Ch. 12, section 2, p. 177.

25. *ibid.* Book I, Ch. 12, section 3, p. 183.

26. *ibid.* Book I, Ch. 9, section 4, p. 144.

27. *ibid.* Book I, Ch. 8, section 6, pp. 130-1.

of agriculture in the economy, which as we have seen had influenced the classical economists so strongly, was ignored by the first neoclassical writers. Indeed it was not until modern times that a truly neoclassical theory of growth has emerged; as will be seen later, this has at last led to a consideration of agriculture's role in economic development within the framework of pure neoclassical principles.

Economists are still divided on the question of whether the marginal revolution should be seen in retrospect as a disastrous diversion of the attention of economics from important to trivial issues, or alternatively as the coming-of-age of economic science which provided the first rigorously testable paradigm for portraying economic systems. Whatever the verdict, the fact remains that the neoclassical tradition established in the late nineteenth century has exerted a dominating influence on the development of economics over the last one hundred years. The rise of agricultural economics in the West which occurred in the first half of the twentieth century, mainly in the United States, was almost entirely within this tradition. Thus, despite the fact that the early neoclassical writers had no particular view of the role of agriculture in the economy, their influence on the subsequent emergence of a view of agriculture within the tradition they established was profound, as will be seen further below.

The neglect of agriculture in nineteenth century neoclassical economics was not, however, entirely universal. William Stanley Jevons, for instance, was turning his attention towards broader issues at the time of his death in 1882. In his uncompleted *Principles of Economics*, published posthumously, Jevons made some observations on modes of production in agriculture and on the division of labour in farming (Jevons 1905, Chs. 13-18, 22), and he planned, but did not complete, chapters on land tenure and the origins of property. More particularly, Alfred Marshall, whose influential *Principles of Economics* of 1890 extended substantially the general analysis of demand, supply and price, was greatly interested in agricultural industry.²⁸ The *Principles* contained several chapters dealing with the fertility of land, the tendency

to diminishing returns in agriculture (clearly formulated as the short-run phenomenon of diminishing marginal product), marginal costs in agricultural production, and the relations between agricultural rent and land tenure. He paid particular attention to technological progress ("an improvement in the arts of agriculture"), and was one of the early writers to recognise the importance of infrastructure in influencing the level of agricultural output. In the latter respect, he wrote that the agricultural surplus was affected by three factors:

the first being due to the value of the soil as it was made by nature; the second to improvements made in it by man; and the third, which is often the most important of all, to a dense and rich population, and to facilities of communication by public roads, railroads, etc.²⁹

Marshall's contribution to a consideration of agriculture in economic analysis can be seen to have had three aspects. Firstly, he applied the principles of marginal analysis explicitly to agricultural production. Secondly, he restated in neoclassical terms the problems of fertility, diminishing returns and rent, which had so preoccupied the classical economists. His account of these phenomena added little to what had gone before, but was updated by the progress in agricultural industry that had occurred during the latter half of the nineteenth century. Thirdly, he addressed the question of farm size and the organisation of the agricultural sector, laying the basis for the treatment by later writers of the family farm as a small-scale profit-maximising enterprise. In this respect he carried forward the position of J. S. Mill that was noted above.³⁰ Marshall's vision of the small independent farmer was almost romantic in its idealisation of rural life:

28. The first edition of Marshall's *Principles* appeared in 1890, with seven further editions appearing in the ensuing thirty years; see Guillebaud (1961).

29. Marshall (1890), *Principles* . . . , Book IV, Ch. 3, section 2; see Guillebaud (1961, p. 156).

30. To the point where one modern writer has identified this interpretation of the farm as the "Mill-Marshallian model"; see Owen (1966, pp. 47-57).

The position of the peasant proprietor has great attractions. He is free to do what he likes, he is not worried by the interference of a landlord, and the anxiety lest another should reap the fruits of his work and self-denial. His feeling of ownership gives him self-respect, and stability of character, and makes him provident and temperate in his habits. He is scarcely ever idle, and seldom regards his work as mere drudgery; it is all for the land that he loves so well.³¹

These sentiments contrast sharply with the view of the peasantry taken in the other major tradition in economic thought that originated in the nineteenth century, that of Karl Marx and his followers, whose work is considered in the next section.

5. Marx and Classical Socialist Thought

In order to understand Marx's views of the agricultural sector, it is necessary to put them into the context of his overall economic and social philosophy and to relate them to his theories of the organisation and development of economic systems in general.

Marx began work in about 1850 on his enormous reconstruction of political economy, to be published eventually in *Capital*. His thinking followed a direct line from that of the physiocrats and the classical political economists. Like Ricardo, Marx recognised the role of a theory of value and distribution as providing an understanding of growth and, again following Ricardo, he developed a labour theory of value and a theory of the falling rate of profit, in the context of an economic model containing rent, profits and wages as returns to landlords, capitalists and workers. But he began from a different philosophical premise from that of the classical economists. Whereas Smith, Bentham and Mill held an essentially harmonious concept of social organisation, Marx's philosophical orientation derived from the Hegelian view that progress could come only from continuous conflict, contradiction and revolution. Marx also had a wider objective than the classical school of economists. In the Preface to Volume I of *Capital*, published in 1867, he described his aim as being "to reveal the economic law of motion of modern society" (Marx 1890, p. 864), an aim which embraced fundamental questions of social organiza-

tion and change as well as of material production, such that Frederick Engels was able to say at Marx's death in 1883 that:

Just as Darwin discovered the law of development of organic nature, so Marx discovered the law of development of human history.³²

Ricardo's interest in the distribution of the total national product focussed Marx's attention on the central economic problem of the origins of the surplus. But whereas Ricardo was content to stop at a labour theory which he used simply to explain long-term variations in commodity prices, Marx developed his labour theory of value into a theory of profits. He argued that labour was sold by the worker to his employer at a price determined by the amount of "socially-necessary" labour time required to maintain the labourer. The difference between the exchange value of commodities and their embodied labour value was profit, the characteristic surplus value of the capitalist mode of production. The inherent contradiction of capitalism was thus exposed, according to Marx, since this surplus value provided both the resources for capital accumulation and growth, and the spark igniting the class conflict that would eventually lead to the destruction of the capitalist system. These processes would occur through the unrelenting tendency to larger and larger units in industrial production, as capitalists strove to realise economies of scale. The imbalance in demand for capital and consumption goods at the "monopoly capital" stage, combined with a persistent tendency to overproduction and a falling rate of profit, would drive down wages and lead to social revolution. Marx's model was the first economic theory to explain both growth and fluctuations in economic systems in terms of the social environment and the technological characteristics of modern industry.

Marx developed his theories of surplus value, of the falling rate of profit, of business cycles, and of the immiserization of the working class in the context of an economic model where the capitalists were

31. *op. cit.*, Book IV, Ch. 10, section 5, pp. 645-6.

32. Quoted in Henderson (1976, p. 569).

industrialists and the labourers were the urban working class. Neither Marx nor Engels had much regard for the peasantry whom they considered to be economically backward and politically reactionary. As early as 1848, in the *Communist Manifesto*, the blueprint for the disappearance of the peasant class after the seizure of power by the proletariat was drawn up, in terms of the following measures for revolutionising the agricultural sector:

Abolition of property in land ... the improvement of the soil generally in accordance with a common plan ... establishment of industrial armies especially for agriculture. Combination of agriculture with manufacturing industries; gradual abolition of the distinction between town and country.³³

Later – in the first volume of *Capital*, for example – Marx moved away to some extent from this uncompromising view, and showed some understanding of the problems which were peculiar to agricultural labour, such as the dispersion of the rural labour force and the multi-operational nature of farming. But he continued to insist on the superiority of large-scale over small-scale agriculture, given the possibilities for scale economies which he believed to be just as readily available in farming as in industry. Marx argued (1863, pp. 193-4) that small-scale peasant agriculture must inevitably give way to large-scale capitalist agriculture:

The peasant who produces with his own means of production will either gradually be transformed into a small capitalist who also exploits the labour of others, or he will suffer the loss of his means of production ... and be transformed into a wage worker. This is the tendency in the form of society in which the capitalist mode of production predominates.

A disdain for the peasantry and the inevitability of large-scale agriculture were aspects of the Marxist canon that appealed to Vladimir Ilyich Lenin, whose early writings demanded the abolition of all private property in land. Lenin believed that large-scale capitalist farming would be the stepping stone to the complete socialisation of agriculture. But in pre-Revolutionary Russia the discontented peasantry could not be ignored, and, realising that the Bolsheviks could only seize power with the peasants' support, Lenin associated himself in 1917 with their demand for land. However, this was but a temporary expe-

dient, and by 1920 he was again advocating communes, collective farms and later state farms.³⁴ In pure terms the collective farm might have been thought to have been close to the Marxist ideal for the last stage of a communist agriculture: a free association of producers combining for communal production. In reality the collectives which after Lenin's death emerged under Joseph Stalin in the Russia of the 1920s and 1930s would scarcely have pleased Marx, since they comprised peasants coerced into unwilling association, deprived of investment funds and able to subsist only through private production.³⁵

Although Marx's teachings dominated the development of socialist thought in the late nineteenth and early twentieth centuries, his contemptuous attitude to the peasantry was by no means universal. Socialist writers and thinkers as far back as Pierre-Joseph Proudhon in the mid-nineteenth century were proposing a far more sympathetic view of the peasant class. In Russia the radical writer Nikolai Chernyshevsky saw the communal organisation of agriculture as enshrining the hope that Russia could tread the path to socialism without passing through the exploitation and social degradation that had occurred in England and France. His work helped to lay the foundations for the Populist movement in late nineteenth century Russia, which sought to save the peasants from "progress" and to preserve the peasant communes as the basis for social organisation in the countryside (Mitrany 1951; Walker 1978, pp. 202-4). Even within the orthodox Marxist tradition, some tempering of the Marx/Engels view of agriculture was evident. Karl Kautsky's influential book on *The Agrarian Question* (1899), for

33. Marx and Engels (1848, pp. 104-5). Their oft-quoted reference to "the idiocy of rural life" occurs in section 1 of the *Manifesto* (p. 84).

34. See Lenin's *Works* vol. 28, p. 156.

35. cf. Dobb (1928; 1963, pp. 251-4); Conquest (1968, pp. 16-32); Laird (1970, pp. 31-9); and Wittfogel (1971). For an overview of the Marxist-Leninist agricultural theory and some of its shortcomings, see Krebs (1983).

example, went into some detail in explaining technological improvements in agriculture, but suggested that this did not necessarily mean that large-scale farming would come to dominate. Rather, he believed that large and small farms were mutually dependent. Nevertheless, Kautsky's ultimate commitment was to the rule of the proletariat in agriculture as in industry.³⁶

The Marxist view of the peasantry was also challenged strongly by socialist writers outside Russia. For instance, Rosa Luxemburg took issue with the argument that the peasant under capitalism represented a microcosm of capitalist production. Marx had written in *Theories of Surplus Value* (1863, p. 192):

... in the capitalist mode of production the independent peasant ... is sundered into two persons. As owner of the means of production he is capitalist, as worker he is his own wage worker. As capitalist, he therefore pays himself his wages and draws his profit from his capital; that is to say, he exploits himself as wage worker and pays himself, with the surplus value, the tribute that labour owes to capital. Perhaps he also pays himself a third part as landowner [rent] ...

