

HISTORY OF ECONOMICS THOUGHT LECTURE NOTES

PRODUCTION AND THE SOCIAL SURPLUS APPROACH

By

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The lectures notes were first written in 1986 when I starting teaching a history of thought course at Roosevelt University. Their working title at the time was simply “The Surplus Approach”. I haphazardly revised the notes a couple of time afterwards, once in the 1990s when I taught a course on linear production models at De Montfort University; and the last time in 2010 when I taught a history of thought course at University of Missouri-Kansas City. However, the overall content of the notes and their beginning with Petty and ending with Marx has not changed. In the 1990s I became more interested in working with Post Keynesian production and price models, and so switch my interests. These notes are freely available to anybody who wants to use them; but keep in mind they do need revision and completion—for example the contributions of Maurice Potron, Georg von Charasoff, Robert Remak, and Alfred Kahler need to be added.

PRODUCTION AND THE SOCIAL SURPLUS APPROACH

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CHAPTER 1

AN INTRODUCTION TO PRODUCTION AND THE SOCIAL SURPLUS APPROACH

Need to discuss the social provisioning process
 Need to define capitalism
 Need to deal with access to SPP
 Going system → SPP → going social lives
 How to analyze it
 Social Surplus Theories
 Long Period Method of Economic Analysis
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 Circular Production versus Linear Production

Economics is concerned with examining, explaining, and altering the provisioning process which is flow of goods and services required by human beings to survive, grow and reproduce. One approach to this is associated with neoclassical qua mainstream economics. Emerging in the 1870s, neoclassical economics defines economics as the allocation of scarce resources among competing via the price mechanism in the face of unlimited wants. Its defining characteristics are focusing on exchange and not production, methodological individualism and the ahistorical-social individual, rationality and self-interest, non-historical time, demand and supply curves, the allocation of scarce resources, the lack of institutions and classes in its theorizing, and its non-specificity in analyzing economic problems, especially with respect to capitalism. Moreover and of particular interest to us, the paradigm is based on the notion of scarcity which is only sustainable if the notion of production and the surplus are absent. Thus, the neoclassical approach to the provisioning process is asocial. In contrast to this, there is a definition of economics which is concerned with examining, explaining, and altering the social provisioning process and it is associated with social surplus theories.

From the social provisioning approach, economics is concerned with examining, explaining, and altering the *social provisioning process* (SPP) which is the flow of goods and services required by society to meet the reoccurring needs and promote the well-being of those who participate in its activities. That is, people have social lives; they have families, parents, children, and a history; and they need to be feed, housed, clothed, married, and schooled. And the needed and desired goods and services are produced to sustain their socially constructed, meaningful lifestyle. Thus the social provisioning process is a continuous, non-accidental series of production-based, production-derived economic activities through historical time that provide ‘needy’ individuals and families the goods and services necessary to carry out their sequential social activities through time. Hence the economic activities are linked to and embedded in various societal institutions (such as the legal system, family, and the state); in cultural values (such as individualism and egalitarianism) that are evaluative criteria for establishing which social activities are worthwhile and desirable; and in norms and beliefs (such as property rights and the work ethic) that explain or justify particular social activities. These components or structures of the social fabric affect the pattern and organization of economic activities underpinning social provisioning: they give it meaning, they give it value. This means that the social provisioning process is embedded in a production-with-a-surplus ‘paradigm’.

Social activities are socially created as opposed to being arbitrarily given. Thus, there is no limitation on what the activities can be or how diverse they are, which means that the goods and services relevant for the activities are diverse and socially specified. This implies that the production processes, which include produced means of production, differentiated labor power, and technology, are also socially specified. In particular, means of production are not limited by

the natural properties of the resources used in their construction; specific types of labor power are not genetically determined; and technology is not a natural transformation process that turns natural resources and natural labor power into natural goods for ‘social’ utilization. Rather, they are social entities and hence are not naturally but technically specified, which means that production is socially determined and production activities are social activities. As a result, there exists an array of social relationships qua social structures within the production process that are endemic to capitalist societies, including class, hierarchy and dominance, gender, and race; and it is through these social structures combined with agency that the production-economic activities underpinning the social provisioning process are conducted, coordinated, and given meaning and value.

Since social lives need continuous social provisioning, the economy itself needs to be a ‘going concern’ that is capable of continually reproducing the productive activities needed to producing the goods and services for social provisioning. In addition, social lives need access to social provisioning. This can occur in a variety of ways even in a capitalist economy, depending upon the social relationships between the various social classes, individuals, and the state. For example, there are socially mandated non-market access, such as single-payer universal healthcare, and market-based access through market- or nonmarket-based incomes (wages, profits, and government transfer payments) to purchase goods and services produced for sale in markets. Social provisioning, economy as a going concern, and forms of access generate a wide range of themes and topics to be explored, but for this course the focus is on the historical development of the social surplus theories from the Sir William Petty in the 1660s to Piero Sraffa in the 1960s.

Social Surplus Theories

1. So far I have mentioned surplus but have not defined it or delineated it. The simplest way to give formal expression to the idea of surplus is in the context of a one-sector model. Consider a highly simplified economy where the only thing produced is corn. Suppose further that land of a given fertility is freely available; and also that the only input into production is corn, which is needed as seed and as food over the growing season. (In this way, we ignore, for the moment, all other inputs other than corn.) Finally, suppose that the technology used in the production of corn is such that it takes g amount of corn to produce Y amount of corn, where $Y_c \geq g_c$. Now we are in a position to make the following statements:

- i. surplus is defined as the excess of output over inputs, i.e $Y_c \geq g_c$;
- ii. if $Y_c \geq g_c$ then we have a viable economy with positive surplus; and
- iii. if $Y_c = g_c$ we have a viable economy with zero surplus

Example:

Let $g_c = 10_c$ and $Y_c = 20_c$ then the surplus is 10_c . This notion of the surplus as consisting of the excess of output over the inputs required in production is common element to all the theories that fall under the rubric of the surplus approach. The different theories do, as should be expected, present the surplus in different ways:

- a. one group of theories presents the surplus in terms of surplus commodities. (The above presentation of the surplus is in this tradition) The commodity approach can be extended to include two more sectors (industries) or commodities. For example a two-sector model could take the following form:

$$10_C + 4_I \rightarrow 15_C$$

$$2_C + 5_I \rightarrow 10_I$$

where the surplus consists of 3_C and 1_I .

(1) This approach was used by Petty, Cantillon, Smith, the early Ricardo and more recently by Sraffa.

(2) In this approach, the amount of the surplus is affected by whether the commodities necessary for workers consumption are included among the inputs. Using the one sector corn model this point can be shown in the following manner:

(a) surplus when worker's consumption bundle is included among the inputs:

$$10_C + 5_L \rightarrow 20_C \text{ now let } L = 1_C \text{ then}$$

$$10_C + 5_{C(L)} \rightarrow 20_C \text{ so the surplus is } 5_C$$

(b) surplus when worker's consumption bundle is not included among the inputs:

$$10_C + 5_L \rightarrow 20_C \text{ so the surplus is } 10_C.$$

(c) the former approach was adopted by the Classical economists and by many Marxist today; whereas the latter approach was adopted by Smith, Sraffa and his followers.

b. a second group of theories presents the surplus in terms of surplus labor. In this case all commodity inputs are reduced to their labor hour content; thus we have the following production scheme if direct labor is not included: $10_L \rightarrow 20_L$ so the surplus is 10_L .

However if direct labor and its consumption bundle is included in the production scheme, we have $10_{L(p)} + 5_{L(L)} \rightarrow 20_L$ so the surplus is 5_L . The approach was used by the later Ricardo, Marx, and the current Marxist.

- c. a third group of surplus theories define the surplus in terms of money and then state that profits (or saving) represent the surplus. However, it will be shown that if this approach is to fall within the social surplus approach, then it must be reducible to the commodity or labor approaches mentioned above. Thus while economists, such as Michael Kalecki, Joan Robinson, Nicholas Kaldor, and Luigi Pasinetti used this approach, it does not represent a truly independent approach concerning the surplus.
2. Now that the notion of the surplus is presented, we are now in a position to outline the kinds of questions and problems inherent in this approach and which will be dealt with throughout the course.
 - a. *origin of profits and the distribution of the surplus* – in the surplus approach the surplus originates in the sphere of production (ignoring for the moment the problem of realization), while the origin of profits and the distribution of the surplus originates both at the level of production and the level of distribution (or exchange). These two points encompass a number of important questions associated with the surplus approach that will be dealt with in the course:
 - (1) how in fact do profits originate?
 - (2) what determines the absolute level of profits?
 - (3) what determines the distribution of the surplus into profits and wages?
 - (4) what role do the theoretical conceptions of profits and wages play in the surplus approach?

- b. *determination of prices*—this problem is closely related to the question concerning profits and distribution above. Moreover, the problem of price determination also has two other aspects which we shall be concerned with in the course:
- (1) can prices be determined in a manner which is completely different from the approach used to determine prices in neoclassical price theory;
 - (2) is there a transformation of labor values into prices problem and if so what does it imply for the labor surplus approach.
- c. *accumulation*—what we are concerned with here is the relationship of the surplus (or profits) to the rate of accumulation of capital (or growth) of the economic system. Of particular importance to us is how different ways of utilizing the surplus (or profits) affects the growth path of the economy as a whole and of particular industries.

Long Period Method of Economic Analysis

1. Now that we have defined what is meant by the notion of surplus, briefly delineated the three general forms of surplus approach, and listed problems and questions associated the approach, we are now in the position to develop the framework of the surplus theories which we shall be discussing in class. The surplus theories which we will discuss have been advanced to explain the operation of the forces that ultimately regulate (relative) prices, distribution, and accumulation in a *capitalist economy*. By this I mean a generalized system of commodity production organized through markets and where the ownership of the means of production are concentrate in the hands of one class in society that met in the market with the laborer selling what Marx referred to as labor-power.

