SUBSISTENCE AND SURPLUS
—ELEMENTS OF CLASSICAL AND MODERN MACROFOUNDATIONS—

David Goalstone

For Volume 2 of: Macrofoundations—Survival Conditions Analysis
This is a ‘recapitulation’ chapter, bringing together threads from Volume 1.
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nature’s net output – social subsistence = available surplus
net output – social subsistence = social surplus
net output – farm-sector subsistence = agricultural surplus
net output – working-class subsistence = capitalistic surplus
Man in this world has only three original needs: (1) that of his subsistence, (2) that of his preservation, and (3) that of the perpetuation of his species.

—Marquis de Mirabeau and Francois Quesnay, *Rural Philosophy* (1763)
...we must consider the common weal in terms of its essence, and humanity as a whole in terms of its roots, subsistence. All moral and physical parts of which society is constituted derive from this and are subordinated to it. It is upon subsistence, upon the means of the subsistence, that all the branches of the political order depend.

—Marquis de Mirabeau and Francois Quesnay, *Rural Philosophy* (1763)

The principal object of this science is to secure a certain fund of subsistence for all the inhabitants, to obviate every circumstance which may render it precarious...

—Sir James Steuart, *Principles of Political Economy* (1767)

Political economy, considered as a branch of the science of a statesman or legislator proposes...first, to supply a plentiful revenue or subsistence for the people, or more properly to enable them to provide such a revenue or subsistence for themselves...

—Adam Smith, *Wealth of Nations* (1776)
1. **FOUR SURPLUS CONDITIONS**

Surplus analysis begins with Francois Quesnay and Sir James Steuart. Quesnay used value theory as a springboard for his theory of society. Eventually, Ricardo and Marx did something comparable. Steuart used anthrodemography as a springboard for an evolutionary theory of society. This was ignored in political economy but was used in anthropology without knowing its source.

Steuart’s analysis is in the form of a brilliant thought experiment. Let us use a corn model to flesh some of it out.

Early humanity is in a state of nature. To survive, human groups must gather the fruits of nature. Like any animal population the size of the human group will be limited by the available means of subsistence.

This gives us the first surplus condition. Let us define it for wild corn. Subtract replacement wild seed from the spontaneous output to get nature’s net output. Define social subsistence as subsistence consumption per person times the population. Their difference is the available surplus:

\[
\text{nature’s net output} - \text{social subsistence} = \text{available surplus}
\]

As long as there is a surplus the area can support a larger human group. If a deficit emerges, the population will shrink, migrate or both. Humanity has spent most of its existence under the discipline of this condition!

Now Steuart introduces food production. The secrets of domestication are gradually learned, starting, let us say, with corn. Humanity adds its labor to the action of nature to produce corn. Subtract replacement seed from output to get net output. This gives us the second surplus condition:

\[
\text{net output} - \text{social subsistence} = \text{social surplus}
\]

With the discovery of food production population exceeds the limit set in a state of nature. But the size is still limited by the available means of subsistence.

As agricultural and non-agricultural knowledge increases, non-agricultural specializations emerge. Farmers produce surplus corn to supply them with food and raw materials. This gives us the third surplus condition:

\[
\text{net output} - \text{farm-sector subsistence} = \text{agricultural surplus}
\]

During Steuart’s life agricultural surplus was very limited in most places. Typically, about 80 percent of a population was still agricultural. England was a great exception, needing less than half of its population in agriculture in 1750.

The fourth surplus condition is well known, from Karl Marx. Now we suppose agricultural surplus is no longer a limiting factor and capitalism reigns supreme:

\[
\text{net output} - \text{working-class subsistence} = \text{capitalistic surplus}
\]

Let us use these conditions as a way to understanding our roots and progress.
2. **STATE OF NATURE**

All forms of life in a state of nature are engaged in a Darwinian struggle for existence. Only one form—humanity—developed beyond its animal nature.

Early humans gradually learned to exert some control over nature. This can be studied under four headings: animal existence, tool making, migration and ecocide. These are all within a state of nature because nature is still providing all of the means of subsistence. Each can be understood within surplus analysis.

Let us turn the first surplus condition into an inequality. In order for available surplus to exist, nature’s net output must exceed social subsistence. Thus:

\[
\frac{\text{nature’s net output}}{\text{subsistence per person}} > \text{population}
\]

This is the first survival condition faced by humanity.

Like all animals, humans had a tendency to reproduce up to this condition. Subsistence was gathered from wild plants and trees in a warm climate. The arrival of a competitor, adverse weather or a disease killing the means of subsistence would thin-out population by reducing food available per person. The arrival of a predator or a killer disease would thin-out population directly. Darwin’s analysis of ‘survival of the fittest by means of natural selection’ was brutally true. Early humanity was just one of many animals found on the earth.

Humanity began to take its destiny in hand with the invention of simple tools of stone, bone and wood. The diet expanded to include animals and fish. Once fire-making was learned, cooking allowed humans to consume a higher percent of animal bodies. Fire gave humanity a weapon against predators. Thus, more of nature’s output became a source of food and human population increased.