Rosa Luxemburg, on the other hand, wrote in *The Accumulation of Capital* (1913):

It is an empty abstraction to apply simultaneously all the categories of capitalist production to the peasantry, to conceive of the peasant as his own entrepreneur, wage labourer and landlord all in one person. The economic peculiarity of the peasantry ... lies in the very fact that they belong neither to the class of capitalist entrepreneurs, nor to that of the wage proletariat, that they do not represent capitalistic production but simple commodity production.³⁷

But perhaps the stoutest defence of small-scale peasant agriculture in opposition to the Marxist doctrine came from Alexander Vasilevich Chayanov, the most important Russian agricultural economist of the first quarter of the twentieth century. From an economic viewpoint, the importance of Chayanov's writings derives from the fact that he was not a political polemicist but a serious theoretician who set about constructing a complete theory of peasant behaviour, which culminated in his monograph *Peasant Farm Organisation*, published in 1925 by the Agricultural Economics Scientific Research Institute in Moscow (Thorner *et al.* 1966). Whereas

the optimal behaviour of capitalist farmers was defined in terms of relationships between wages, rent, interest and profit, Chayanov argued that the marginalist theory could not be transferred to the peasant. The peasant paid no wages since he hired no labour; the return to the family unit as a whole was, according to Chayanov, undifferentiable. The key to his theory lay in his concept of the labour-consumer balance, the trade-off between the necessity to satisfy family wants and the drudgery or irksomeness of labour. He developed a complex theory of this balance as it affected the size, nature and stage of development of the peasant family and he tested his theory against contemporary Russian statistics.

Chayanov's theory led to predictions about the differing influences of the economic environment on the behaviour of peasant and capitalist farms. For example, he illustrated the difference in attitude to the adoption of technological innovation as follows (Thorner *et al.* 1966, pp. 237-8):

For the agricultural undertaking organized on capitalist lines, adoption of a particular possible land improvement measure depends on whether the increase in *economic rent*, resulting from the improvement of the plot, is greater than, or at least equal to, the capital interest rate usual in the country in relation to the capital involved ... [These] considerations are quite inapplicable to improvement on the labor farm ... [The] family farm's decision on the question of the advantage from improvement will depend on the effect this improvement will have on the on-farm equilibrium between drudgery of labour and demand satisfaction. In

36. "If [after the revolution] the small industry is still able to assert itself in agriculture this is due not a little to the fact that it can pump more labor out of its laborers than the great industry. It is undeniable that farmers work harder than the wage workers of the great land owners. The farmer has scarcely any free time, and even during the little free time that he has he must be continually studying how he can improve his business ... When once the farmer sees, however, that he can remain in agriculture without being compelled to renounce leisure and culture he will no longer flee from agriculture, but will simply move from the little industry to the great and therewith the last fortress of private property will disappear." Kautsky (1902, pp. 161-2). See further in Hussain and Tribe (1981, vol. 1, ch. 4).

37. Thorner *et al.* (1966, p. xx); passage quoted is from the German edition of Luxemburg (1913, p. 368).

a situation of relative land shortage, the family, needing to expand its economic activity, will carry out many improvements disadvantageous and not available to the capitalist farm . . .

Chayanov showed that under declining prices a peasant would tend to work harder when a capitalist farmer would go out of business. His view was clear that the competitive power of peasant farms vis-a-vis large-scale capitalist agriculture was much greater than had been foreseen by Marx, Engels, Lenin or Kautsky.

Given its peculiarly Russian context, Chayanov's theory might not be able to be interpreted as a universal theory of peasantry. Yet his analysis of decision making and resource allocation on the peasant farm can be seen in retrospect to have been more descriptively powerful than the simple Marxist interpretation of agriculture under socialism. Furthermore Chayanov's work could be argued to have considerable relevance in explaining the persistence of the family farm in advanced Western agriculture in the twentieth century, as well as being directly applicable to much small-scale agriculture in the Third World today.³⁸ Nevertheless the Marxist tradition has remained more resilient and has continued to influence the development of socialist thought to the present day. We shall return to neo-Marxism and contemporary socialist views of agriculture in a later section.

6. Mainstream Economic Thought in the First Half of the Twentieth Century

The marginal revolution, whose origins were discussed in Section 4 above, brought it its wake an enormous explosion in economic theory and analysis on a variety of fronts including the areas of the neoclassical theory of value, the methodology of economics as a positive science, the theory of imperfect competition, growth, welfare theory, economic planning, monetary theory, capital theory, and of course the great problems of unemployment and macroeconomic management that were at the heart of the Keynesian revolution. Amongst these developments, three aspects had especial relevance to the evolution of ideas about the role of agriculture in the economy.

The first aspect was the application of the neoclassical production model to the farm business. In most Western countries over the first half of the twentieth century the agricultural sector comprised a large number of relatively small independent units, generally organised on a family basis. By and large, any single unit's production was an insignificant fraction of total industry output, and no farm's produce could be differentiated from that of any other farm in the same industry. In these circumstances a model of the farmer as a perfectly-competitive profit-maximising price-taking entrepreneur found ready application. Furthermore, the empirical and technical nature of the production process itself for most farm outputs appeared to fit quite nicely the essential assumptions of the neoclassical model of production: divisible inputs and outputs, smooth continuous production functions exhibiting diminishing marginal product, decreasing rates of substitution between factors, and so on. With factor markets in agriculture also being reasonably competitive, the extension from this production model to the traditional neoclassical theory of cost was also straightforward, such that the now-familiar short- and long-run cost curves of the firm could be readily interpreted in the context of the farm business.

The interpretation of agriculture as a perfectly competitive industry, with all its attendant ramifications, was developed during the early years of the century, particularly in the United States (*e.g.* Black 1926), with growing empirical support from experimental and other research. In the post-war period this view of the farm business was extended and restated in more rigorous form.³⁹ This general model was argued to be both descriptively realistic in depicting small farmers as striving to maximise their net receipts in the face of uncer-

38. *cf.* Kerblay (1971, p. 159); Lehman (1982). On the relationship between Chayanov and Marx, Durrenberger (1982, pp. 128-9) argued that they were complementary rather than contradictory: "[Marx] provides a way of analysing the relations between the organization of production and other social and political aspects of social formations, [Chayanov] offers an analysis of the dynamics and organization of one form of production left unanalysed by Marx."

tain climatic and market conditions, and normatively valid in pointing the way to principles of optimal resource use and efficient business management in the farm sector.

The second area of economic analysis in the period to 1950 that affected the evolving view of agriculture in developed countries was the area of price analysis. Particularly in the period between the two World Wars, the role of the agricultural sector in the mature industrial economy was analysed in terms of the aggregate supply and demand conditions, both domestic and international, for agricultural commodities.⁴⁰ From a policy viewpoint much of this work was motivated by a concern for farm incomes, which, in most advanced economies, were relatively low and chronically unstable. The perception of agriculture that emerged from these analyses can be stated as follows. Although income comparisons between agriculture and other sectors could not be drawn altogether reliably, for example because of problems in valuing on-farm consumption and in accounting for off-farm income, the situation appeared clear that a substantial disparity existed between incomes in agriculture and in other occupations. This phenomenon was explained in terms of the generally low income elasticities of demand for farm products, which meant only sluggish increases in demand for food (and to a lesser extent fibre) as incomes rose. At the same time technological change in agriculture led to rapidly expanding output, and increased the optimal size of the farm business. However, appropriate resource adjustments – movement of labour out of agriculture, consolidation of land holdings, and so on – were inhibited by the fixity and immobility of factors of production in farming. At the same time the tendency towards supply fluctuations that could not be controlled to any great extent by market management, combined with a demand generally unresponsive to price, led to instability in commodity prices which in turn destabilised the incomes of primary producers. The policy responses to this general perception of the state of the agricultural industry typically involved market intervention by governments in an attempt to

support and stabilise farm incomes by means of commodity programs, price controls, import quotas, tariff protection, export subsidies, and so on.

The third area in the development of economics of importance to agriculture in the period under discussion was the analysis of economic growth. The mainstream of this development, from Joseph Schumpeter's *The Theory of Economic Development* (1911) to the post-Keynesians, was essentially concerned with macroeconomic aspects of growth, and had little to say specifically about agriculture. This mainstream was initially concerned to an important extent with explaining cyclical fluctuations in industrial economies and, especially during the interwar period, the tendency to stagnation, which was compared with the "stationary state" envisaged by the classical economists. The appearance of more sophisticated theories of growth, such as the celebrated Harrod-Domar models of the late 1930s, led in the immediate postwar years both to neoclassical interpretations of economic growth (e.g. Solow 1956; Swan 1956) and to the more wide-ranging, less easily quantifiable approaches to growth theory of the Cambridge school of economists (e.g. Robinson 1956; Kaldor 1957; Dobb 1960).⁴¹ At the same time another stream of thought was emerging which placed questions of economic growth in a different context. Instead of dealing in the macroeconomic aggregates of output, investment, savings and consumption in mature capitalist economies, this stream was concerned with the seemingly intractable problems of poverty, malnutrition and low rates of growth in developing countries. Furthermore, instead of being almost

39. Probably the most influential work of its period was Heady (1952). See also Bradford and Johnson (1953).

40. An example of the sort of price analysis being developed over this period can be seen in Shepherd (1951). An influential work that analysed the place of agriculture in the industrial economy was Schultz (1945).

41. For a survey of these and other approaches, see Hahn and Matthews (1964).

exclusively theoretical in scope as was "mainstream" growth theory, the development economists' concern was to carry out analyses which could yield immediate implications for policy. Given the overwhelming importance of the agricultural sector in developing countries, it was this area of the economic growth debate that was of most relevance in influencing ideas about the role of agriculture in the economy.

Most of the major contributions to development theory have appeared after the period covered by the present section, and are treated below. However, work on the role of agriculture in economic development in the years to the 1950s laid to some extent an empirical foundation for these later theoretical endeavours, by documenting the declining share of agriculture in the economic activity of advanced economies, a fact which was taken by some writers to imply that a similar decline in agriculture's share of output and employment in developing countries would be a concomitant of growth in those countries. In other words observed trends in advanced economies were interpreted in some quarters to indicate that a strategy for development would have to be a strategy for industrialisation.

The early workers drawing attention to these phenomena were A. G. B. Fisher (1935, 1939) and Colin Clark (1940), and later Eric Ojala (1952) and Simon Kuznets (1957). Their analyses demonstrated that in all countries for which long-term data were available there had been a secular decline in agriculture's share of GDP and in the proportion of the total labour force engaged in agriculture, together with (less consistently) a secular rise in output per worker in farming. The explanations advanced for these trends were related to the demand and supply conditions for agricultural commodities as discussed above, that is, the changing composition of aggregate demand with rising per capita incomes when the income elasticities of demand for farm products are low and declining, and, on the supply side, productivity changes, substitution of capital for labour, and increased specialisation in agricultural production. Nevertheless the empirical validity of these efforts

was questioned (*e.g.* Bauer and Yamey 1951, 1954), for example on grounds of the arbitrariness of sectoral classifications used, and the unreliability of labour force statistics when members of farm households were increasingly becoming engaged in off-farm non-agricultural work.