2. When examining a capitalist economy, the aim of economic theory is to provide statements of general applicability (or statements of tendency), one necessarily commences by specifying an abstract characterization of the actual economy so as to isolate a well-defined set of phenomena upon which to concentrate theoretical endeavor. This abstract characterization is meant to capture the systematic, regular and persistent forces at work in the system and thereby to permit the ‘theory’ to exclude accidental, arbitrary and ‘temporary’ phenomena. This abstract characterization of the actual system will be referred to as the object of the economic analysis and it defines the conceptual framework within which the subsequent discussion of the surplus theories will be conducted.
3. Having specified the object of economic analysis, the next task is to offer an explanation of the causal relationship that exists between prices, distribution, and accumulation within the capitalist economy. This explanation is identified as the *long-period method of economic analysis* (LPM). The LPM can be described as a kind of analysis that is concerned with characteristics of a capitalist economy which represent *only* the systematic, regular, and persistent forces. Such characteristics only exist when the economy is in a long period position. Traditionally, long period positions are said to exist when the price of each commodity is uniform throughout the economy and a uniform rate of profit exists. An example of a two sector economy in a long-period position is as follows:

$$(10_c p_c + 5_i p_i) (1 + r_c) + 5Lw_c = 20_c p_c$$

$$(2_c p_c + 5_i p_i) (1 + r_i) + 5Lw_i = 10_i p_i$$

where, $r_c = r_i$

$w_c = w_i$, and

input and output prices are the same.

The object of the LPM is to provide an explanation of the manner in which prices (and the wage-rate), the uniform rate of profit, the distribution of income, and the rate of accumulation are determined under long-period conditions.

- a. It is important to appreciate that while the operation of persistent forces occurs essentially in real time there is no concomitant guarantee that the long period will be associated with a definite interval of calendar time. The period distinction of long-period (as opposed to short-period where the impact of the transitory forces are recorded) refers rather to the nature of the causes that operate in the situation under consideration—and, the distinction at this level is between ‘fitful and irregular’ causes and those of a ‘permanent’ nature. This usage reflects the manner in which ‘long’ and ‘short’ periods are seen to be related. For example, natural prices (or long period prices) are viewed as the centers around which market (short period) prices tend to fluctuate and toward which, under the influence of more systematic forces, the latter are inexorably drawn.
- b. The uniformity of the rate of profit in the long period was based on the notion that given free competition, capitalist will move their capital to the sector that provides the greatest rate of profit; thus given this persistent force, the rate of profit becomes uniform. Hence it is argued that any situation exhibiting non-uniform profit rates would be ‘short lived’ and due to the operation of certain arbitrary ‘friction’ and that persistent forces would

ultimately make their presence felt by tending to equalize profit rates and to pull prices back towards their natural level.

4. The traditional long-period method of economic has been connected with two different bodies of theories which purport to explain prices (and the wage-rate), the uniform rate of profit, the distribution of income, and the rate of accumulation under long period conditions. One is neoclassical economics (or supply and demand theories) and the second is the social surplus theories which is the focus of this course.

Deviations from Long Period Positions

1. Before proceeding to discussing the evolution of surplus theories in the context of long period method of analysis, let us consider the relationship between short-period and long period theory. The basis of the traditional long-period and long-period theory. The basis of the traditional long-period method has always been the distinction between permanent, systematic forces operative in the economy and temporary or accidental disturbances. But in view of the fact that no attempt to produce an ordered discipline of 'economics' had been made much before 1776, it is quite proper that early attempts to do so should have concentrated their efforts first upon isolating the systematic forces and subsequently upon explaining their operation in terms of cause and effect. This meant that most studies were devoted to the specification of the economy's long period position and to the provision of an adequate long-period theory to explain it. However, this was by no means the complete program that these writers had in mind. Ricardo, for example, defined quite clearly the overall program: to separate out the persistent from the temporary cases and to ascribe the due effects to each. Yet it would be fair to say that the whole territory of

short-period theory, the detailed examination of deviations between the actual position of the system and its corresponding long-period position, was left largely unexplored until the 20th century, that is until the Kiel Group and Kalecki emerged upon the scene.

(However, like always Marx was an exception.)

2. Further points to notice:
 - a. conclusions of the short-period theory temporarily modify but do not change the conclusions of the underlying long-period theory.
 - b. Short-period statements relate to long-period statements in the same way as the ‘particular case’ relates to the ‘general case’. To claim that deviations’ occur frequently and/or hold especially undesirable implications for the well-being of some or all members of the society should not be mistaken for the claims either that the systematic forces isolated by the long-period theory have ceased to be operative or that the forces that initiate the disturbance can be regarded as anything other than ‘secondary’.

Circular Production Versus Linear Production

There are three different production models/ schemas of production that have been used to model the social surplus theories. In one schema, production is characterized as a one-way street from original non-produced inputs, usually labor and raw materials, through various intermediate stages of production to produced final consumption goods. The defining feature of the schema is that the intermediate means of production goods used for further production are not themselves produced by intermediate goods at a later stage in the production process—this is referred to as linear production. This schema has been used by David Ricardo and subsequently by the Ricardian economist Vladimir Dmitriev. Given its pedigree, the schema of production

will be denoted as the *classical production model*, or the classical model for short. The second production schema characterizes production as a circular flow with regard to fixed investment goods and a one-way flow (linear production) with regard to intermediate goods ending with the production of consumption and fixed investment goods. The defining features of the schemas are circular production for fixed investment goods, one-way production for intermediate and consumption goods, the necessary existence of two industries or sectors, and the absence of inter-industry flows of intermediate goods. Since such a production schema was first delineated by Fritz Burchardt, it will be denoted as the *Burchardt production model* or the Burchardt model for short. The third production schema has production characterized as a circular flow in which both fixed investment and intermediate goods are involved directly or indirectly in their own production as well as in the production of all other final consumption, fixed investment, and government goods. The defining feature of the schema is that all intermediate and final goods cannot be fully resolved into original non-produced inputs. Although the schema can be traced back to Francois Quesnay and Karl Marx, its current popularity dates from the 1930s and thus it will be denoted as the *circular production model*.

PART 1

SURPLUS MODELS PRIOR TO 1800

CHAPTER 2

SIR WILLIAM PETTY, RICHARD CANTILLON, AND FRANCOIS QUESNAY AND THE

PHYSIOCRATES

Sir William PettyLife

Born 26 May 1623 and died 26 December 1687.

The son of a clothier, he was a ship-boy on a merchant ship at the age of thirteen, but ten months later he was put ashore on the French coast with a broken leg. He supported himself by giving Latin and French lessons and soon succeeded in gaining admission to the Jesuit college in Caen where he studied Latin, Greek, French, mathematics and astronomy. After serving in the Royal navy, when the English civil war broke out, he joined other refugees, first in Holland (1643), and then in Paris (1645-6), where he studied medicine and anatomy. When his father died in 1646 he return to England and went to London, where he tried unsuccessfully to exploit one of his own inventions, a machine capable of producing duplicate copies of a written text simultaneously, for which he had obtained a patent in 1646. In 1648, after a few months' study, he was awarded the degree of doctor of medicine at Oxford University. Here his career quickly blossomed, favored by the political unrest of the period that led to the dismissal of the old professors who were considered to be supporters of the king. In 1650 Petty became professor of anatomy. In the following year he moved to the chair of music at Gresham College. A short time later he left England, this time for Ireland as the chief medical officer of the English army sent there by

Cromwell. After the victories over the Irish, Petty was entrusted with the task of conducting a geographical survey of the Irish lands (known as the Down Survey), as the first step for distributing them among the English soldiers, the state domain and the financiers of the military expeditions. This was a most complex task, but Petty succeeded in completing it in only four years, between 1655 and 1658. In the process, he became a very rich man, with large properties in Ireland. For the rest of his life, Petty was busy with the administration of his lands.

Political Arithmetic and the Method of Economic Science

1. The reason we start with Petty in our discussion of the surplus approach is the following: (a) at this time (1600s) theoretical analysis of the economic sphere begins to become separated from morality; (b) commentators on “economics” started to become aware that particular economic phenomena were occurring in a regular and systematic manner; and (3) the surplus approach was designed to analyze capitalism, especially with respect to distribution and growth, and capitalism in England was beginning to emerge in the 1600s, especially in the agricultural sector.
2. **Political arithmetic:** it denotes Petty’s method of analysis which was the use of quantitative methods to produce a more rigorous analysis of social phenomena for policy purposes. Explanations of social phenomena were based on objective (visible) causes and not subjective causes; and built up from objective evidence. The origin of such an approach is found in the emergence of science (Newton and Bacon) and the use of commercial arithmetic. Petty’s approach was in opposition to the logical-deductive method of the Scholastics, which was still dominant, although not all-powerful, in scientific research in the 17th century. Petty used this quantitative-objective approach to develop scientific evidence to be used to establish (nature)

laws by which the government could regulate the social system. Petty viewed the social system as a natural phenomena in that it could be analyzed by the same methods that scientists use to analyze the natural world. Moreover, Petty considered as a law of nature everything that facilitated the proper functioning for the development of a capitalist system.

National State and the Economic System

Petty has an idea of the nation state (body politick) and even an embryonic idea of national wealth. More specifically, for Petty the existence of an economic system is an area in which regular economic activities occur; and this requires the existence of a framework of political and social support which guarantees the perpetuation of particular relations regarding production and private property. This support function is carried out by the apparatus of the state (by its administrative and judicial branches—thus the state plays a decisive role in guaranteeing the normal operation of economic activity. Consequently, the state and the (capitalist) economic system are interdependent—the state requires the economy and the economy requires the state. However, Petty did not extend this interdependency to the economy itself in terms of the technological relations of production that link the various sectors of the economy. This would come with Quesnay.

Commodity and Market

1. Markets exist when there are continuous transactions/exchanges; markets do not exist where there are only individual exchanges that are accidental. Moreover, the existence of a market implies that forces are in place that determine the prices of the commodity exchanged/sold in the market

2. The forces or causes that determine the market price can be divided into intrinsic or fundamental causes which determine the political (and natural) price and extrinsic or contingent causes which in conjunction with intrinsic causes determine the current (market) price.
3. The natural price depends on the state of technological knowledge and on subsistence required for the workers; and the political price takes social costs into account.