Furthermore the somewhat sweeping nature of the hypothesis that, by analogy with developed countries, the path for growth in the developing world lay in a shift from primary to secondary and tertiary industry raised controversial questions of cause and effect in economic development. The essential problem was whether structural transformation was an engine of economic growth, or whether it arose as a sort of by-product of a development process whose impetus originated elsewhere. The implications specifically for agriculture of these issues were similarly unclear, and indeed framing the question in this way may even have meant that finding an answer was impossible; as D. Gale Johnson (1964, p. 5) subsequently remarked:

We do not yet understand whether in most cases the reduction in factor costs of agricultural products, which makes possible transferring labor out of agriculture and an elastic supply of agricultural products, has occurred mainly because of actual or incipient developments in the non-agricultural sectors of economies or has been due to circumstances that were largely unique to agriculture. Perhaps this is something we shall never know – it may be nothing more than the old query as to which came first, the hen or the egg.

In the end, however, the sorts of issues raised by the early development economists as a result of their extensive documentation of the growth experience of different types of economies could only be studied sensibly by relating them to a properly articulated theoretical foundation. It was appreciated that such a foundation would have to involve a theory or theories of the development process which recognised the structural features of the developing economy and in particular which accounted explicitly for the role of the agricultural sector. The period after 1950 has witnessed a considerable amount of work seeking to build such theories.

7. Agriculture in Contemporary Development Theory

(i) Models of the agrarian economy

The simplest type of economy of interest to development theorists of the modern period was one in which all resources, or at least a very high proportion of resources, were devoted to agriculture. Such an economy was recognised as characteristic of a significant number of countries in the Third World, particularly in Africa, where non-agricultural activity was either absent or restricted to simple artisan or service industries. It has been noted already that this condition also typified the pre-Industrial-Revolution economies of Europe which were the concern of the classical political economists (Schumpeter, 1954, p. 565). Accordingly, there has been some revival of interest in recent years in the writings of Smith, Malthus and Ricardo, in order to evaluate their relevance to problems of the developing world today.

The characteristics of the agrarian economy were summarised by John Fei and Gustav Ranis (1966, p. 4) as follows:

The central feature of agrarianism is the overwhelming preponderance of traditional agricultural pursuits. While other economic activities may be in evidence, they are of distinctly secondary importance in both a quantitative and qualitative sense. Those nonagricultural pursuits which exist are characterised by a modest use of capital. The agrarian economy is essentially stagnant, with nature and population pressure vying for supremacy.

This static picture of traditional societies did not, however, preclude the possibility of some increase in output within the agrarian system. For example, Rostow depicted the agrarian economy as one in which

acreage could be expanded; some *ad hoc* technical innovations, often highly productive innovations, could be introduced . . . productivity could rise with, for example, the improvement of irrigation works or the discovery and diffusion of a new crop. But the central fact about the traditional society was that a ceiling existed on the level of attainable output per head."⁴²

The crucial point for Rostow and other "growth-stage" theorists whose work made an impact during the 1960s was that the agrarian society required changes to its economy, its social structures, its politics

and its values in order to attain the conditions for "take-off" into sustained growth.⁴³

Formal modelling of the agrarian economy provided insights into the relationships between output, employment and technological progress within closed agricultural systems. Dale Jorgenson (1967) postulated an agrarian economy characterised by a constant-returns-to-scale production function with an agricultural labour force comprising both productive and redundant workers. At a constant real wage rate (measured in agricultural goods), his model implied that population would increase at the same rate as agricultural output, whose growth in turn was dependent on the rate of technological advance in agriculture. In an agrarian economy with no redundant labour to start with, population would, according to this model, increase until productive opportunities in agriculture were exhausted. Beyond this point population growth would be constrained, and all increments in population would contribute to the redundant labour force.

As well as generating surplus labour, the agrarian economy model could also produce surplus agricultural output. The long-run fate of the agrarian economy was argued by Fei and Ranis (1966) to depend on how these two surpluses or "slacks" were used. These writers suggested two possibilities. Firstly the agricultural surplus could be devoted entirely to increasing per capita consumption which in turn could lead to increased population growth. The consequences of this process could be either a low-level "equilibrium trap", as foreseen earlier by Harvey Leibenstein, in which population growth, technological change, and diminishing returns to agricultural labour just offset each other, or a "non-trap" case in which population reached a point of being no longer responsive to increased income, the economy threw off its Malthusian shackles and attained a readiness for sustained

42. Rostow (1960); quotation is from second edition (1971), p. 4.

43. See especially the writings of contributors to Rostow (1963).

growth (Leibenstein 1957; Jorgenson 1961; Nicholls 1963).

The second possible use for the "slack" generated by the agrarian economy as seen by Fei and Ranis was in financing the luxury consumption of the unproductive non-agricultural elite. This possibility was close to the model of the physiocratic system that we have noted earlier, in which the agricultural surplus was appropriated by the "sterile" classes. In the Fei and Ranis model of the agrarian economy, such a diversion of output and resources would have adverse long-term consequences for agricultural productivity arising because the diverted resources might otherwise have been devoted to maintaining and developing the agricultural infrastructure.

In a later paper the same authors introduced the possibility that the agrarian economy might be opened by the development of an export production sector (Fei and Ranis 1969), which they saw arising as a result of penetration of the closed agrarian system by foreign commercial interests. The export sector they envisaged was profit-oriented, and would in due course stimulate the growth of a sophisticated services sector to provide for the emerging needs for finance, insurance, transportation, and other infrastructure. Although in this model of the open agrarian economy surplus agricultural labour was put to productive use, the development of the export sector was seen by Fei and Ranis as leaving the agricultural sector largely untouched, and herein, they argued, lay the reason for this type of economy's tendency to long-run stagnation (Fei and Ranis 1969, p. 157):

In this context the required routinized interaction between a small but relatively expanding industrial sector and a large but relatively shrinking agricultural sector has no chance to take hold. As a direct consequence, the ability to count on a dependable, routinized, innovation-inducement mechanism in both sectors (but especially agriculture) is missing. This mechanism is the most important single link in the chain of successful dualistic growth, the growth that has a chance to culminate in economic maturity.

Overall the question remained unanswered as to whether the agrarian economy, either closed or open, was in fact doomed to inevitable stagnation, or

whether it could progress to a more diversified and advanced stage. In formal terms the outcome depended on precise relationships and relative values of parameters assumed within the agrarian model. In practice, as we remarked above, a host of other economic, political, social and institutional factors could also be seen to be decisive. Nor could appeal to empirical evidence determine the issue, since examples both from history and from present-day experience could be invoked to support either side of the argument. Nevertheless, there was some agreement at least in theory that if the agrarian economy was to go anywhere it would be likely to move into a stage of economic dualism before being able to attain full maturity. Indeed the analysis of the dual economy, to which we turn next, became a major pre-occupation amongst the vanguard of post-war development theorists, and decisively influenced emerging perceptions of the agricultural sector in the development economics of the 1950s and 1960s.

(ii) Dual economy models

Economic dualism in developing countries can be described as the coexistence of a traditional and an advanced sector within a single economy. The interpretation of precisely what economic activities and social classes were contained in the traditional and advanced sectors varied between different versions of the dual economy model, but in general the traditional sector was regarded as a backward predominantly-rural subsistence sector, whilst the advanced sector could be described as modern, urban and capitalist. Here we shall interpret the two sectors as "agricultural" and "industrial", though recognising that a more exact definition is necessary in order to understand some aspects of some writings in this field.⁴⁴

Although the concept of dualism had been known for some time,⁴⁵ it was W. Arthur Lewis' pioneering paper of 1954

44. For example, part of the subsistence sector may exist in urban areas (petty retail trade, domestic service, and so on), so to describe labour transfer from backward to modern sectors as "rural-urban migration" may have been something of a misnomer in certain cases; see further in Godfrey (1979, p. 230).

that contained the seminal exposition of the dual economy model in its contemporary form (Lewis 1954, 1958). The key feature of the Lewis model was the transfer of surplus labour from the backward sector, enabling employment and output growth in the modern sector. The urban wage was assumed to be fixed at a premium over the subsistence agricultural wage, providing the inducement to rural-urban migration. The supply of rural labour was perfectly elastic at the fixed urban wage rate; it was assumed that there were unlimited supplies of surplus labour in the agricultural sector, whose numbers would increase further with population growth. The marginal productivity of agricultural labour was assumed to be zero. More precisely, the marginal productivity of rural labour measured *per worker* was zero, implying that transfer of persons out of agriculture would not depress agricultural output, although maintenance of output levels in agriculture might be achieved by the fact that those remaining would work harder, implying in turn that their marginal productivity *per hour* was greater than zero. Capital accumulation in the modern sector came about by reinvestment of capitalist profits; the model predicted that the share of profits in national income would rise with technological progress and further industrial capital formation, given constant wage rates. In the Lewis model the modern sector continued to grow until the supply of surplus rural labour was exhausted, at which point wage rates would begin to rise.

Lewis' essentially heuristic two-sector model was subsequently formalised and developed by a number of writers. Fei and Ranis elaborated the effects that growth in the dual economy would have on the subsistence sector, in particular the changes in the marginal productivity of labour in agriculture as more and more workers were transferred to the modern sector (Ranis and Fei 1961, 1963; Fei and Ranis 1964, 1966). They saw initially workers moving out whose marginal productivity was zero, causing no change in agricultural output. Subsequently, workers would move whose marginal productivity was greater than zero but less than the subsistence wage, and some decline in agricultural output

would ensue. In the end the marginal productivity of migrating workers would exceed the subsistence wage. They showed that the agricultural surplus available for consumption in the nonfarm sector would fall during this process, worsening the terms of trade for industry and putting an upward pressure on wage rates. Fei and Ranis stressed particularly the problems facing the dual economy of allocating its two surpluses – industrial profits and agricultural surplus – between the two sectors in such a way that labour productivity in both would be enhanced, taking into account the prospects for technological advance in both industry and agriculture. Their model could therefore be seen as one of balanced growth, even if the net flow of resources (both capital and labour) in the growth process was out of agriculture and into industry.

The Lewis-Ranis-Fei interpretations of the dual economy have been called “classical” models because of their focus on capital accumulation, their concern for the effects of population increase⁴⁵ and technological change, and their characterisation of the agricultural sector as a source of industrial labour and wage goods (Ranis and Fei 1982). As noted earlier, in Adam Smith's two-sector model, industrial capital existed only in the extension of production advances in the form of wage goods to industrial workers for the support of further production. Contemporary models of the dual economy concentrate more on the industrial sector, and analyse the asymmetrical structural relationships between production conditions in agriculture and industry. Thus, whilst it is reasonable in broad terms to call modern interest in the dual economy a “classical revival”, there remain substantial differences between the 19th and 20th century analyses, with the latter models allowing for real investment in industry, technological

45. The notion of dualism can be traced back at least to the 1920s; see Dixit (1973, p. 325).

46. So, for example, these models accepted a broadly Malthusian interpretation of the relationship between population and agricultural growth, an interpretation sharply disputed by Boserup (1965).

change in both sectors, the possibility of a surplus in industry as well as agriculture, and international movements of commodities, factors and technology.

A model proposed by Jorgenson (1961, 1966) was similar in all respects to these classical versions except that he assumed that the marginal productivity of labour in agriculture was positive, not zero, and that the real wage rate was variable, not fixed. His model defined a critical point to which average agricultural output would have to grow in order to create the conditions for viability of the industrial sector. Beyond this point a food surplus would be created and employment growth in the modern sector would become possible. Jorgenson labelled his model as "neoclassical", because of his assumption that the market wage was free to reflect the social opportunity cost of additional employment instead of being institutionally determined as in the classical models. He compared the implications for the agricultural sector in the two types of model, showing that in the classical model the agricultural labour force declined absolutely as redundant labour moved out, whereas in his neoclassical model the agricultural population could grow, decline or remain constant depending on the rate of growth of total population and the rate of technological progress in agriculture. The two models differed only when surplus labour existed; at the point when all redundant labour had been used up, the classical and neoclassical models became identical. Jorgenson claimed that the classical model's assumption of a fixed real wage rate and its prediction of a declining agricultural labour force were both inconsistent with the evidence, and suggested the neoclassical model was therefore to be preferred, although this conclusion was sharply disputed, for example by Marglin (1966), Minami (1968) and Dixit (1970).

Despite these criticisms, interest in neoclassical models of the dual economy has not waned. Several recent papers have explored the theoretical properties of these models by tightening their formal specification and relaxing some of their more restrictive assumptions. For instance, McIntosh (1975) made population and factor allocations endogenous, and subse-

quently found empirical support for his analysis (McIntosh 1978). At the same time Marino (1975) generalised the neoclassical dual-economy model's production function, discarding the somewhat restrictive Cobb-Douglas function of earlier versions of the model. Amano (1980) extended the Jorgenson model by allowing for capital accumulation and generalising the specification of demand for food. All of these models have attempted to define conditions under which the dual economy will grow or decay and to suggest the important policy instruments to which governments should pay attention if growth is desired. However, these formal models await rigorous empirical testing, and so for the time being their recommendations can be regarded as suggestive only.

In the meantime, what have been the more general implications of dual-economy models, especially in influencing perceptions of the role of the agricultural sector in economic development? One of the areas of greatest controversy has been the theoretical and empirical role of rural underemployment in the theory. Hirschman (1982, pp. 376-8) has suggested that disguised unemployment achieved its position as a "foundation-stone for development economics" because economists of the day felt comfortable with the theoretical notion of underemployment from the Keynesian system in which they had been trained. Empirically, on the other hand, the question was simply whether or not surplus labour existed in the agricultural sectors of developing countries.⁴⁷ In the 1940s and 1950s the optimistic view that rapid industrialisation would be possible through the mobilisation of the large pool of surplus agricultural labour that was thought to exist in poor countries undoubtedly lent some appeal to the Lewis model at its original appearance. However, this view was decisively rejected by writers such as Theodore Schultz (1964, Ch. 4)

47. One reason for controversy was the problem of defining "surplus labour" touched on earlier. In his recent writings, Lewis has decided to eschew this term because, he says, its use causes "emotional distress" (Lewis 1979, p. 211n.). See further a discussion in Reynolds (1975, pp. 11-14).

and others, leading Kao *et al.* (1964, p. 141) to conclude:

To date, there is little reliable empirical evidence to support the existence of more than token – 5 per cent – disguised unemployment in underdeveloped countries as defined by a zero marginal product of labour and the condition of *ceteris paribus*.

More recent data suggest a somewhat higher figure than this, but still not enough to confirm the existence of a universal year-round surplus labour problem in the traditional sectors of developing countries (Berry and Sabot 1981, pp. 173-5).

Nevertheless, even if labour has not always been readily available for transfer out of agriculture, the potential for surplus labour has always been present, whether its withdrawal would affect agricultural output or not. The simple reality of current rates of rural population growth in some developing countries, combined with the sheer size of their traditional sectors has continued to build up substantial pressure for migration from the countryside (Lewis 1979, p. 223). In any case, from the viewpoint of judging dual-economy models, the existence of surplus labour or disguised unemployment was not crucial; all that was required was that there should be labour willing to transfer to industrial employment at the going urban wage. In this respect, models such as that of Michael Todaro, which explained rural-urban migration in terms of the expected urban-rural wage differential and the probability of finding a job, have illuminated this aspect of dual-economy models whilst at the same time helping to understand the paradox of continued urban migration in times of growing urban unemployment (Todaro 1981, pp. 238-44).

Dual-economy models have undoubtedly helped to shed light on some observed trends in developing countries in the last thirty years, such as the tendency for the share of wages in national income to fall and for the share of profits to rise, the growth in savings and capital formation, and the rise in industrial output. The persistence of low standards of living in the agricultural sectors of many countries can also be regarded as having been consistent with these models, even if some other predictions about the benefits of modern

sector expansion on the traditional sector, such as improvement of infrastructure, modernisation of institutions, and growth in trade, have not always come to pass (Griffin and James 1979, p. 248; Lewis 1979, pp. 212-7). But the major problems for the theory of the dual economy remain in the labour market: firstly, what determines absolute and relative wage rates in both industrial and agricultural sectors, and what do those rates in turn determine (Bertrand and Squire 1980) and secondly, what to do about the generally poor absorptive capacity of emerging industrial sectors in developing countries, where employment growth in urban areas has not lived up to expectations (Baer and Herve 1966; Morawetz 1974).

As for the agricultural sector, did the rise of the dual-economy models of the post-war years, with their focus on labour transfer and industrialisation, imply a relegation of agriculture to a totally subsidiary role? Lewis (1979, p. 217) has argued that critics of his and other models misunderstood their orientation:

Nowadays a bogus history of economic thought floats around in which the economists of the fifties were rooting for industry to the neglect of agriculture, but this was not so. The economics of the 1950s was obsessed by balanced growth, arguing that development of industry alone would be constrained by the farmers' poverty, and that development of agriculture alone would turn the terms of trade against agriculture and bankrupt farmers. As it happened most Governments neglected agriculture for reasons of their own, but this was in spite of and not in accordance with economists' advice.

Nevertheless the fact remains that some economists of the period felt that priorities in the progress of development theory had swung away from agriculture.⁴⁸ Johnston (1970, p. 378), for example, argued that the dual economy models' preoccupation with surplus labour:

... often seems to have encouraged neglect of the agricultural sector as well as a tendency to assume too readily that a surplus can and

48. Note that the word "priority" in this context needs careful interpretation. Giving "priority" to the agricultural sector does not necessarily imply a faster growth rate for agriculture than for industry, nor does it always make sense to speak of priority for agriculture or industry as a whole as opposed to priority for different kinds of agricultural or industrial development. See, for example, Sutcliffe (1971, pp. 72-3).

should be extracted from agriculture, while neglecting the difficult requirements that must be met if agriculture is to play a positive role in facilitating overall economic growth.

The work of these economists, to which we now turn, pointed the way for an emergence of interest in defining the conditions and possibilities for growth of the agricultural sector in its own right.

(iii) Models of agricultural transformation

Although the notion was by no means new that it might be desirable to accord the agricultural sector some increased attention in development policy, conditions during the 1960s and 1970s were right for a re-focussing of attention on problems of agricultural transformation in the developing world. Many of the writings of economists during this period were based, explicitly or implicitly, on a rejection of the view of agriculture simply as a passive supplier of resources for the benefit of an expanding urban-industrial sector; rather they shifted the emphasis towards the possibilities for a dynamic agricultural sector playing an important, even a leading, role in the development process. Schultz (1964, pp. 4-5), in his seminal book *Transforming Traditional Agriculture*, wrote:

Economists who have been studying growth have with few exceptions put agriculture aside in order to concentrate on industry, despite the fact that every country has an agricultural sector and in low income countries it is generally the largest sector . . . But there are no basic reasons why the agricultural sector of any country cannot contribute substantially to economic growth . . . There is no longer any room for doubt whether agriculture can be a powerful engine of growth.

To some extent this change of emphasis was due to the disillusion with industrialisation that was noted above; not only had the modern sector in many developing countries failed to absorb labour, but also policies designed to encourage industry had spawned a new generation of problems of their own (Reynolds 1965; Frank 1968; Todaro 1969; Balassa *et al.* 1971; Turnham and Jaeger 1971). But in addition the growing concern for agricultural development *per se* was related to increased preoccupation with poverty and malnutrition, problems that were generally concentrated in the countryside and clearly exacerbated by

policies that neglected or discriminated against agriculture (Healey 1972; ILO 1977).

Although there was much variation in emphasis, the majority of theoretical and empirical work on agricultural development during the 1960s and 1970s was based on a generally accepted view of the role of agriculture in the development process. The importance of agriculture as a supplier of food output to meet rapidly increasing domestic consumption requirements was stressed, especially since in most countries the foreign exchange constraint meant that importing food was not a feasible alternative. The role of the agricultural sector in providing labour for industrial expansion was also considered relevant, but was not generally accorded the pre-eminent status it had enjoyed in some of the earlier writings mentioned above. Greater emphasis was placed on the significance of the agricultural sector as a source of domestic savings to finance capital formation both within agriculture itself and in the non-agricultural sectors of the economy. Rising incomes of farm families were seen also as a potential source of demand for domestically-produced manufactures, with the balance between this and the previous effect being determined by the relative marginal propensities to save and to consume of the rural population (Flanders 1969). The potential for agricultural commodity exports as a means of financing imports of capital goods for industrial expansion was also recognised, both in terms of a possible surplus of farm products over domestic requirements, and in terms of a specialisation in export production. In one particular theory of the period, the so-called "staples thesis", it was suggested that resource-based export industries could become the leading sector in economic development.⁴⁹ All the above "contributions" of agriculture to the growth process could occur spontaneously, or could be made to happen "compulsorily" through government policy measures (Myint 1975, p. 328).

The implications of these concepts for the nature of the process of transformation of the agricultural sector were explored in several models put forward in the early 1960s, including those of Johnston and

Mellor (1961), Perkins and Witt (1961), and Hill and Mosher (1962). These models depicted the transformation of the agricultural sector from a large, static subsistence sector with a low capital/labour ratio and little technical change, to a relatively smaller, efficient, commercial sector with rapid innovation and “rational” decision-making processes.⁵⁰ These models designated specific phases in the growth of the agricultural sector, ranging from a primitive stage where the pre-conditions for growth had to be established, through to a mature capital-intensive state. The models could thus be seen as comparable with the growth-stage theories of Rostow and others that we mentioned above, and hence subject to the same criticisms that were levelled at these theories, criticisms primarily directed at the theories’ lack of analytical power (Baran and Hobsbawm 1961; Ruttan 1965).

Nevertheless, important policy insights were derived from these models. For instance, Bruce Johnston and John Mellor in their original paper and in a number of subsequent places (*e.g.* Johnston and Kilby 1975; Mellor 1966, 1967, 1976, 1983) elaborated a development strategy involving expansion of agricultural production based on labour-intensive capital-saving techniques with a strong reliance on technological innovation. The picture thus created was one of a technologically dynamic but still small-scale agriculture, with rising farm output and incomes. Johnston and Mellor attributed great importance in this setting to infrastructure developments designed to improve the generation and dissemination of appropriate innovations, including investment in research programs, extension services, marketing arrangements and general educational facilities. These suggestions were given some dramatic support with the introduction of high-yielding varieties of wheat, rice and maize in parts of the Third World during the 1960s. Although a number of technical, economic and social problems have subsequently emerged to temper somewhat the original optimism about the new cereals technology, the fact remained that this sort of scale-neutral innovation could, under the right conditions, have a significant impact on farm

output and employment and on the productivity of farm-supplied resources in smallholder agriculture, a result strikingly consistent with the general Johnston/Mellor thesis.