Surplus, Distribution, Prices

1. Petty developed his concept of the surplus with respect to the agricultural sector in that he saw it as the quantity of corn extracted by the landlord in the form of rent. Moreover, he saw the surplus as a continually reoccurring economic phenomena and thus provided him the basis to make the following observations:
 - a. the continual reoccurrence of the surplus is predicted on the continual flow of the gross output from the capitalist farmer to the laborer and landlord and back again :

The capitalist farmer produces say 20 units of corn. He keeps 5 units as seed, sends 10 units to the landlord for rent and pays 5 units to the farm laborers that produce the corn.

The landlord in turn sends 5 units of corn to the manufactures who send back to the landlords manufactured goods. If the corn for the farm laborers is considered as an input along with the seed corn, then the surplus is 10 units of corn which the landlord receives.

The output of the manufacturers is not considered as part of the surplus.

That is, the continual reoccurrence of the surplus is based on the 'circular' mode of production in which corn produced corn (or labor-land produced land-labor); thus since it does reoccurrence systematically, it is capable of systematic and theoretical analysis.

- b. Because the economic system is assumed to be a capitalist one, the exchange of the surplus corn (or money equivalent) for artisan goods or the exchange of necessary production corn for labor and /or necessary implements for production took place in markets, at prices and on a reoccurring basis. Thus Petty was able to discuss the concepts of markets and prices as abstract concepts which captured certain reoccurring economic phenomena.
- c. Because goods did exchange in the market at particular prices, Petty had to develop a theory of value (that is an explanation for the relative prices of two goods) in order to explain the price ratios that goods would exchange for in the market and to show that the ‘market’ would not interfere with the reoccurrence of the surplus.

(1) Petty begins his analysis by stating the following:

“... all things ought to be valued by two natural denominations, which is Land and Labor, that is, we ought to say, a ship or garment is worth such a measure of Land , with another measure of Labor, for as much as both Ships and Garments were the Creatures of Land’s and men’s Labour... we should be glad to find out a natural Par between Land and Labor, so we might express the value by either of them alone as well or better than by both, and reduce one with the other as easily and certainly as we reduce pence into pounds.”

What Petty is stating here is that any good produced can be reduced to labor and land in that these two attributes are the ultimate productive force. Thus the *intrinsic* value or price of ay good is determined by how much labor and land is embodies in it. For example, abstracting from land, the intrinsic value of a good can be expressed in the following two examples:

(i) $2L \rightarrow 1 \text{ corn}$ or $2L_w = 1_c p_c$

so the intrinsic value of corn is 2 units of labor, irrespective of what the wage rate is denoted in.

(ii) $3L + 1 \text{ machine} \rightarrow 1 \text{ corn}$

$2L \rightarrow 1 \text{ machine}$

in this case the intrinsic value of corn is 5 units of labor.

Petty then goes on to say that the relative value (or price) of any two goods can be accounted for by the relative amounts of land and labor they contain- for example commodity A is worth twice as much as commodity B if it embodies twice as much land as and labor.

(2) Because Petty argued that both land and labor were the ultimate inputs used in production and the basis for value, he faced the problem of whether commodity A which is produced by 1 land and 2 labor had more intrinsic value than commodity B which is produced by 2 land and labor.

To solve it, he sought a way to 'reduce' labor to land. He did this in the following manner:

(a) first he determined the amount of corn that could be 'produced' on an acre of land in a year's time unassisted by labor- example $1 L_d \rightarrow 20c$

(b) second he determined the amount of corn that could be produced on an acre of land in a year's time assisted by one labor – $1L_d + 1L \rightarrow 30c$

(c) deducting the amount corn produced by unassisted land from the total output, Petty arrived at the output attributable to the use of 1 unit of labor – in our example we have $1L \rightarrow 10c$

(d) now comparing the total amount of land and labor, Petty could arrive at a par between them – in our example $1L_d = 2L$ or

$\frac{1}{2} L_d = 1L$

(e) thus a commodity which contains $1L_d$ and $2L$ in fact contains $2L_d$ where as a commodity which contains $2L_d$ and $1L$ in fact contains $2.5 L_d$ thus making its intrinsic value more than the first commodity

(3) Thus Petty could conclude that goods in the market tended to be traded at the values which accorded to their intrinsic value as measured in terms of land. That is, while it was possible for commodities to be sold at prices (or exchanged in ratios) that differ from intrinsic value (or ‘intrinsic ratios’), these deviations were due to temporary or accidental disturbances in the market. However for exchanges to continually reproduced, activities in the market cannot disturb the intrinsic value of a commodity, that is it cannot disturb the ‘intrinsic exchange ratios’ at which commodities tended to be exchanged for in the market. Petty insures this by having these ratios determined independently of the market place and in the sphere of production.

c. Petty’s theory of value is predicted on the assumption that only corn is produced –that is he made what economists call the one-commodity world assumption. As, will become evident latter, this assumption is terribly restrictive; however the assumption does let Petty argue that the surplus originates solely from land-a theme which is adopted by Cantillon and Quesnay.

Consequently, the total surplus is determined by technology and farm laborers consumption and it is denoted as rent (the notion of profit, especially industrial profit did not come into existence until Adam Smith wrote *Wealth of Nations*). Using the above example this can be shown in the following manner:

$$1L_d + 1L \rightarrow 30c$$

deduct $6c$ for subsistence for labor and seed

$$1L_d + 1L \rightarrow 24c \text{ since } 1L = 1/2 L_d \text{ we have}$$

1 ½ Ld → 24c which is the surplus and rent of land and 'labor'

- d. It should be noted that Petty carried out his analysis of the surplus in terms of social classes-

Landlords get rent because of social/ economic position

Labor get subsistence

This feature of his analysis, as we shall see, is maintained although in modified form in all the subsequent surplus models we shall study.

Richard Cantillon

1. Cantillon reproduced and extended Petty's analysis of the surplus and developed a theory of the allocation of the surplus. He starts off his analysis by defining wealth as commodities designed for the maintenance, conveniences, and superfluities of life and which are produced by labor and are drawn from the land. That is, wealth is produced by labor and is drawn from the land. That is, wealth are produced commodities not simply the physical attributes of the land. Thus Cantillon concluded that the wealth of social/economic system could be divided into those commodities necessary for maintenance and conveniences and those for luxury consumption.

These latter commodities or wealth was the same as the surplus:

- a. Supposing then that the land of a new country belongs to a small number of persons, each landlord manages his land himself or rent it to one more (capitalist) farmers: in this case it is essential that the farmers and laborers should have a living when they cultivate the land for the landlord. The surplus of the land is at the disposition of the landlord.
- b. As for the use to which the land should be put, the first necessity is to employ part of it for the maintenance and food of those who work upon it and make it productive: the rest depends principally upon the consumption patterns of the Prince, Lords, and the landlord. Consequently

the artisans and merchants who supply goods and services to the landlords and the rest of the elite live off the surplus

c. It should be noted that the notion of social class is basic to Cantillon analysis of the surplus.

Landlords get the surplus, farmers and labor get necessities, and artisans and merchants live off the surplus.

2. With the notion of the surplus in hand, Cantillon then turns to developing further Petty's theory of value for the same reasons—to show that land is the origin of all wealth, especially the surplus wealth, and to show that exchanges in the market place does not disrupt the continual reproduction of wealth and the surplus.

a. like Petty, Cantillon argued that land and labor constitute the intrinsic features of the intrinsic value or price of a commodity and that the price or intrinsic value of a commodity is the measure of the quantity of land and labor entering into its production, having regard to the fertility of the land and to the quality of the labor. Cantillon then goes on to state that there is never a variation in intrinsic value in the market place since such value is determined independent of and prior to the market; but the impossibility of exactly proportioning the production of merchandise and the agricultural produce to consumption demands causes a daily variation and perpetual ebb and flow in market prices. However, in well organized societies, market prices of articles whose consumption are tolerably constant and uniform do not vary much from the intrinsic value. Thus it can be concluded that the price ratios at which goods exchange for in the market which are necessary for the reproduction of the surplus are not systematically deviated from—that is, market prices may deviate slightly from intrinsic prices but never systematically or permanently and therefore do not disturb the process of recreating the surplus. But what determines these

price ratios? This is a question that requires a theory of value—and it appears that Cantillon had a land theory of value.

b. in terms of developing a relationship between the value of land and labor that is needed to have a land theory of value, Cantillon argued that the value of the day's work has a relation to the produce of the soil, and that the intrinsic value of anything may be measured by the quantity of land used in its production and the quantity of labor which enters into it, in other words by the quantity of land which the produce is allocated to those who have worked upon it. This argument has 5 parts:

(1) the intrinsic value of a commodity is made up of , say $1Ld + 1L \rightarrow 30c$

(2) land produces corn and labor consumes corn, say $1Ld \rightarrow 20$ corn unassisted and labor produces 10 corn and consumes 5 corn to stay alive and uses the other 5 corn for seed.

(3) thus $1L = \frac{1}{2} Ld$

(4) there the intrinsic value of a good can be reduced to land and we can also say land produces labor $-1.5 Ld \rightarrow 30c$ or the intrinsic value of $30c$ is $1.5 Ld$ and the surplus or rent is $20c$ or one unit of land ($1 Ld$).

(5) this suggests that price ratio of two goods is determined by the quantity of land embedded in their production. However, Cantillon never really went this far in arguing that only land is the regulator of value in exchange.

c. This last point brings out a particular problem in Cantillon as to whether the laborer produces a surplus, which the capitalist farmer can capture as profit. If the laborer does produce a surplus – profit for the farmer then the value of a commodity would seem to consist of land, labor, and profit ; and moreover, it would not appear that the land produces all the surplus. To get around

the problem, Cantillon assumed that labor did not produce a surplus while at the same time the farmer was also able to get profit by obtaining some of the rent of the land. Thus the capitalist farmer does not produce a surplus but claims part of land-output-surplus and calls this profit. Thus the capitalist farmer gets profit only because of his place in the scheme of production not because he undertakes production. Hence profits are only rent but under a different name. It should also be noted that Cantillon did not believe that artisans and merchants generated a surplus and thus could get profits.