Models of agricultural transformation relied on a view of the peasant farmer as being responsive to economic incentives in determining his input usage, his output mix and his investment priorities. The conventional stereotype of the small farmer in the developing world as tradition-bound and uninfluenced by the economic environment was challenged in these models, with theoretical and empirical support from writers such as Jones (1960), Schultz (1964) and contributors to Wharton (1969).⁵¹ Indeed it was suggested that price relativities influenced farmer behaviour to such an extent that they were a significant determinant of the success or otherwise of nonprice measures designed to affect the level of farm output or to promote structural change in the developing economy. So, for example, Krishna (1967, p. 516) argued:

The evidence clearly suggests that even when a government is doing its best to restructure agriculture institutionally, and to expand the availability of knowledge and inputs, it finds that output remains stagnant until these measures are supplemented by a positive agricultural price policy. The engines of extension and institutional reform do not raise output fast enough without the steam of price incentives.

The terms of trade between agricultural and non-agricultural sectors in the developing economy,⁵² which had begun to be explored in the earlier Lewis models, became an important focus of discussion in

49. This hypothesis was originally proposed to explain Canadian economic growth in the nineteenth century (Watkins 1963). It depended on factor proportions – an abundance of land relative to capital and labour – creating a comparative advantage in resource-intensive exports, with development occurring as a spreading process of diversification around the export base. It can be suggested that the staples thesis was more an account of technological history than a generalisable theory of economic growth (Buckley 1958).

50. These and other models of the period are discussed in Wharton (1963).

51. See also Hopper (1965), Sahota (1968), Thirlwall (1977).

models of agricultural transformation. The question was asked as to whether there were likely to be cyclical or secular trends in the terms of trade that might encourage or inhibit overall economic growth. A move in the terms of trade against agriculture could reduce the incentives for farm output expansion that was a vital component of the development process. On the other hand, if the domestic terms of trade turned too far in favour of agriculture, the overall growth process could be impeded, for example through worsening the position of industrial workers by raising the relative prices of wage goods. Yet improved terms of trade for agriculture were also seen as crucial for encouraging technological innovation and the use of modern inputs in the farm sector, in line with the view of the rational economising peasant noted above. Thus Hayami and Ruttan (1971) argued strongly that both the direction and intensity of technological progress in agriculture were functions of relative prices, with cogent empirical support coming from studies such as that of Timmer and Falcon (1975), although it was also suggested that these sorts of results might not hold when unequal distribution of land rights prevailed (de Janvry 1973; Bacha 1980, pp. 266-8).

The focus of models of agricultural transformation on the terms of trade and on forward and backward linkages between agriculture and other sectors of the economy reflected some of the concerns and modes of analysis of the classical political economists. For example, the work of Johnston and Kilby (1975) on the production side, and of Mellor (1976, 1983) and others on the demand side, saw problems of agricultural development in the present-day environment in similar terms to those implied in the rather simpler models put forward by the eighteenth and nineteenth century economists discussed earlier in this paper.

The logical corollary of these analyses of the effects of changes in the terms of trade was the issue of whether government regulatory or fiscal measures could or should be used to assist or encourage the transformation process. Most development strategies generated by models of agricultural transformation involved some form of

government intervention which affected the domestic terms of trade. This in turn raised questions as to the efficacy of public institutions when they replaced traditional market systems in developing countries (Bauer 1971; Cochrane 1974, p. 49; Krishna 1982).

Despite the contribution made by models of agricultural transformation to an understanding of growth in developing countries, they were by no means a complete or unchallenged panacea for development problems. To begin with, there remained serious questions as to the distribution of the benefits of agricultural growth. If the emphasis of policy was at the so-called "intensive margin", *i.e.* was directed towards the best farmers in the most favoured areas, the growth rate of marketed surplus may well have been maximised, but at the same time such a policy would tend to create concentrations of economic power and pressure for larger farms, with adverse effects on employment and income distribution.⁵³ Furthermore, some of the earlier models of agricultural transformation appeared to underestimate the capital requirements for essential infrastructure development, and to overplay the role of taxation and price policy in exacting the required capital transfers from agriculture (Schultz 1967, pp. 64-5). In a recent paper Mellor (1983, pp. 224-5) conceded the latter point, attributing now a greater significance to increased demand for industrial output arising from an expanding farm sector:

By emphasizing the market side more and recognizing the possibility of cost reducing technological change in industry, one can . . . depict agriculture as a sector providing a growing demand at constant prices for industrial goods produced at decreasing cost and hence with rising profits. It is the highly elastic and upward shifting demand arising from rising rural incomes that can provide the basis for a high rate of capital formation in the nonagricultural sector.

52. We refer here to the domestic terms of trade and not to the international terms of trade between agricultural commodities and industrial goods on world markets (see *e.g.* Streeten 1974).

53. The phenomenon of "urban bias" is extensively discussed in Lipton (1977).

At the same time, arguments for “priority to industry” continued to be promulgated, including suggestions that industry had greater forward and backward linkages than agriculture, that industrialisation could provide a more diversified economic base than agriculture, and that in the long term specialisation in primary exports would tend to widen the gap between developing and developed economies, a view usually identified with Raul Prebisch (see Prebisch 1959; Flanders 1964). In addition, the formal models of growth that focussed on capital goods production, where the level of employment and the rate of economic growth were constrained simply by the rate of industrial capital formation, continued to be discussed.⁵⁴ None of these arguments for industrialisation proved decisive; rather, the view of the agricultural sector discussed in this section appears to have met with general acceptance and to have established the belief that no development theory or strategy can afford to overlook or underemphasise the role of agriculture in the development process.

Ultimately these considerations could be seen to have led inexorably to a conclusion in favour of “balanced growth”. Insofar as this meant that expansion of agricultural and industrial sectors should occur in such a way that neither placed a constraint on the growth of output of the other, such a conclusion would seem unexceptionable. Nevertheless, this proposition would not necessarily imply equal “priorities” for industry and agriculture. Myint (1964, p. 130) argued in this respect that

... the manufacturing sector cannot continue to expand for long without a balanced expansion in the output of the agricultural sector. Given the logic of the balanced growth path, the rate of development of the whole economy will be determined by the rate of expansion of its slowest moving component part; and given the tendency to diminishing returns, agriculture clearly qualifies for this role as the major bottleneck.

The role of agriculture in “balanced growth” was also stressed by Nicholls in an important paper published in the early 1960s (Nicholls 1964). Overall, these lines of thought strengthened the viewpoint that if “balanced growth” were to have any operational significance, theoretical gen-

eralisations about priorities, bottlenecks, constraints and differential sectoral growth rates would need careful interpretation in the light of a given economy’s specific circumstances.

8. Post-war Socialist Agriculture

Two distinct aspects of contemporary socialist views of agriculture can be considered, relating to the two major centrally-planned economies of the modern world, the USSR and China.

In Russia, the attitude to agriculture that prevailed in the immediate postwar period was a continuation of the Stalinist approach noted earlier of extracting as large a surplus from agriculture as possible in order to support the growth of the heavy industrial sector. The structural characteristics of the farm sectors that resulted from the imposition of this view of agriculture’s role varied in detail between the Soviet Union and the Eastern European satellites (Bergmann, 1975). But the outcomes were generally disappointing, with agriculture frequently falling short of production targets and failing to provide sufficient resources to enable desired rates of industrial development to be achieved.

In the 1960s, a shift in the attitude to agriculture in most of these countries began. Following the more or less complete achievement of the socio-political goal of collectivisation of agriculture, attention turned to rectifying several major policy shortcomings. Firstly, it was realised that withholding capital inputs from agriculture could not continue, and that significant increases in agricultural investment were long overdue. Secondly, a stronger appreciation began to emerge of the role of remuneration and incentives in stimulating labour productivity (Shaffer 1977; Durgin 1980). Thirdly, efforts were made to put agricultural planning on a less inflexible footing, more responsive to local condi-

54. These models included those of the Harrod-Domar type mentioned earlier, the Soviet model of growth, whose theoretical foundation was expounded by the Russian economist Fel’dman (see Domar 1957, pp. 223-61), and a model used in Indian planning (see Mahalanobis 1953). For a discussion of these and other models see Mellor (1974, 1983).

tions and needs. Wadekin (1982, p. 258) described the latter process as follows:

The rigid Stalinist systems of "command agriculture" had to be made more flexible by relinquishing strictly centralised planning, procuring of produce, and price setting – some reform of the system was necessary, although at the same time, the leaders were eager to uphold central control and to prevent the re-emergence of "petty-bourgeois capitalism" on the farms.

Despite some successes in implementing these and other policy reforms, the modernisation of communist agriculture in the ensuing decades has proceeded very slowly, with chronic shortfalls in performance. The goal of "agro-industrial integration" with its requirement of raising capital inputs, labour rewards and other economic performance indicators in the agricultural sector to levels comparable with those elsewhere in the economy, has remained an elusive one for most of these countries. It has brought up again the question of the appropriateness of large-scale "industrial" methods in socialist agriculture that was discussed earlier, and the applicability of Western "agribusiness" concepts in the communist system (Wadekin 1980, pp. 317-8 and 1982, pp. 233-57).

The cornerstones of Soviet agriculture at the farm level have been the collective and state farms. Their respective economic roles were discussed by a number of writers. Bergmann (1975, pp 258-61) looked at the collective farm in comparison with agricultural co-operatives in the West, finding it to stand in a midway position between complete economic integration (such as in a kibbutz) and the looser forms of agricultural service organisations found in other countries such as the US and Australia. Whether the state farms were a "higher" form of socialism than the collectives has remained a moot point, though it has been suggested that the two forms of organisation have been growing closer together (Dunman 1975, pp. 118-9).

Overall, although the perception of agriculture in the socialist countries of Europe that has emerged in the postwar period has continued to be firmly based in Marxist-Leninist doctrine, immediate practical and political considerations have played a major role in directing agricultural policy at a number of stages in these countries'

development.⁵⁵ Recently, efforts have been made to free up labour markets, to provide greater economic incentives, to rationalise agricultural investment and to allow "economic" considerations to play a more prominent role in the setting of prices (Hedlund 1984, pp. 191-214). However, it is not clear whether these changes reflect a fundamental shift in the socialist view of the role and functions of the agricultural sector, or whether they are simply *ad hoc* responses to the wide range of social, political and economic problems that continue to beset agriculture in these countries.