3. Cantillon now turns to the utilization of the surplus. He shows very clearly that variations in landlords consumption patterns have a decided impact on the consumption of total goods and the total amount of goods produced and on the level and composition of employment:

a. The landlord, who has at his disposal the surplus, is the principal agent in the charges which may occur in demand. If a lord changes his mode of living—wanting more horses less servants—the number of artisans and laborers who worked to maintain them would have to decline.

Moreover there will be much corn for the needs of the remaining inhabitants and not enough hay for the horses. Thus the price of hay will increase and price of corn decline, resulting in the capitalist farmers shifting their use of land from corn to hay. In this way the fancies of landowners determine the use of land and bring about the variations of demand which cause variations in market prices and thus a reallocation of land usage by the capitalist farmer.

b. Cantillon shows very clearly that changes in the production sphere to accommodate new consumption pattern is accomplished through variations in prices (and profits). Moreover in showing this, Cantillon also clearly showed that the production and reproduction of the surplus and the distribution of the surplus is a circular process in which the various classes of society are

necessarily connected. Thus the recreation of the surplus is also simultaneously the recreation of the classes in society.

Francois Quesnay and the Physiocrats

1. Economists have generally traced the origin of Classical production models to Quesnay's *Tableau Economique*. However, it is quite clear that many (if not most) of the essential aspects of Quesnay's model can be found in previous writers. Petty appears to have been the first person to clearly articulate the notion of surplus. He argued that the surplus was "corn" which was extracted by the landlords as rent. Cantillon adopted this view of the surplus and argued that all the classes and inhabitants of a state live at the expense of the Proprietors of Land. Each proprietor will either manage his land himself, or rent it to one or more farmers. The subsistence of the farmers and laborers must then be deducted, and the surplus goes to the proprietor. Merchants, artisans, and professional people of all sorts, live off part of the surplus, which the proprietors pay them in return for their services. This notion of surplus brought forth a number of crucial points that have been with Classical Political Economy and classical production models ever since:
 - a. Classes: both Petty and Cantillon used classes to organize, in part, their economic analysis. That is, classes were used to collectivize certain kinds of economic activities, such as production and consumption. For example, Petty argued that peasant farmers engaged in production while the landlords extracted the surplus production from this class in the form of rent. Cantillon argued that the capitalist class-farmers produced the output from which the surplus is derived while the landlords determine the composition of total commodities produced through their control of the surplus output.

- b. Origin of the surplus: both Petty and Cantillon argued that the surplus came solely from the land; that is the farmers was the only class which produced a surplus, even though a class of artisans who engaged in manufacturing was assumed to exist. Consequently the notion of the rate of profit was not used in their analysis. It should be noted that the origin of the surplus was a non-produced means of production.
 - c. Theory of value: both Petty and Cantillon were concerned with the ratio at which various commodities exchanged. To simplify their analysis, they both argued that produced commodities could be reduced to their land and labor contents and that labor could be reduced to land. Thus not only would commodities exchange according to their embodied land, but the surplus producing nature of land would be clearly evident.
 - d. Allocating the surplus: Cantillon argued that the demands of the landlords determined the allocation of the surplus between the different areas of production. In particular, he showed how, in a free market prices would serve to allocate the surplus so as to satisfy the demands of the various economic classes. Later the allocation of the surplus for expansion became a dominant concern of the Classical economists.
2. Quesnay designed the *Tableau Economique* to show the advantages of the organization of production on a capitalistic basis. Moreover, the *Tableau* embodied Quesnay's and the Physiocrats view of "economic" society, especially in terms of the classes and their relations to production, the origin of the surplus, and economic interdependence and reproduction.
- a. Classes: The Physiocrats were among the first to use the concept of social classes in economic analysis. They distinguish between three classes:

- (1) The *productive class* is that which brings about the regeneration of the nation's annual wealth through the cultivation of its territory, which advances the expenses which agricultural work entails, and which annually pays the revenue of the proprietors of the land. We include within this class all the work done and all the expenses incurred up to the sale of the products at first hand; it is through this sale that the value of the annual reproduction of the nation's wealth is ascertained.
- (2) The *class of proprietors* includes the sovereign the owners of land, and the tithe-owners. This class subsists on the revenue or *net product of cultivation*, which is paid to it annually by the productive class, after the latter has first deducted, out of the reproduction which it causes to be annually regenerated, the wealth necessary for the reimbursement of its annual advances and for the maintenance of the wealth it employs in cultivation.
- (3) The *sterile class* is composed of all the citizens who are engaged in providing other services or doing other work than that of agriculture, and whose expenses are paid by the productive class, and by the class of proprietors, which itself draws its revenue from the productive class.
- It should be noted that Quesnay distinguished his classes according to their economic activities- the reproductive class is defined in terms of its function in the process of production and reproduction of the nation's annual wealth, while the other two classes are defined in terms of their function in the circular process.
- b. The origin of the surplus: Quesnay postulated that the surplus originated in the agricultural sector. Two arguments were developed to support this position: (i) that the surplus is due to the gift of mother nature; and (ii) that a "value surplus" (that is rent) exists only in agriculture. (The weaknesses of both of these arguments are quite evident and will be discussed below.) Equipped

with such a postulate, the Physiocrats then expanded their central thesis that it is only the labor which is performed in agriculture which is productive labor which is performed in agriculture is the only sector which yields a surplus.

- c. Economic interdependence and reproduction—the Physiocrats were one of the first (see Cantillon) to analyze economic interdependence in the society as a whole. The *Tableau Economique* is precisely a description of the interdependence between the three classes of society. Economic interdependence implies that no class can exist without the others; it also implies that the relation between the classes is an economic one. Moreover, economic interdependence also implies the reproduction of economy through the “reproduction” of the classes. As will be noted below, the notion of economic interdependence and reproduction undermines the Physiocratic view that surplus originates only in the agricultural sector.
3. Quesnay developed his model, the *Tableau Economique*, to show clearly the economic interdependency of the economic classes and to show the economic impact of different kinds of government policy. Therefore his presentation had two parts: first he presented an ideal picture of the French economy in which all land was brought under cultivation and large-scale capitalist agriculture, using the most productive methods then available, had been widely introduced (which means productivity and the surplus is due to both land and investment and not to just land alone) and secondly the impact of variations in government policy from those Quesnay assumed the government to be practicing in the first part are presented. Because we are primarily interested in the *Tableau Economique* by itself, the second part of Quesnay’s discussion will not be dealt with.

- a. To set his model, Quesnay assumed that the maximum amount of investment into agricultural production had taken place. As a result, he assumed that net investment would be zero. In addition, in setting up his initial zig-zag model (this model was used in the first three editions of the *Tableau Economique*), Quesnay assumed that the productive class start with 600l of working capital and 600l of money and the sterile class starts with 300l of working capital. Finally Quesnay assumes that the productive class produces 1200l of agricultural produce while the sterile class produces 600l of manufactured commodities.

(1) Now Quesnay's zig-zag model can be delineated

| | Productive Class | Proprietors Class | Sterile Class |
|------------------------------|---|--|---|
| (i) initial position | 300 _{l_a} agricultural inputs 300 _{l_f} manufacture inputs 600 _{l_m} money | 300 _{l_a} food stuff 300 _{l_f} manufactured goods | 300 _{l_a} agricultural inputs |
| (ii) production period | 1200 _{l_a} agricultural output | foodstuff and goods consumed 600 _{l_m} for rent received | 600 _{l_f} manufacture output |
| (iii) exchange periods | 600 _{l_a} agricultural output kept 600 _{l_a} agricultural output for exchange | 600 _{l_m} money | 600 _{l_f} manufacture output |
| (1) | 300 _{l_m} 300 _{l_a} | 300 _{l_a} 300 _{l_m} | 300 _{l_f} 300 _{l_m} |
| (2) | 150 _{l_m} 150 _{l_a} | | 150 _{l_f} 300 _{l_m} |
| (3) | 75 _{l_m} 75 _{l_a} | | 75 _{l_f} 300 _{l_m} |
| Etc. | | | |
| (iv) final exchange position | 600 _{l_a} 300 _{l_f} 300 _{l_m} | 300 _{l_f} 300 _{l_a} | 300 _{l_a} 300 _{l_m} |

(2) given the model two points can be made:

(a) the final exchange position is not the same as the initial position. The productive class has 300_{l_a} in excess and 300_{l_m} in deficit, while the sterile class has 300_{l_m} in excess. Quesnay implicitly assumed that the 300_{l_m} would be spent on 300_{l_a}, thus making the final exchange position:

(iv) $600l_m$ $300l_a$ $300l_f$ $300l_f$ $300l_a$ $600l_a$

(b) it appears in the model that the sterile produces a surplus since $300l_a \rightarrow 600l_f$: but this paradox is solved once it is realized that the sterile sector starts with $600l_a$ instead of $300l_f$.

b. Quesnay corrected the above problems in his model by redesigning it in the following manner:

| | Productive Cass | Proprietors Class | Sterile Class |
|---------------------------------|--|--------------------------|-------------------------|
| (i) initial position | $300l_{rm}$ raw material input $300l_{fs}$ food stuffs $300l_f$ manufactured goods $600l_m$ money | $300l_{fs}$ $300l_f$ | $300l_{rm}$ $300l_{fs}$ |
| (ii) production | $900l_{fs}$ $600l_{rm}$ | $600l_m$ | $600l_f$ |
| (iii) exchange | $300l_{fs}$ kept $300l_{rm}$ kept $600l_{fs}$ for exchange | $600l_m$ | $600l_f$ for exchange |
| (1) | $300l_m$ $600l_{fs}$ $600l_{rm}$ | $300l_{fs}$ $300l_f$ | $300l_f$ $300l_m$ |
| (2) | $600l_{fs}$ $600l_{rm}$ $300l_f$ | $300l_{fs}$ $300l_f$ | $600l_m$ |
| (3) | $600l_m$ $300l_{fs}$ $300l_{rm}$ $300l_f$ | $300l_{fs}$ $300l_f$ | $300l_{fs}$ $300l_{rm}$ |
| (iv) final position of exchange | $300l_{rm}$ $300l_{fs}$ $300l_f$ $600l_m$ | $300l_{fs}$ $300l_f$ | $300l_{fs}$ $300l_{rm}$ |

c. With this final delineation of the model, the following points can be made:

(1) the *Tableau Economique* clearly (?) portrays the Physiocratic view s that the agricultural sector produces a surplus in the form of rent that goes to the proprietors class, while the sterile class produces no surplus. Consequently, the notion of profit and the rate of profit are not found, except in some fleeting references to the capitalist farmer. The amount produced by the sterile class is determined by the total amount spent on manufactured foods by the productive and proprietors classes.

(2) the surplus is devoted entirely to luxury consumption (which is necessarily the case since net investment is assumed to be zero.) Thus the *Tableau Economique* represents an economic system which is engaged in Marxian simple reproduction.

(3) the distribution of the output to the various classes/sectors through the mechanism of market exchange occurs in such a manner that the final position of exchange is the same as the initial position. Thus the economic interdependence and reproduction of the various classes is effectuated through exchanges in the market. Consequently any alteration in the distribution of total output through government policy will affect all the classes because of their interdependency. Moreover, because distribution is done through markets, prices are now a way to represent/describe the relationships between the classes of society. The exchange values of commodities on the market represent the social relationships which characterize the economic system and in particular the way in which the social product is appropriated by each class.

Distribution can no longer be regarded as a technical process.

4. Before proceeding to the later Classical surplus models of Smith, Ricardo and Marx, Quesnay's statement that the sterile class produces no surplus needs to be looked at more closely.

a. As noted above Quesnay and the Physiocrats argued that only the agricultural sector produced a physical surplus. This statement can be investigated in the following manner:

(1) Let Q_{fs} be the total output of foodstuff, Q_{rm} the total output of raw materials and Q_f the total output of manufactured goods. Also let q_{ij} be the total amount of the j th input needed to produce the i th output.

(2) the corresponding production model now takes on the following form:

$$q_{fs-rm,fs} + q_{fs-rm,rm} + q_{fs-rm,f} \rightarrow Q_{fs} + Q_{rm}$$

$$q_{f,fs} + q_{f,rm} \rightarrow Q_f$$

(3) from above we know that $q_{fs-rm,fs} + q_{f,fs} < Q_{fs}$ and that $q_{fs-rm,rm} + q_{f,rm} = Q_{rm}$, that is the productive class produces a physical surplus of foodstuff while producing no surplus of raw materials. We also know that $q_{fs-rm,f} < Q_f$ because the class of proprietors consumes manufactured goods. Therefore we must conclude, contrary to Quesnay's supposition that the sterile class produces a physical surplus although possibly not a value surplus.

b. This conclusion is not altered if prices are introduced since Quesnay assumed that the value of the surplus of foodstuffs and raw materials equaled the rent paid to the proprietors. That is, the sterile class use 600l worth of inputs to produce 600l_f, thus implying that it does not produce a surplus in value terms. However, we find that only 300l_f is used up in production while 600l_f is produced. Since it is not conceptually possible to look at a single sector in an interdependent economy, we must conclude that the sterile sector does not accrue any of the value of the surplus only because of the distribution assumption made and not because of some inherent characteristic of the sterile sector.

c. Consequently we must conclude that the Physiocratic view of the origin of the surplus flounders because they assumed an interdependent reproducing economic system.

d. one final point can be derived from the above model is that the physical surplus: $Q_{fs} - q_{fs-rm,fs} - q_{f,fs} = q^*_{fs}$ and $Q_f - q_{fs-rm,f} = q^*_f$ is consumed by the landlords as luxury consumption. This of course follows from the assumption that the economic system has already reached the desired level of output.

CHAPTER 3

ADAM SMITH

Life

Adam Smith was born in the small town of Kirkcaldy, on the eastern coast of Scotland, close to Edinburgh in 1723. The young Smith had a placid childhood, raised by his mother with the help of relatives – a moderately well-to-do family of landowners – until 1737, when he moved to Glasgow in order to attend the local university. At the time, fourteen was not an uncommon age to enter university, which was in fact a sort of upper secondary school. The young Adam had already studied some Latin in Kirkcaldy, and was immediately admitted to Greek lectures; he also took lessons in logic, in natural philosophy, in mathematics and physics, and in moral philosophy. Later in 1740, Smith went to Oxford for six years and left without a degree. He returned to Scotland where he spent two years studying on his own and writing some essays on literary and philosophical subjects.

For three years, from 1748 to 1751, Smith held public lectures in Edinburgh on rhetoric and English literature, with some success in terms of audience and finance. On the strength of the fame obtained with these lectures, in 1751 Smith became a professor at Glasgow University, first holding the chair of logic and subsequently the moral philosophy chair. This involved lecturing on natural theology, ethics, jurisprudence and, in the same set of lessons, politics and political economy. In 1759, Smith published *The Theory of Moral Sentiments* in which he discussed issues of self-interest, the invisible hand, and sees the economy like a machine. In 1764 he resigned from the University and undertook to tutor the young Duke of Buccleuch which involved traveling to Europe and meeting various thinkers including the Physocrats. In

1767 he returns to Scotland and works on *The Wealth of Nations* which is published in 1777. In 1778, Smith was appointed commissioner of customs for Scotland and thus moves to Edinburgh and lives in the area called Cannongate. He dies in 1790 and is buried in Edinburgh.

Background

1. Before looking at value, price, profits, and growth in Smith, let us eliminate a common view attributed to Smith's view of the working of the economy. It is argued that:

In decentralized economies a large number of individuals make economic decisions which, in the light of market and other information they consider most advantageous. They are not guided by the social good nor is there an overall plan in the unfolding of which they have pre-assigned role. It was Adam Smith who first realized the need to explain why this kind of social arrangement does not lead to chaos. Millions of greedy, self-seeking individuals, in pursuit of their own ends and mainly uncontrolled in these pursuits by the State, seem to 'common sense' assure recipe for anarchy. Smith not only posed an obviously important question, but also started us economists off on the road to answering it. General equilibrium (current economics) is near the end of that road."

However a close look at Smith would reveal that he never speaks of the 'invisible hand' considered as a metaphor for the efficient allocation via the price mechanism.

a. In the *Theory of Moral Sentiments* Smith discusses the unintended beneficence of the rich who only select from the heap what is most precious and agreeable. They consume little more than the poor, and in spite of their natural selfishness and rapacity, though they mean only their own convenience, though the sole end which they propose from the labors of all the thousands whom they employ, be the gratification of their own vain and insatiable

desires, they divide with the poor the produce of all their improvements. They are led by an invisible hand to make nearly the same distribution of the necessities of life, which would have been made, had the earth been divided into equal portions among all its inhabitants, and thus without intending it, without knowing it, advance the interest of the society, and afford means to the multiplication of the species. When Providence divided the earth among a few lordly masters it neither forgot nor abandoned those who seemed to have been left out in the partition.

Also in the *Wealth of Nations*, Smith discusses the invisible hand in a passage in which he suggests that restrictions against the export of capital are not necessary if people are allowed to follow their own interests because

the study of his own advantage naturally, or rather necessarily, leads him to prefer that employment which is most advantageous to the society.

Thus there is no question of the ‘invisible hand’ causing anyone to do anything other than he originally intended, nor are the outcomes any different from those expected. Actions simply have position externalities, which is quite different from what is usually intended by the action of the market in coordinating *conflicting* individual actions.

b. Smith does deal with the problem of ‘coordinating conflicting individual actions’, not in his discussion of the invisible hand, but in his discussion of the applicability of self-interest to a market economy with division of labor. Smith’s entire economic and philosophic theory is based on one simple proposition:

as we have no immediate experience of what other men feel, we can form no idea of the manner in which they are affected, but by conceiving what we ourselves should feel in

the like situation. Though our brother is upon the rack, as long as we ourselves are at ease, our senses will never inform us of what he suffers (*Theory of Moral Sentiments* p.9).

It then follows that “Everyman is, no doubt, by nature, first and principally recommended to his own care; and as he is fitter to take care of himself than of any other person, it is fit and right that it should be so. Every man, therefore, is more deeply interested in whatever immediately concerns himself, than in what concerns any other man” (Ibid. pp. 82-3). Thus, self-interest is imposed by the limit placed on man’s information about others; he has no other basis for action. But, Smith also takes as a basic principle “How selfish so ever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it.” But, our senses being limited such that “they never did, they never can, carry us beyond our own person, *and it is by imagination only* that we can form any conception of what are his sensations.” (Ibid. p.9).

In such a system “though it may be true, therefore, that every individual, in his own breast, naturally prefers himself to all mankind, yet he dares not look mankind in the face, and avow that he acts according to this principle,” rather, “he must..... humble the arrogance of his self-love, and bring it down to something which other men can go along with...” (Ibid. p. 83). Here, quite clearly, the aggregate results of social behavior are not the sum of simple self-interested behavior - here the individual adjusts his behavior to meet social norms, he acts differently – the whole is not the sum of its parts. An external constraint – socially acceptable

behavior limits self-interested behavior. This is no longer a case of a positive externality from self-interested behavior, but a curb on that behavior in order to make it socially acceptable.

When Smith moves to economic problems he naturally retains his basic assumptions concerning man's behavior, and the basic limitations on the empirical knowledge available to him. He had already given an indication of this extension to economic relations in *Moral Sentiments*. "Society may subsist among different men, as among different merchants, from a sense of utility, without any mutual love or affection; and though no man in it should owe any obligation or be bound in gratitude to any other, it may still be upheld by a mercenary exchange of good offices according to an agreed evaluation" (p. 56).

The bridge to the *Wealth of Nations* is completed by substituting the imagined sentiments of others with the imagined sentiments (utility) of the individual concerning the economic goods and services which are acquired through exchange.