In turning to China, it can be noted that the approach of Mao Tse-tung to socialism was founded on the basic philosophy of Marx, although he gave a distinctly Chinese orientation to Marxian ideas by relating them to the historical and cultural circumstances of China. But his view of the agricultural sector, and of the role of agriculture in socialist economic development, was different from that of Marx. Mao held a more sympathetic view of the role of the peasant farmer in economic development than Marx, Lenin or Stalin; he therefore did not espouse the "conventional" Soviet socialist line of pre-empting the maximum possible surplus for State-owned industry, but saw agricultural and industrial transformation taking place simultaneously. In 1955, Mao wrote:

Heavy industry, the most important branch of socialist industrialisation, produces for agricultural use tractors and other farm machinery, chemical fertilizers, modern means of transport, oil, electric power, etc., and all these things can be used, or used extensively, only on the basis of an agriculture where large-scale cooperative farming prevails... We must on no account regard industry and agriculture, socialist industrialization and the socialist transformation of agriculture, as disconnected or isolated things, and on no account must we emphasise the one and play down the other.⁵⁶

Mao's overall development strategy involved a number of distinctive features.

55. The influence of Khrushchev on agriculture is a good illustration; see, for example, Laird and Laird (1970); McCauley (1976).

56. Mao Tse-tung (1977) "On the Cooperative Transformation of Agriculture"; see *Selected Works*, vol. 5, p. 197.

At the outset was land reform; he argued that the institutional transformation of traditional agriculture was an essential precursor to all other developmental changes including technological transformation. Then there was the balanced programme of industrial nationalisation and the establishment of agricultural cooperatives noted above, with emphasis on encouragement of industries with direct links with agriculture and on worker/peasant integration, within a full-scale planning (nonprice) allocative system. In the rural sector, Mao stressed the need to mobilise unemployed and under-employed labour in order to meet seasonal labour demands in agricultural production, to work on public capital projects, and to create a "modern" small-industrial sector within the countryside using indigenous technology. This whole development strategy was set in the context of the Maoist ideology which saw selflessness and unity of purpose amongst workers and peasants as releasing a huge reservoir of energy, enthusiasm and creativity. Mao's well-known "holistic" view – that everything depends on everything else – meant that rural change was to be brought about by a process in which economic, political, cultural and social development were inseparable.

The role of the collective or commune in the Maoist view of the agricultural sector was fundamental. In his famous essay *On Contradiction* of 1937, Mao wrote:

Every form of society, every form of ideology, has its own particular contradiction ... Qualitatively different contradictions can only be resolved by qualitatively different methods. For instance, the contradiction between the proletariat and the bourgeoisie is resolved by the method of socialist revolution; ... the contradiction between the working class and the peasant class in socialist society is resolved by the method of collectivization and mechanization in agriculture.⁵⁷

The Chinese agricultural commune, as it evolved after the establishment of the Peoples' Republic in 1949, was not simply a large rural cooperative. Rather it was a composite unit embracing the complete range of economic, administrative and social functions required for a self-reliant rural community. It enabled the organisation and mobilisation of labour, the plan-

ning and implementation of programs for improving both farm and nonfarm output, and the provision of a range of support services such as education, health and farm extension. Although the communes relied on the ideological commitment of their members, they also involved the introduction over time of systems of incentives to stimulate production and enhance efficiency (Aziz 1978; Khan and Gek-boo 1979).

The evolution of the Chinese communes following the revolution was in accordance with Mao's theoretical view. Although in the early 1950s the units (based on "mutual aid teams") were too small for peasants to operate effectively, larger-scale cooperatives were in existence by the mid 1950s which, according to Mao himself, had realised his basic aims; in 1957 he wrote:

Agricultural cooperatives have been successfully organised, and this has resolved the great contradiction in our country between socialist industrialisation and individual peasant farming.⁵⁸

However the "People's Communes" of the late 1950s, the period of the Great Leap Forward, were poorly managed and disorganised, and led in the 1960s to a further stage involving greater decentralisation, with production control in the hands of smaller units, including production brigades (about 300 households) and production or work teams (about 30-45 households) (Gray 1974; Rawski 1979). The latter became the main basis for accounting, planning and income distribution at the village level. Following Mao's death in 1976 there have been further changes, particularly the development of a new system of household contracting (the "Responsibility System"), which further establishes the individual family and the work team as the basic production unit rather than the commune or brigade.⁵⁹

The question as to whether the Maoist theory of socialist agricultural development can be applied elsewhere has been

57. See Mao Tse-tung (1967, pp. 79-81).

58. Mao Tse-tung (1967) "On the Correct Handling of Contradictions among the People"; see *Selected Readings*, p. 365.

widely debated (Aziz 1978, Ch. 7; Gurley 1974, 1979). Despite marked differences in the social and economic structure of China compared with other countries, the Chinese experience does at least provide a significant indication of the potential of small-scale labour-intensive activities in the rural sector using appropriate or indigenous technology. It also highlights the way in which an agricultural labour surplus can be utilized without its having to emigrate from the rural sector, by the development of a light industrial base in the countryside, and, perhaps more significantly, by the allocation of surplus labour to agricultural infrastructure projects. Beyond these isolated observations, however, the application of Mao's principles outside China remains strictly limited. As Wong (1979, p. 255) has argued:

The question amounts to whether the existing nonsocialist Asian countries can actually emulate the Chinese strategy of development without having undergone a thorough political and social revolution beforehand. Further pursuit along this line would lead to the inevitable *cul-de-sac* that Maoist economics cannot operate in the land without Mao.

9. Neo-Marxism and the New Political Economy

Over the last thirty years a strong radical challenge to the existing orthodoxy has grown up in Western economics, a challenge that is critical of what is seen as the increasing abstraction, trivialisation and irrelevance of traditional economic theory and analysis. The attack has been particularly aimed at the dominant influence exerted by the neoclassical paradigm, with its characterisation of an historically timeless economy comprising homogeneous utility-maximising consumers demanding goods and services from profit-maximising producers through perfectly-functioning competitive markets. Radical economists have suggested that in reality economic systems operate more through the use and misuse of power, and that economic phenomena cannot be sensibly studied in isolation from their social, cultural and political context. They have favoured a return to the agenda of the classical political economists of the nineteenth century, and a reintroduction of the term "political economy" to indicate the reinstatement of a

broader purview for economics. These economists have been importantly, though by no means exclusively, influenced by Marxian ideas, and as a result have been especially concerned with a class-based interpretation of economic affairs, and, in a wider context, with analysing the evolution of capitalism. The label "neo-Marxist" has sometimes been used to denote in broad terms the extension of the Marxian mode of analysis to embrace phenomena and institutions that did not exist in Marx's own day, especially in the context of "underdevelopment".⁶⁰

In the agriculture of advanced Western countries these lines of thought have had little specific to say, beyond perhaps pointing to structural changes brought about by the workings of capitalism, where the "ideal" of the family farm is seen as being overtaken and replaced by large-scale commercial-conglomerate agriculture.⁶¹ Rather, the work of the new political economists as it has related to agriculture has been overwhelmingly concerned with development questions. These writings have had two main implications. Firstly, at a national level, an alternative view of agrarian change has been provided by an analysis of rural class structures. This analysis has drawn significantly on the work of social scientists from outside economics, notably anthropologists, sociolo-

59. See Gray (1982), Hazzard (1982), Griffin and Griffin (1983), Nolan (1983), Perkins and Yusuf (1984). Some of the new developments in China's agricultural policy run counter to Maoist thought; see Nolan and White (1982, p. 184), Hinton (1983, p. 762). Others, such as the belief that increased peasant purchasing power is a major force in national economic development, can be interpreted as deriving from the teaching of Mao Tse-tung; see Gray and Gray (1983).

60. Foster-Carter (1974). For an analysis of the relationship between neo-Marxism and orthodox development economics, see Hirschman (1982).

61. See Vogeler (1982). Radical economists have also criticised advanced capitalist agriculture for its "ecological unsoundness"; see Caldwell (1977, pp. 102-4). For a discussion of the radical critique of the neoclassical paradigm in agriculture, see Petit (1982, pp. 330-5), and for a contemporary account of the Marxian view of agriculture under capitalism and the small scale/large scale debate, see Servolin (1972).

gists and political scientists (de Kadt and Williams 1974; Oxaal *et al.* 1975; Wallman 1977; Bernstein 1979; Dopfer 1979). Secondly, at an international level, radical political economy has looked at technological dependence and multinational capitalism as important influences on growth and income distribution in the Third World, raising thereby some serious questions about existing attitudes to the transformation of agriculture in developing countries. These two aspects will now be examined in turn.

Development economists in the orthodox tradition have of course always recognised the obvious differentiation in rural societies between strata or classes that perform distinct economic functions, such as landlords renting their land, or workers selling their labour. Non-orthodox economists, encouraged by the work of radical anthropologists and sociologists, saw this differentiation as something that was not peripheral or incidental to the process of economic change, but central to it. They took up a model of rural class structures that clearly distinguished the roles of landlords, rich, middle and poor peasants, and the rural proletariat (landless labourers), and used it to study not only the economic position of members of each group, but also their social and political interrelationships. The extent to which class differences were overlaid by ethnic, religious or other kinds of stratification was also accounted for (Stavenhagen 1975, Ch. 2).

These studies analysed the evolution of the class structure by examining the generation and use of an agricultural surplus and its impact on employment and incomes amongst the poorest social groups. They showed that if the surplus generated by middle and rich peasants was used to acquire more land or to intensify cultivation of existing land, the relative position of poor peasants and agricultural labourers could be worsened. Alternatively the agricultural surplus could be appropriated by the rising urban entrepreneurial class and used to support conspicuous consumption and other imported values of the "advanced" consumer society. Either way, class divisions in the rural sector were intensified by the process of agricultural modernisation, with increased polarisation

between landowners on the one hand and poor peasants and wage labourers on the other. In these circumstances redistributive policies such as land reform had to be interpreted carefully, since, without additional measures to help the poorest social classes, such policies could have the opposite effects from those intended (Bagchi 1982, Ch. 6).

The differential impacts on different rural classes of alternative development strategies were analysed by Griffin (1973), who suggested that "technocratic" development directed principally at increasing output benefited mainly the landowning elite, whereas radical socialist strategies which aimed to redistribute political power and wealth worked in the interests of small peasants and landless labourers. In between these extremes was a "reformist" development strategy that helped mainly middle peasants and progressive farmers through efforts both to increase agricultural output and to redistribute income and wealth.

A consistent theme of many radically-oriented studies was their seemingly inexorable conclusion that revolutionary change was a likely outcome of the conflicts and inequities existing between classes in traditional rural societies (Roxborough 1979, Ch. 7). This conclusion was appropriate to the neo-Marxist framework, which

... [queried] the mechanisms of transition, which modernization theorists have failed to specify explicitly, pointing out that the implicitly expected smooth, 'evolutionary', transformations of the typical social forms of [capitalist] underdevelopment are less likely to come about than much sharper revolutionary breaks.⁶²

Such lines of thought led to attempts to identify the mechanics of revolutionary processes amongst the peasantry (Alavi 1965; Moore 1966, Ch.9). For instance, Paige (1975) examined the conditions for the political mobilisation of rural classes, the circumstances leading to political conflict, and the likely outcome of such conflict, for each of five agrarian systems: the commercial manor or hacienda, the sharecropped estate, the migratory labour estate,

62. de Kadt (1974, p. 3).

the plantation, and the family smallholding. He traced the process of change by establishing the conditions for mobilisation of workers in conjunction with the likelihood of a zero-sum conflict between workers and owners. He showed how the predicted outcome (peasant revolt, revolutionary nationalist movement *etc.*) depended on the type of agrarian system in operation. These sorts of analyses have been used convincingly to explain and interpret the historical process of revolutionary rural change in a number of countries (*e.g.* Wolf 1971).

The second main implication of radical economic thought for perceptions of the rural sector has been in the area of dependence and multinational capitalism. The traditional orthodoxy, based on the Ricardian theory of comparative advantage, was that trade and international factor movements occurred to the mutual advantage of all participants. Dissenters, on the other hand, pursued not so much a single alternative theory but rather a loosely related set of ideas gathered around notions of colonialism, exploitation and imperialism. They argued both theoretically and empirically that international integration actually increased inequality and poverty, and that the transformation of traditional agriculture has been advocated by rich nations not out of a desire to help Third World countries to cope with problems of food supply and poverty, but rather out of motives of self-interest. Paul Baran, for example, one of the leading writers of the radical school, suggested in his *The Political Economy of Growth* (1957) that agricultural development, or "priority for agriculture", was used as a tool by advanced Western countries to ensure a continuation of food supplies from the Third World, and that agricultural backwardness in developing economies was "the largest legacy of capitalism to be overcome by the socialist society" (Baran 1957, p. 274).

In the postwar years considerable attention has been paid to the ideas of "dependency theory", arising originally from the work of economists at the U.N. Economic Commission for Latin America, and more recently associated with the writings of Andre Gunder Frank, Theotonio dos

Santos, and others.⁶³ Although there has been dissent on the boundaries of dependency theory, on the ideological orientation of its various proponents, and even on whether it should be regarded as a theory at all (Kay 1975; O'Brien 1975; Leys 1977; Palma 1981), its principal propositions were clear enough. The common historical background of developing countries had created in them particular structures of production and trade, notably the export of primary commodities, the import of manufactures and capital goods, and a reliance on foreign technology, that made them dependent on the rich nations of the world, not just economically but culturally, socially and politically as well. The theory saw "underdevelopment" not as a stage through which countries passed, but as a necessary counterpart to the continued existence and progress of developed countries in the world capitalist system. Although such a view might suggest a simple binary division of the world into developed and underdeveloped, or independent and dependent, or central and peripheral, the reality was more likely to be a spectrum of dependence from total autonomy to total domination (Lall 1975; Seers 1979). In any case, the results for developing countries' agriculture were bleak: stagnation, declining average incomes, and little prospect for alleviating the plight of the poorest groups in rural society.⁶⁴

The international transfer of technology, especially through the operations of transnational corporations, has been seen by radical economists as one of the major avenues through which dependency is perpetuated (Griffin 1978, pp. 13-41; Solomon 1978, Ch. 18; Sunkel and Fuenzalida 1979; Muller 1979; Stewart 1981). For instance, Singer and Ansari (1977, p. 37) suggested that the

fundamental advantage of rich countries is . . .

63. See especially Frank (1967), dos Santos (1970), Sunkel (1973), de Janvry (1975), Cardoso and Faletto (1979); for a useful summary of the theory of unequal development see de Janvry (1981, Ch. 1).

64. See further Petras (1978, Ch. 5), and the analyses of plantation economies by, for example, Best (1968) and Beckford (1969, 1972).

that they are the home of modern technology and the seats of multinational corporations . . . The real source of the maldistribution of the gains from trade and investment lies in the nature of modern technology and the process of its development. By rendering obsolete the older, simpler, more labour-intensive existing technology, this process creates a condition of continued and sharpening technological dependence . . . that has to be corrected if the poor countries are to emerge from the depths of poverty.

This argument implied that technology transfer would occur only if it suited the profit-maximising interests of the corporate sector of the international capitalist economy. As far as agriculture was concerned, such transfer would militate against income redistribution and would reduce employment opportunities within the agricultural sectors of developing countries. This would occur either directly through the concentration of capital-intensive agricultural technology in the hands of a small group of efficient producers,⁶⁵ or indirectly through the transfer of inappropriate industrial technology that distorted and unbalanced the overall development process.

10. Quantitative Modelling of the Agricultural Sector

At the same time as the developments discussed in the preceding three sections were taking place, considerable strides were also being made in the area of quantitative model-building of the agricultural sector. This work was not uniquely identifiable with any particular theoretical school, economic system or ideological commitment, although the great majority of this work was based, implicitly or otherwise, in the partial or general equilibrium economics of the neoclassical tradition. But regardless of their theoretical background, studies in this area were united by certain common features. They made full use, for example, of the rapidly expanding armoury of statistical and econometric methods and computational facilities that were becoming available during the period. Furthermore, most of these modelling studies shared a hard-headed recognition that successful analysis required a sound descriptive as well as theoretical basis. Their orientation in the first instance was

therefore towards providing a realistic representation of actual economic processes and relationships as an essential prerequisite to generating policy conclusions that could be taken seriously.

Agricultural sector models have been built at all levels of aggregation. At the most disaggregated level the unit of observation was the farm as both a producing firm and a consuming household. Groups of farms were aggregated on the basis of social, economic or locational criteria to form industries, regions, *etc.* which in turn were combined to comprise the whole agricultural sector. Next, linkages between agriculture and other sectors of the domestic or international economy were specified (Fox *et al.* 1973, pp. 587-95). The level of aggregation provides one important criterion for classifying sectoral models. A further basis for classification relates to the purpose of the study. Some models were constructed simply to examine the structural characteristics of the agricultural sector, the interrelationships between its component parts, and/or the linkages through commodity and factor markets between the agricultural sector and the rest of the economy. Others, in both advanced and developing countries, were embedded more firmly in the theory of economic planning and policy making. The objectives of these models included forecasting the time paths of key economic variables such as output, consumption, investment or employment, under various assumptions concerning the values of exogenous variables, in order to evaluate the effectiveness of a range of policy instruments in achieving given economic and social goals.

Perhaps the clearest basis for classification of quantitative models of the agricultural sector, however, is provided by the analytical technique that determined the structure of the model and the means of its quantification and solution. On this basis, then, we can look at the nature of the agricultural sector implied in turn by four

65. Griffin (1974) has argued that the new cereals technology has tended to have such an effect, resulting in increased income inequality and polarisation of rural social classes; see also Lefebvre (1972). A contrary view is put in Schultz (1977) and Campbell (1979, pp. 82-3).

major types of models: econometric models, input-output models, programming models and social accounting matrices.⁶⁶

Models of the agricultural sector that estimated structural equations from historical time series and/or cross-section data using econometric methods typically attempted to explain the level of farm production, the domestic and export demand for farm output, inventory movements, the behaviour of farm prices, and overall levels of farm income. On the supply side, they proposed supply functions in which own-price, cross-price effects, weather, levels of variable inputs, and institutional factors were likely to be amongst the important explanatory variables. On the demand-for-domestic-consumption side, most models contained conventional demand equations with quantity demanded explained by relative prices and consumer incomes, although it was shown that if farm output were assumed to be determined independently of current price, the demand equation could be estimated with price as the dependent variable (Tweeten 1967). The specification of the export sector depended on the nature of foreign demand, with export prices generally being exogenous. Some models attempted to depict specifically the demand of the farm sector for factors of production, for example by specifying investment functions, usually in terms of the discrepancy between actual and desired capital stock but with credit constraints included where relevant, or by characterising markets for different types of farm labour, where wage differentials and non-farm unemployment levels could be expected to have some explanatory power.

Generally these models of the agricultural sector were proposed as complete systems, with appropriate lagged relationships between variables specified, and were estimated from time-series data by simultaneous equations methods. Some such models were constructed as a part of a global econometric model, such as Fox's (1965) 15-equation farm-sector model which explained the determination of farm product prices and net farm income as part of the Brookings model of the U.S. economy. Similarly, Evans (1970) con-

structed a model of the Israeli economy which contained 79 behavioural equations and 24 identities, amongst which were a consumption function for food, a farm investment function, import functions for food and agricultural inputs, functions for farm exports and an agricultural production function.

At the next level were "free-standing" econometric models of agricultural sectors. The more general of these models, such as Egbert's (1969) four-equation annual model of U.S. agriculture, attempted to depict the major aggregates without looking beneath the surface at their composition; in so doing they traded off sectoral detail against ease of specification. Other more extensive models built up to the aggregate variables by specifying separate equations for components of the farm sector; breakdowns used included a food/nonfood division as in Throsby and Rutledge's (1977) 17-equation quarterly model of the Australian agricultural sector, and an industry breakdown as in Cromarty's (1959) early model of U.S. agriculture, which divided the farm sector into wheat, feed grains, beef, dairy, hogs, eggs, poultry, soybeans, cotton, tobacco and truck crop industry groups.

In addition to these whole-sector studies there have been numerous attempts to model separate components of the agricultural sector, mostly defined on a commodity or industry basis. Formally these models have been very similar to their higher-level cousins, and have implied the same sort of modelling perspective, identifying those price and quantity variables that were postulated to be determined within the defined systems, relating them amongst themselves and with other variables determined outside the system, with lagged effects carefully accounted for, and

66. For an overview of these types of models in the context of agricultural policy analysis, see, for example, Heady (1983), Labys and Pollak (1984), and Thomson and Rayner (1984). In addition to the types of models mentioned, we should also note sectoral models constructed using computer simulation methods – see, for example, Manetsch *et al.* (1971), Linneman *et al.* (1979), Csaki (1985) – and control theory models of agricultural systems (*e.g.* Rausser and Hochman 1979).

estimating the whole system from quarterly or annual time series. Most of the empirical applications have been to agricultural industries in the U.S., including wheat, beef/pork, feed/livestock and tobacco.⁶⁷

Developments in input-output analysis following the seminal work of Wassily Leontief (1966) have found important applications in agricultural sector modelling. Most economy-wide input-output models developed during the 1960s and 1970s contained some reference to agriculture, and input-output techniques came to play an important role specifically in the construction of economic planning models.⁶⁸ The perception of the agricultural sector contained in such models emphasised the importance of both forward and backward linkages amongst components of the farm sector and between them and other sectors of the economy, in keeping with the Walrasian general-equilibrium foundations of input-output analysis which recognised the sectoral interdependence and simultaneity of economic systems.

Construction of an input-output model involved specifying the coefficients of an interindustry matrix which showed the intermediate demands for commodities in the production of other commodities, and vectors of final demands for industry output by domestic consumers, government, the external sector and so on. These models could then be used to forecast commodity outputs necessary to meet certain known or assumed final demands, and, through multiplier analysis, to examine the incremental impacts of exogenous change on the system under study. Apart from general applications in sectoral analysis in agriculture, these techniques have been used particularly to study spatial and interregional relationships (*e.g.* Datta-Chaudhuri 1975; Schaffer 1976; Polenske 1980).