Smith assumes that man tends to underestimate certain type of social sentiments and overestimate the future utility of goods. Thus, man suffers from a kind of myopic telescope faculty which leads him to attach more utility to the possession of a good than it can actually produce: "and it is well that nature imposes upon us in this manner. It is this deception which rouses and keeps in continual motion the industry of mankind" (Ibid p.183). This same deception applies to the advantage of a superior situation for "it is chiefly from this regard to the sentiments of mankind, that we pursue riches and avoid poverty" for, Smith argues, it is only under such deception that people should "imagine that their stomach is better, or their sleep sounder in a palace than in a cottage,.... And from whence arises that emulation which runs through all the

different ranks of men,” and produces, “that great purpose of human life which we call bettering our condition.” (p.50).

This provides Smith with an explanation of the desire for economic advancement of the *Wealth of Nations* and in that book he explains what may cause such advancement: the extent of division of labor and the proportion of productive to non-productive labor. Since self-interest was at the basis of the moral philosophy which was used to justify the demand for accumulation, Smith recognized the necessity of demonstrating the consistency of self-interest and division of labor.

In the rude state of society man produced all of his needs himself - he looked after his own interest as Smith’s theory assumed he was capable of doing. A do-it-yourself, man produced only those goods he needed in the quantities he required them.

Division of labor would require specialization. How could one be sure that self-interest would produce specialization such that the self- interested needs of each individual would be met? Since self-interest was based on the premise that others *could not know* your needs, sentiments or desires, surely division of labor would fall because specialization would lead to production of wrong goods in the wrong amounts.

Smith solves the problem by noting that it is incorrectly formulated. Referring to the argument of the *Moral Sentiments* where people adjust their social actions according to the presumed or imagined sentiments of others. Smith notes that it is not to the benevolence but to the self-interest of others that we must look. If everyone acts to serve his own self-interest, recognizing that he depends, under division of labor, on their goods as much as he does on his own, then all will be led to serve the self-interest much as he does on his own, then all will be led

to serve the self-interest of others and will do their best to furnish goods in the proportions and kinds required by others. There is no place for greed or pure selfish behavior in a specialized system. It is here, in the demonstration of the compatibility of self-interest and division of labor that the problem of the coordination of economic activity is to be found. Smith discusses it without reference to price.

In the famous chapter where Smith evokes the butcher and the brewer, he is concerned to demonstrate that it is self-interest “which gives occasion to the Division of Labor” and which gives “the certainty of being able to exchange... the surplus part of the produce of his own labor, which is over and above his own consumption, for such parts of the produce of other men’s labor as he may have occasion for,” and which “encourages every man to apply himself to a particular occupation, and to cultivate and bring to perfection whatever talent or genius he may possess for that particular species of business” (*Wealth of Nations* p.7). Smith’s basic point is not the efficiency of decentralized decision making, but the specialization that results from the division of labor. The problem is not how the price system makes potentially conflicting choices compatible, but to show that the application of the rule of self-interest along with the disposition to truck, barter, and exchange “gives occasion to the Division of Labor”, for otherwise, “everyman must procure to himself every necessary and convenience of life which he wanted” (Ibid. pp. 7-8), for without the division of labor the demand for bettering ones condition cannot be satisfied.

It is also relevant to consider how this process of appealing, not to benevolence, but to self-interest, each individual will be led to ask the most advantageous terms of exchange for his own surplus. But, realizing that he must appeal to his counterparts’ self-interest in accepting the

bargain, this implies that the seller should guarantee to the buyer that he is giving the best terms available from any other supplier. Thus, self-interest leads to behavior which limits pure self-interest, and it also leads to uniform market price.

Self-interest assures that division of labor should take place. Once it has occurred, self-interest leads to a constraint on prices used in the exchange in surplus goods. This is the process of competition, which depends in a classical manner on the freedom of entry, for the constraint on self-interest in setting prices is the ability of a competitor to appeal to the buyer's self-interest by quoting better terms. When Smith does come to discuss prices this process of competition is associated with the relation of market to natural values, *not efficient market allocation*.

Competition, in the sense of the freedom of entry and exit into trade, employment or production is thus based on individual self-interest to achieve the highest price, wage or rate of profit. The necessity of appealing to the others self-interest by assuring that your bargain cannot be beaten leads to a change in behavior of a variety which produces outcomes which were never intended, not in the sense of externalities, but to the extent that they were never foreseen: the producer who invests in a new enterprise because the rate of return is higher discovers that in fact it is not. It is through his theory of natural prices, to which we shall now turn, that Adam Smith shows how conflicting individual actions are handled in the market.

Theory of Natural Prices

a. A theory of prices is, for Adam Smith, an explanation of why commodities exchange at particular ratios- that is for example why 1 dress exchanges for 2 shirts or 1 dress exchanges for 3 books. To explain these ratios Smith adopted a labor value' approach. Once the exchange ratios were explained, then Smith went on to discuss the components and properties of the prices.

b. Labor Value Approach

(1) Smith essentially assumes that labor is the basis for all exchange ratios or relative prices in that their explanation has to somehow relate to quantities of labor. However, he based his explanation on two different labor explanations one involving a primitive society and the other based on a commercial or capitalistic society.

(2) *primitive society*- in this case when there is no class structure or the use of produced commodities to produce commodities, commodities exchange in ratios according to the quantities of labor they contain:

in that early and rude state of society which precedes both the accumulation of stock and the appropriation of land, the proportion between the quantities of labor necessary for acquiring different objects seems to be the only circumstance which can afford any rule for exchanging them for one another. If among a nation of hunters, for example, it usually costs twice the labor to kill a beaver which it does to kill a deer, one beaver should naturally exchange for or be worth two deer. It is natural that what is usually the produce of two days or two hours, should be worth double of what is usually the produce of one day's or one hour's labor. (This of course assumes that skilled in homogenous labor has been reduced to a homogenous equivalent.) In this state of things, the whole produce of labor belongs to the laborer; and the quantity of labor commonly employed in acquiring or producing any commodity, is the only circumstance which can regulate the quantity of labor which is ought commonly to purchase, command or exchange for." (p.65)

(a) To say that production takes place prior to the accumulation of stock means that the laborer only used his/her hands to produce the output- that is, not only did not use any tools in production but also not advanced any foodstuff for consumption.

(b) In this context the exchange ratios or relative prices of commodities can be represented in the following manner:

(i) production would take the following form

15 L \rightarrow 3 Corn

14 L \rightarrow 2 arrows

24 L \rightarrow 4 deer

(ii) exchange price model takes the following form

$$5 L \rightarrow 1 \text{ corn} \quad 5Lw = p_c$$

$$7L \rightarrow 1 \text{ arrow} \quad 7Lw = p_a$$

$$6L \rightarrow 1 \text{ deer} \quad 6Lw = p_d$$

so relative prices or exchange ratios according to Adam Smith would have the following values:

let $p_c = 1$ – that is p_c is the numeraire; then $w = 1/5$; now substituting $w = 1/5$ into the other equations we get

$$p_a = 7/5 \text{ or } 1.4 \text{ units of corn exchange for one unit of unit of arrow}$$

$$p_d = 6/5 \text{ or } 1.2 \text{ corn exchange for a unit of deer}$$

(iii) p_a/p_c the relative price of arrows in terms of corn

(iv) each exchange price is based on the amount of labor (measured in terms of say days) needed to produced the commodity exchanged.

(3) *capitalist society* - in this case, there are classes (workers and capitalists [landlords ignored for now] the former gets wages and the latter profits) , produced commodities are used to produce commodities, and commodities exchange in ratios according to how much labor they can command:

As soon as stock has accumulated in the hands of particular persons, some of them will naturally employ it in setting to work industrious people, whom they will supply with materials and subsistence in order to make a profit by the sale of their work , or by what their labor adds to the value of the materials. In exchanging the complete manufacture either for money, for labor, or for other goods, over and above what may be sufficient to pay the price of the materials, and the wages of the workmen, something must be given for the profits of the undertaker of the work who hazards his stock in this adventure. The value which the workmen , something must be given for the profits of the undertaker of the work who hazards his stock in this adventure. The value which the workmen add to the materials, therefore, resolves itself in this case into two parts, of which the one pays their wages, the other the profits of their employer upon the whole stock of materials and wages which he advanced. He could have no interest to employ them, unless he expected from the sale of their work something more than what was sufficient to replace his stock to him; and he could have no interest to employ a great stock rather than a small on, unless his profits were to bear some proportion to the extent of his stock. In this state of things, the whole produce of labor does not always belong to the laborer. He must in most cases share it with the owner of the stock which employs him. Neither is the quantity of labor commonly employed in acquiring or producing any commodity, the only

circumstance which can regulate the quantity which it ought commonly to purchase, command, or exchange for. An additional quantity, it is evident, must be due for the profits of the stock which advanced the wages and furnished the materials of that labor. Finally the price of a commodity is equal to the quantity of labor which enables the commodity to purchase or *command*. (pp. 65-7)

(a) The first thing that should be noticed is that the price consists of two components – wages and profits; the second thing to notice is that labor does not get all of the output, that is the value of the labor input is not equal to the price or the value of the output; third thing to notice is that produced commodities are used in the production of commodities; finally the price of a commodity is measured in terms of the amount of labor it commands.

(b) Let us first look at some of the above things in the context of a production model.

(i) the capitalist in Smith's model employed two kinds of capital- *fixed capital* which consisted of produced means of production, such as machines and tools, that 'produced' a revenue or profit without changing capitalist, and *circulating capital* which consisted of produced commodities for immediate consumption (or the money equivalent) that produces revenue or profit. In this latter case the circulating capital of the manufacturer consists of money which it pays to its workers in order for them to buy the provisions they need to reproduce themselves.

(ii) To show this model of the production of commodities by means of commodities let us do the following:

$$(a') \quad 3_m + 3_L \rightarrow 18_c$$

$$4_m + 3_L \rightarrow 10_m$$

In this model the machine sector produces machines for itself and for the corn sector. The ‘surplus’ of the system consists of the fixed capital 3 machines and the 18 corn which obviously consists partly of the circulating capital of provisions for workers.

(b’) let us alter the above model by stating that each unit of labor ‘gets’ 1 unit of corn for his/her necessary consumption. Thus the above model could be rewritten as follows if the unit of corn is put in the place of the unit of labor:

$$4_m + 3_c \rightarrow 10_m$$

$$3_m + 3_c \rightarrow 18_c$$

where corn inputs is an explicit representation of circulating capital and the ‘real’ surplus reduces to 3_m and 12_c .

(c) To deal with prices in the Smithian sense, let us construct the following price models based on the above production models:

(i) To develop the price model, the first thing we must do is to introduce the notion of industrial profit and uniform rate of profit. Smith clearly showed that profits *per se* came into existence when the social relationship between property less labor and the capitalist class comes into existence - that is to say profits as a category of income represent a social relationship. However, a closer look at profits reveals that they are predicted on the notion of the surplus in that total output can be divided into the part which replaces the fixed and circulating capital and the part which can be used for accumulation/growth and/or unproductive consumption, and profits consists of this latter part of total output in value form. Since this surplus of output (and value) is generated in all sectors of the economy, including the manufacturing sectors, Smith has clearly stated that, industrial profits exist. Given the existence of industrial profits, Smith went on to

argue that the amount of profits and capitalist/ sector received “bore some proportion to the extent of his stock” and that, in the long period, was the same throughout the economy for all capitalist. This proportion is called the rate of profit and we say that it is uniform throughout the economy. (Why this is the case will be discussed below). [Smith, p. 66]

(ii) The next thing we must do is introduce the notion of wages and the uniform wage rate.

Wages as an economic and income category came into existence according to Smith when the capitalist comes into existence and appropriates the accumulated stocks of commodities, that is appropriated the fixed and circulating capital. Thus the workers are left without any provisions to maintain their existence or any machines and tools to produce the commodities necessary for their existence. Thus the worker must work for the capitalist in order to get a wage (money income) that will provide him/her the means to obtain the consumption commodities necessary to reproduce themselves. Smith then goes on to state (implicitly) that the wages of the worker bear a definite proportion to ‘hours’ worked – called the wage rate - and that this proportion was uniform throughout the economy - thus a uniform wage rate. Thus hours worked times the wage rate provides the worker the wages necessary to survive upon. (This notion also implies that labor can be made homogenous - we will, for better or for worse, adopted this assumption in the models below.)

(iii) Because Smith appears to have the capitalists pay the workers with ‘money’ our first price model will come from model a’ above:

(1’) the model in the gross sense looks like the following:

$$(4_m p_m + 3Lw) (1+r) = 10_m p_m$$

$$(3_m p_m + 3Lw) (1+r) = 18_c p_c$$

(2') dividing through by the level of output to make the model more relevant to price analysis we get

$$(.4p_m + .3Lw) (1+r) = p_m$$

$$(0.167p_m + .167Lw) (1+r) = p_c$$

(3') the model can further be rearranged as follows: let us write our production/ price equations as

$$(0.4p_m) (1+r) + (3w)(1+r) = p_m$$

$$(0.167p_m) (1+r) + (0.167w) (1+r) = p_c$$

now let us write them in matrix form

$$\begin{bmatrix} 0.4 & 0 \\ 0.167 & 0 \end{bmatrix} \begin{bmatrix} p_m \\ p_c \end{bmatrix} (1+r) + \begin{bmatrix} 0.3 \\ 0.167 \end{bmatrix} w (1+r) = \begin{bmatrix} p_m \\ p_c \end{bmatrix}$$

or

$$Ap(1+r) + l_w(1+r) = p$$

Now reworking the model we get

$$P = (I-A)^{-1}Apr + (I-A)^{-1} l_w(1+r) = Hpr + vw(1+r)$$

Now plugging in the numbers we get

$$\begin{bmatrix} p_m \\ p_c \end{bmatrix} = \begin{bmatrix} 1.67 & 0 \\ 0.278 & 1 \end{bmatrix} \begin{bmatrix} 0.4 & 0 \\ 0.167 & 0 \end{bmatrix} \begin{bmatrix} p_m \\ p_c \end{bmatrix} r + \begin{bmatrix} 1.67 & 0 \\ 0.278 & 1 \end{bmatrix} \begin{bmatrix} 0.3 \\ 0.167 \end{bmatrix} w (1+r)$$

or simplifying we get

$$p_m = 0.67p_m r + 0.5w (1+r)$$

$$p_c = 0.278 r + 0.25w(1+r)$$

Now rearranging we get

$$p_m = (0.67p_m + 0.5w)r + 0.5w$$

$$p_c = (0.278p_m + 0.25w)r + 0.25w$$

or

$$\text{Prices} = \text{profits} + \text{wages}$$

Thus we can see that Smith's statement that prices can be divided up into the components of profits and wages has a basis. It can also be immediately noticed that when the rate of profit is positive the value of the labor input is not equal to the price (or labor does not get all of the output in value terms).

(4') to solve for prices we must first notice that we have 4 unknowns p_m , p_c , w , r and only 2 equations; therefore we have to in some manner reduce the number of unknowns to the number of equations before we can solve for anything. First we need a *numeraire* which denotes how we are going to represent (measure) prices – that is the numeraire is our 'money' unit. Let us choose wage rate as our numeraire and set $w = 1$. Second, let us remember that Smith argued that wages must be such that the worker can buy the commodities necessary for reproduction. Thus let us assume that each unit of labor needs 1 unit of corn for reproduction; hence $1L_w = 1p_c$ or $p_c = 1$ since $w = 1$. With w and p_c known we can solve for p_m and r :

$$(0.4p_m + 0.3w)(1 + r) = p_m$$

$$(0.167p_m + 0.167w)(1 + r) = p_c$$

Now substituting we get

$$(0.4p_m + 0.3)(1 + r) = p_m$$

$$(0.167p_m + 0.167)(1 + r) = 1$$

Now reworking the equations we get

$$(0.4p_m + 0.3)(1 + r) = p_m$$

$$\frac{5+r}{1+r} = p_m$$

now substituting and solving for r and p_m we get

$$r = 0.869 \text{ and } p_m = 2.20$$

Looking at p_m we see that it is 2.20 times the price of corn; thus each machine in value terms is equal to 2.2 units of corn in value terms. Since labor needs corn to survive (1 unit of labor needs one unit of corn), the price of machines *commands* 2.2 units of labor (while $p_c=1$ commands only one). This Smithian result is arrived at by setting wages (and wage rate) in terms of the necessary consumption commodity which just happens to be corn our numeraire in this case.

(5') these same results would be obtained if we use production model (b'). In this case 1 unit of corn would be substituted for one unit of labor with the results being

$$(4 p_m + 3p_c)(1 + r) = 10p_m$$

$$(3 p_m + 3 p_c)(1 + r) = 18p_c$$

or converting into pure price equations, we get

$$(0.4 p_m + 0.3 p_c)(1 + r) = p_m$$

$$0.3 p_m + 0.3 p_c)(1 + r) = p_c$$

putting it into matrix form and solving for r , p_m , while $p_c = 1$, we get

$$Ap(1 + r) = p \text{ or } Ap = \lambda p \rightarrow (A - \lambda I)p = 0$$

Solving for λ we get 0.535 thus making $r = 0.869$. Now plugging back into the equations we find that $p_m = 2.20$. Although it cannot be explicitly shown, here (but will be shown under Ricardo), profits and the rate of profit exists because of the productive structure with the class structure

generates profits – this is evident from the determination of $\lambda = (1/(1+r))$ solely in terms of the surplus.

c. Properties of Smith's prices

(1) the first property of Smith's prices is that they are long period prices or what Smith called natural prices:

“the natural price is the central price to which the prices of all commodities are continually gravitating. Different accidents may sometimes keep them suspended a good deal above it, and sometimes force them down even somewhat below it. But whatever may be the obstacles which hinder them from settling in this center of repose and continuance, they are constantly tending towards it.” (p 75)

These prices Smith noted consisted of the natural rates of profits and wages and, more importantly, were such that they ensured that the economy as a whole could continue indefinitely to reproduce itself at that given scale of economic activity. In addition, natural prices are based on a given level of effectual demand defined as the demand of those who are willing to pay the natural price of the commodity, or the whole value of rent, labor, and profit which must be paid in order to bring it thither. [Smith, p. 73]

(2) In counter distinction to the natural price, Smith introduced the notion of the market price which is the actual price of a commodity in the market. The market price of every commodity is regulated by the proportion between quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity which must be paid in order to bring it thither. Such people may be called effectual demanders and their demand effectual demand. When the quantity brought to the market falls short of the effectual demand,

the market price rises above the natural price; when it exceeds the effectual demand, the market price below the natural price. Finally, when the quantity brought to the market just equals the effectual demand, the market price and the natural price coincides. This description of the movement of the market price to the natural looks like supply and demand of conventional theory, but it is not. The reason is that the neoclassical foundations of the demand and supply schedules did not exist for Smith. Hence his description of the convergence must be left at simply being vague. If monopoly exists, then market price can be above the natural price.

(3) A second property Smith attributed to his natural prices is that it is obtained by adding together natural (long period) profits and wages, that is if the long period prices, wage rates, and rate of profit are known, then we have the following:

$$p_m = (0.67 p_m + 0.5 w) r + 0.5 w$$

$$p_c = (0.278 p_m + 0.25 w) r + 0.25 w$$

or,

$$2.20 = ((0.67)(2.20) + (0.5)(1)(0.869) + (0.5)(1))$$

$$1 = [(0.278)(2.20)+(0.25)(1)] [0.869] + 0.25(1)$$

However, this is not exactly what Smith meant; rather the natural price of any commodity is determined solely by adding together wages and profits. That is, Smith theory of natural prices was an ‘*adding-up-theory*,’ the implications of which shall be noted below. However, it should be obvious that ‘*adding-up-theory*’ of natural prices is inconsistent with the surplus model of prices developed above. This point will not be pursued here – rather we shall discuss it when we deal with Ricardo.