A natural extension to the fixed-coefficients production model of input-output analysis was to incorporate with it a welfare function expressing some goal or goals for the economic system, enabling determination of the "best" patterns of input usage and output disposition for the economy. A computational structure for

such a conceptual model was readily provided initially by linear programming. As a result, programming models have been widely applied in agricultural sector modelling, where they have offered considerable scope for incorporation of constraints on output imposed by particular economic, political, institutional, social or cultural features of the economy under study. Again, intertemporal features of production, as well as regional and spatial aspects, have received particular attention.⁶⁹

One of the main uses of programming models in agricultural sector analysis has been in exploring the feasible production set of the system in an effort to map out the range of choices open to planners, rather than simply in generating a single "optimal" plan. In this respect programming models have become particularly important in evaluating economic strategies when multiple objectives are involved. The extent to which one objective must be sacrificed in order to pursue another can be readily mapped out, a feature that has been especially useful in looking at the general trade-off between growth and distributional objectives in economic planning (*e.g.* Loucks 1975). A further application has been in the generation of patterns of shadow prices attaching to scarce resources used in the agricultural sector. Such analyses have relied on duality theory which establishes the existence of an optimal (dual) pattern of input prices corresponding to any optimal (primal) pattern of output quantities within a programming framework. This sort of information has proved valuable as an input to other studies, such as project appraisal work (*e.g.* Bruno 1975).

67. Examples include Fuller and Ladd (1961) (beef/pork); Cromarty (1962) (wheat); Egbert and Reutlinger (1965) (feed/livestock); Vernon *et al.* (1969) (tobacco). A review of progress in the overall area of econometric modelling of the agricultural sector is contained in King (1975).

68. For some applications in developing countries see Polenske and Skolka (1967, Chs. 7-10); a major Australian application has been the economy-wide ORANI model which contains considerable detail of the agricultural sector (Dixon *et al.* 1982, 1983).

As noted above, programming models of agricultural sectors have now been constructed for a number of countries. Illustrative of the methods used and results obtainable is one of the earliest such studies, Duloy and Norton's (1973) model of Mexican agriculture which disaggregated the agricultural sector into four regions and twenty districts, with over two thousand cropping activities specified embracing a wide range of possible alternative technologies. Some non-linearities were built into specification of objective functions and constraints. The model was usable for studying pricing policies for both inputs and outputs, trade policies, employment programs and the effects of investment projects on the agricultural sector.

A more recent development is the evolution of social accounting matrices (SAMs), whose potential for modelling the agricultural sector appears very bright. The SAM framework extends the input-output model to incorporate the factorial distribution of income, and the receipt and disbursement of income by institutions (households, corporate enterprises and government) in the economy. Like input-output analysis, the original relevance of this work for agriculture lay in the fact that economy-wide SAMs necessarily included a fair amount of detail about the farm sector and its linkages with other sectors. More recently attention has been turned towards the use of social accounting matrices specifically for agricultural sector modelling. Three types of applications can be distinguished. Firstly, because a SAM is specified as a closed accounting system, it imposes strict requirements on data, and can thus be used as a consistent database describing the structure of the agricultural sector, either on its own or as an input to a larger model. Secondly, as a simple extended Leontief-type linear model, an agricultural sector SAM can be used extensively on its own to study structural aspects of demand, supply and price formation in agriculture and the impacts of exogenous change on production and income distribution. Thirdly, a SAM can be used as a structural component of a larger and more general model of the agricultural sector, such as a computable general equilibrium

model or a programming model of the type described above. Work in these three areas is still in its infancy, but has already been suggestive of the degree to which social accounting matrices can extend existing techniques, especially towards evaluating the distributional consequences of alternative strategies for agricultural development.⁷⁰

Indeed one of the most important contributions that quantitative models have made as a whole in the area of economic development has been in enabling a shift in emphasis from growth *per se* towards an explicit recognition of equity considerations, against the background, noted earlier, of an observed increase in inequality in the distribution of the gains from growth in many countries. As Chenery (1974, p. xviii) noted:

A reorientation of policy requires a reorientation of planning methods. The term 'reorientation' is used advisedly, since poverty-focused planning does not imply the abandonment of growth as an objective. It implies instead redistribution of the benefits of growth. The major change needed in the design of planning models is the addition of a new dimension: the identification of socio-economic groups of asset holders and income recipients, including the principal target groups on whom specific policies are focused.

Over the last ten years, planning models of all types have increasingly been extended to incorporate this new dimension.

69. For an outline of the application of programming methods to policy analysis, see Sengupta and Fox (1969). Agriculture sector applications are contained, for example, in Adelman and Thorbecke (1966, Chs. 6-14), Judge and Takayama (1973), and the ambitious APMAA model of Australian agriculture (see Walker and Dillon 1976). Some applications to agricultural sector modelling are reviewed in Thorbecke (1973), Labys (1975), Egbert (1978) and Heady (1983). For examples of dynamic models in agricultural sector analysis see Day (1973) and Singh and Ahn (1978), whilst programming models emphasising spatial aspects in agriculture are contained in Heady *et al.* (1967), Bishay (1974) and Heady and Srivastava (1975).

70. See further Pyatt and Roe (1977), Pyatt and Round (1977, 1985), Round (1982). For agricultural applications see Bell and Hazell (1980), Throsby and McColl (1981), Le-Si and Scandizzo (1982), Bell and Devarajan (1985). For discussion of the relationships between social accounting matrices and computable equilibrium models, see Dervis *et al.* (1982, pp. 155-62).

Although the models discussed in this section have advanced enormously our understanding of the nature and role of the agricultural sector in both developed and developing economies, it would be misleading to suggest that quantitative sectoral modelling has been free from problems or criticism. For example, Vernon (1966) pointed to difficulties of specifying planning objectives, obtaining data, and providing model-building resources. Further, theoretical problems have continually surfaced, including restrictive assumptions in some models' portrayal of production relationships, and difficulties in handling behaviour under uncertainty. Despite considerable progress in constructing dynamic systems, the incorporation of time-dependent processes in these models is also still far from complete. Bowles and Falcon (1971, p. 221) stressed the difficulties of identifying social, political and institutional constraints in sectoral models of the programming type. Nevertheless, quantitative modelling will undoubtedly remain central to the development of analytical thinking about the role of the agricultural sector in the economy in the future, a matter to which we now turn in the final section of this paper.

11. Concluding Remarks

In this paper, changing perceptions of the agricultural sector in the economy have been observed in a way that has emphasised the historically evolutionary nature of the progress of economic thought. It is now possible to draw together some of the threads of this discussion in an effort to see where these developments might lead in the future.

In regard to developed economies, an understanding of the structure and functions of the agricultural sector is now well advanced in terms of the specification and quantification both of production relationships within the sector and of price/quantity relationships between the farm sector, input-supplying industries, and domestic and export commodity markets. Although unsolved problems still exist in the area of farm management and resource allocation especially in the face of market and climatic uncertainty, the major challenges for the economic analyst, whether

descriptively or normatively motivated, seem certain to remain in the policy arena. There is still no agreement amongst economists as to the appropriate model for setting farm policy analysis in context, that is, whether it should be an institutional approach that emphasises the interactions between groups within a constraining political and legal framework, or a market-oriented approach that sees government intervention as serving simply to maintain the operation of competitive market forces, or some intermediate position.⁷¹ The integration of agricultural policy analysis with wider aspects of economic and social policy determination, and assessing the relative roles in this context of demand management, monetary policy, structural adjustment measures, social welfare programs and international and commercial policies, will continue to present difficult challenges (Josling 1974).

The domestic problems confronting the agricultural sectors of advanced capitalist countries, however, diminish in scale when compared to the vast difficulties facing agriculture in the Third World. As we have noted, there is no general consensus yet about the role of agriculture in development. Nevertheless, the current state of perception of the nature and functions of the agricultural sector in the developing economy does allow us to draw some conclusions about likely directions of future work. Five interrelated areas of particular interest are identified.

Firstly, it can be observed that development strategies that neglect the agricultural sector or seek to relegate it to a secondary or passive role are unlikely to command much attention in the future. This will be a function partly of the inevitable fact that priority in many cases will have to be given to the production of food for domestic consumption, since most of the poor live by agriculture in the countryside. But partly too it will be a function of an increasing recognition of the complex and subtle interrelationships existing between the agricultural and other sectors of the devel-

71. In this context attempts to endogenise government behaviour and to ask why governments behave as they do are of interest; see further Rausser *et al.* (1981), de Janvry (1983), Petit (1985).

oping economy that have been discussed in this paper.

This question in turn raises the second issue. Regardless of the "development" of agriculture, industry or any other sector, there remains a fundamental "bottom line", the question of relieving chronic hunger and poverty amongst the rural population (Sen 1981). Some writers in this area have focussed on nutrition as a key object of development planning (Berg 1973; Joy and Payne 1975; Mellor and Johnston 1984), others have thought more in terms of integrated programs taking nutrition, health and control of population growth into account (Johnston and Meyer 1977; Cassen 1981). At a global level, a number of writers have suggested that the major constraints on increasing food supply and eliminating malnutrition are political, economic and social, rather than agricultural in the technological sense (*e.g.* Allaby 1977; Campbell 1979; Rosenblum 1983). These issues are still far from settled, but it is clear that in the development thinking of the future a greater amount of attention will have to be paid, both conceptually and operationally, to these basic needs (Streeten 1980; Timmer *et al.* 1982; Mukhoti 1985).

The third area of importance is the distributional question that has been encountered at several points in the above discussions. Although the new political economists have rightly focussed much of their attention on inequities in the distribution of income and wealth in developing countries, they by no means have a monopoly on concern for this problem. Indeed, as previously noted, one of the major achievements in the application of quantitative modelling techniques to developing countries has been the opening up of the possibility for rigorous examination of the distributional consequences of alternative development policies and strategies. Far from seeking "growth at any price", as the work of these analysts has sometimes been caricatured, their writings show an increasing concern for equity issues, and this concern, when supported with their powerful analytical methods, will clearly be of dominating importance in the evolution of agricultural development studies in the future (von Witzke 1983, 1984).

Fourthly, attention should be drawn to the undiminished importance of an improved theoretical and empirical understanding of the process of agricultural transformation and modernisation in developing countries. This question comes to the heart of the problem of agricultural development, drawing together the issues of food supply, nutrition and distribution mentioned already. Three aspects need emphasis in relation to the role of these factors in affecting perceptions of the agricultural sector: the mechanics of structural change, especially in regard to redistribution of rights over resources, particularly land (*e.g.* Klein 1977; Cohen 1978; Rosenzweig 1978; Berry and Cline 1979); the role of technological progress and changing factor intensities; and the incorporation of social, political and institutional variables and constraints more fully into rigorous economic analysis of rural change.

Finally, study of the infrastructure of the agricultural sector in developing economies will continue to grow in importance, as its significance in underpinning agricultural growth becomes more clearly understood. Many writers have pointed to the crucial role in agricultural development played variously by transport systems, public works, communications, marketing services, research and extension services, credit markets, and so on. With increased modernisation, that is, a greater commercial orientation within traditional agricultures, a fuller understanding of these processes and institutions will become even more important.

To conclude, we turn to the global perspective, wherein both developed and developing agricultures coexist. Theoretical and empirical analysis of the world economy is still in its infancy. But there are promising signs. Dependency theory, for all its unproductive squabbling about ideological commitment, has at least formalised some propositions about international exploitation. The theory of international trade has shown signs in recent years of casting aside its preoccupation with idealised models of exchange and paying attention instead to the phenomena of international cartels, restrictive measures, transnational corporations and

other realities of world markets. Further, increasing rigour in studies in international political relations should be of benefit in due course to economic analysis of commodity and factor movements between countries. These developments are likely in the future to add a new and wider dimension to the evolution of ideas about the role of agriculture in the economies of the world.

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