(a) the first implication of Smith's adding up theory is that wages and profits (or the wage rate and rate of profit) are determined independently of each other; and

(b) the second implication is that an increase in wages (or the wage rate) will increase all prices and leave the rate of profit unaffected (or the profit rate can vary thus varying the price without affecting wages)

d. Component parts of the natural price

(1) wages – the total wage or wage rate is determined by supply and demand forces of a sort and by bilateral negotiations between workers and masters:

(a) wage rates depend on the contract made between the worker and the master; but since the master has the upper hand he/she can reduce wage rates to 'subsistence level' for the worker and the family. [Smith, p. 83, 85, 89]

(b) however it is necessary for wages to be reduced to the lowest subsistence level. If the rate of demand for the labor is greater than the rate of growth of labor force, then the wage rate in the long period will be above the lowest 'subsistence level,' and of course the opposite conditions will drive it down to that level—issue of wage fund growth. The wage fund equals the stock of goods for workers (at a given rate of profit). If the number of workers increase relative to the wage fund, then the wage rate falls and vice versa.

[Smith, p. 86]

(c) the actual money wage rate is determined by the demand for labor and by the prices of the commodities labor buys (this statement it should be noted can contradict the adding-up theory of prices). That is at different wage rate the worker buys a different set of goods. [Smith, p. 103]

(d) the wage rate is essentially determined independently off the rate of profit and that is uniform because Smith assumed labor mobility and the desire of workers for the greatest standard of living.

(e) wage rates increase so do prices [Smith, p. 104]

(2) profits

(a) Smith sees the determination of the rate of profit as the amount of capital stock in existence; and as the stock increases the rate of profit falls and vice versa (determination of the rate of profit is different from wealth, although both are based on stock [Smith, p. 105]:

“the increase of stock tends to lower profit. When the stocks of many rich merchant are turned into the same trade, their mutual competition naturally tends to lower its profit; and when there is a like increase of stocks in all the different trades carried on in the same society, the same competition must produce the same effect in them all.” (p 105)

“As capitals increase in any country, the profits which can be made by employing them *necessarily* diminished. It becomes gradually more and more difficult find within the country a profitable method of employing any new capital. There arises in consequence a competition between different capitals, the owner of one endeavoring to get possession of that employment which is occupied by another. But upon most occasions, he can hope to jostle that other out of this employment, by no other means but by dealing upon more reasonable terms. He must not only sell what deals in somewhat cheaper, but in order to get it to sell, he must sometimes too buy it dearer. Both actions reduce the rate of profit.”

(b) the rate of profit is uniform because of the assumed free mobility of capital and the inherent pursuit of the highest rate of profit possible:

“The whole of the advantages and disadvantages of the different employments of labor and stock must, in the same neighborhood, be either perfectly equal or continually tending to equality. If in the same neighborhood there was any employment evidently either more or less advantageous than the rest, so many people would crowd into it in the one case, and so many would desert it in the other, that’s its advantages would soon return to the level of other employments. This at least would be the case in a society where things were left to follow their natural course, where there was perfect liberty, and where every man perfectly free both to chase what occupation he thought proper, and to shun the disadvantageous employment,” (Smith, p.116)

3. Accumulation and Growth in Adam Smith

a. accumulation and Growth in *Wealth of Nations* is extensively dealt with; thus it is not possible to provide you a detailed exposition of it. Rather what I want to do instead is to present a Smithian model of growth and accumulation and discuss the distribution of the surplus between classes and between categories of workers within this context.

b. Let us return to the production model that was presented above:

$$4_m + 3L \rightarrow 10_m$$

$$3_m + 3L \rightarrow 18_c$$

and 1 unit of labor needs one unit of corn to survive

(1) Given this level of output we see that it takes 0.4_m to produce one machine, $0.3L$ to produce a machine, 0.167_m to produce a unit of corn. These *production coefficients* can be written as 0.4_{mm} , $0.3L_m$, 0.167_{mc} , and $0.167L_c$ where the second letter indicates what industry the coefficient belongs to.

(2) Working with the coefficients we can rewrite our production model as follows replacing labor with corn

$$0.4_{mm}(10_m) + 1/6_{mc}(18_c) < 10_m$$

$$0.3L_{cm}(10_m) + 1/6L_{cc}(18) < 18_c$$

or

$$4_m + 3_m = 7_m < 10_m$$

$$3_c + 3_c = 6_c < 18_c$$

or there is surplus of inputs over what is needed to reproduce the production process.

(3) Now let us look at growth in this model - specifically let us assume that labor is freely available and that we want to see the conditions under which the 'economy' would 'growth' the fastest. Let us also assume that the production coefficient remain the same. Saving for accumulation is assumed to be natural (Smith, p. 337, 341]

(4) Let us assume that all the surplus machines are allocated to the production of corn – thus we would get double the output of corn:

$$4_m + 3L \rightarrow 10_m$$

$$6_m + 6L \rightarrow 36_c$$

or

$$0.4_{mm} (10_m) + 1/6_{mc}(36_c) = 10_m$$

$$0.3L_{cm}(10_m) + 1/6L_{cc}(36_c) < 36_c$$

Thus we see in this example that if all the 'surplus' machines were devoted to producing corn, the corn surplus would have a once over increase (from 12 to 27) but that would be it. Hence for

the economic system to grow continually, it is obvious that some of the ‘surplus’ machines should be devoted to their own reproduction.

(c) Now let us assume that all the surplus machines are devoted to the production of machines

(i) in round one the output of machines would raise to 17.5 and our ‘surplus’ of corn reduces to 9.75 while the surplus of machine raises to 7.5

$$7_m + 5.25L \rightarrow 17.5_m$$

$$3_m + 3L \rightarrow 18_c$$

(ii) now let us again devote all the ‘surplus’ machines to the production of machines; so in the second round we find that the output of machines increases to 36.25 machines, the surplus of machines to 18.76 and the surplus of corn to 4.125:

$$14.5_m + 10.875L \rightarrow 36.25_m$$

$$3_m + 3L \rightarrow 18_c$$

(iii) now if we again devote all the ‘surplus’ machines to the production of machines arrive at the following situation:

$$20_m + 15L \rightarrow 50_m$$

$$3_m + 3L \rightarrow 18_c$$

where the surplus of machines is 27, there is no surplus of corn, and after each production cycle the economy has an excess of 22 machines. (It should be noted that to get to this position an excess of machines was also produced the excess being 13.25.) Because the labor force cannot be expanded beyond 18 (the total output of corn), it is not in this instance for growth to continue

in the machine industry; thus the economy will now continue to produce the same volume of outputs and along with this an excess of useable machines of 22.

(c) what the above 2 examples show us is that, given production coefficients which do not change, if one industry grows faster than another, a situation is eventually reached that prevents growth from occurring further – that is either a surplus of corn or machines has reached zero.

Therefore, if growth is to continually occur under these conditions, then each industry has to grow at the same rate. To determine to maximum rate of growth for economy as a whole and for each industry, give the production coefficient and the assumption that $1L=1_c$, we do the following:

$$\begin{bmatrix} 0.4mm & 0.167cm \\ 0.3mc & 0.167cc \end{bmatrix} \begin{bmatrix} Y_m \\ Y_c \end{bmatrix} (1 + g) = \begin{bmatrix} Y_m \\ Y_c \end{bmatrix}$$

solving we find that $g = 0.869$ (the same as $r!$), $Y_c = 1$, $Y_m = 1.23$

c. in inspection this analysis of growth, we quickly see that the ‘real’ surplus of the system does not include all the corn produced - rather because of the above assumption made some of the corn produced forms part of the necessary inputs. However, the remainder of the corn and rest of the machines actually formed surplus that is available for growth. Working from this point the following conclusions can be stated:

(1) all the surplus goes to the capitalist class as profits (not explicitly shown here- but will show this later in the course starting with Ricardo).

(2) if the necessary consumption bundle increases ($1L=1_c$ to $1L=2_c$), the production coefficients increase, the surplus declines, profit and profit rates decline, and the maximum

growth rate for the economy declines (again this will be shown explicitly later in the course starting with Ricardo).

(3) the capitalist can devote their accumulated surplus to two distinct activities – employing productive workers and employing unproductive workers: if the capitalist devotes any of his/her surplus to employing unproductive workers, the growth rate of the economy declines (although the rate of profit remains unchanged).

- (a) “There is one sort of labor which adds to the value of the subject upon which it is bestowed: there is another which has no such effect. The former, as it produces a value, may be called productive; the latter, unproductive labor. Thus the labor of a manufacturer adds generally to the value of the materials which he works upon, that of his own maintenance, and of his master’s profit. The labor of a menial servant on the contrary adds to the value of nothing.” (Smith, p 330)
- (b) “Both productive and unproductive laborers are all equally maintained by the annual produce of the land and labor of the country. This produce can never be infinite, but must have certain limits. According, therefore, as a smaller or greater proportion of it is in any one year employed in maintaining unproductive hands, the more in the one case and the less in year’s produce will be greater or smaller accordingly; the whole annual produce being the effect of productive labor.” (Smith, p. 331)
- (c) “The proportion between capital (that is, profits devoted to capital) and revenue (that is, profits devoted to luxury) seems everywhere to regulate the proportion between industry and idleness. Whenever capital predominates, industry prevails; wherever revenue, idleness. Every increase or diminution of capital, therefore, naturally tends to increase or

diminish the real quantity of industry, the number of productive hands, and consequently the exchangeable value of the annual produce of labor of the country, the real wealth and revenue of all its inhabitants. Capitals are increased by parsimony, and diminished by prodigality and misconduct.” (Smith, p. 337)

d. Before leaving Smith and his views on growth, we must point out that his discussion/interest in allocation of commodities to uses as inputs was done so in a manner as to increase the economy’s growth rate and the amount of the surplus as much as possible. This allocation takes place in the market and through prices, and it will be shown later that when $r = g$, prices are such that the allocation of the output will be such as to make the growth of the surplus as large as possible.