With population growth, human groups pressed against the carrying capacity of their land. This could be resolved by dieoffs, bloodshed or migration of part of the group. Migration to neighboring land was the obvious solution if it could support human populations. If such land could not, the band was in serious trouble. Avoiding dieoffs or bloodshed required trekking into the unknown. Armed with primitive tools and fire, the group had some capacity to carve out a new existence. Fire allowed migration to a colder climate. Native animals there provided an essential subsistence good: thick skins for clothing.

And migrate we did! With hunting tools and social organization, human groups ate their way around the planet, unleashing a man/nature imbalance worse than any imagined by Malthus! A group would migrate to a place well stocked with big game. For a while the land supported a growing human population. Eventually big game stock was exhausted. Little game was an insufficient substitute. The group moved on to another hunting ground. By 10,000 years ago much of the planet’s megafauna had fallen in unintentional ecocide.
3. Early Agriculture

The stone-age megafauna extinction constituted a grave crisis for emerging humanity. Without domestication of plants and animals human population would have crashed in many places. As domestication occurred a new surplus condition emerged. Let us see this in a corn model.

Corn is produced on land with corn seed and labor time. Subtract the replacement seed from output to get the net output. For the first time a human-produced surplus emerges:

\[
\text{net output} - \text{social subsistence} = \text{social surplus}
\]

In order for social surplus to exist, net output must exceed social subsistence. We may write this as an inequality similar to the first surplus condition:

\[
\frac{\text{net output}}{\text{subsistence per person}} > \text{population}
\]

This is the first production-survival condition faced by humanity. Agriculture allowed humans to supplement, or replace, nature’s bounty. As net output grew population expanded. The population ceiling in a state of nature was broken.

Early agriculture was mainly of two types: sowing seeds on forestland intentionally burned or sowing seeds on land recently flooded on a riverbank.

Slash-and-burn was probably the most common because it was the easiest way to clear a bit of land. The ash served as a natural fertilizer. But most of the nutrients had been in the trees so the fertility of the land was easily exhausted. After a few years the group would have to slash-and-burn an adjacent piece of land. This nomadic form of agriculture could only support a growing population if groups would subdivide themselves and spread out. Slash-and-burn had an ecocidal aspect but the land could regenerate with time.

Riverbank agriculture was far more promising because it allowed the development of a sedentary life style and higher population densities. The most famous are legendary: the Nile, Tigris-Euphrates and Indus.

Animal domestication also changed production possibilities. Some wild animals were attached to human control—for example: sheep, goats, pigs and cows. This gave human groups a ready source of animal protein and raw materials for other things. Animal manure became a crop input because it could significantly enhance crop yields. As agricultural knowledge and activity increased population grew in step with higher net output.

Native plant and animal endowments varied all over the globe. Eurasia had a good variety of both and experienced the greatest development. Mixed agriculture was the best path to higher net output and larger population. The Americas were unlucky. The first humans killed off most of the megafauna. By the time they turned to agriculture there were few candidates for domestication.
4. Agrarian Society

As the agricultural way of life was well established along riverbanks and lakes, non-agricultural specializations emerged. This led to the third surplus condition. Farm-sector subsistence is subsistence consumption per person times the farming population. Subtract this from net output to get agricultural surplus:

\[ \text{net output} - \text{farm-sector subsistence} = \text{agricultural surplus} \]

The first great use of agricultural surplus was the reclamation of nearby land for crops, fruit trees and pasture. Swamps were drained, jungles were cleared and irrigation channels were cut—all needing huge effort. Net output and both forms of surplus increased. Agricultural and non-agricultural populations grew.

Early agrarian societies were largely divided into two social classes: farmers, and, to use Steuart’s expression, free hands. A ruling class existed in embryo—in the form of spiritual and tribal leaders, and the managers of social projects.

As non-agricultural knowledge developed, agricultural surplus was used to support specialized crafts. With the invention of bricks, permanent buildings were constructed. The pottery wheel and kiln allowed for mass production of storage containers. River navigation in wooden boats became a common way to move people and goods. The invention of metal tools allowed for advances in farming, transportation and construction.

Metal ore was rarely available locally. It was necessary to trade surplus crops, animals or crafts for ore or metal—creating the first bonds of interdependence. Nomads traded such goods and provided information about other societies.

The invention of the plow was a milestone—and a defining feature of advanced agriculture for millennia. Plow agriculture produced much higher yields per acre than hoe agriculture and a farmer covered a much larger field. Irrigated hoe agriculture could support perhaps 10 percent in non-agricultural activities while irrigated plow agriculture could support at least 20 percent as non-agricultural.

Animal power had many uses. In addition to plowing, teams of oxen were used to draw carts filled with people or cargo and to fell trees.

In some places a distinct ruling class emerged in the form of priests and leading families. They devised tithes and taxes in order to gain control over society and carry out projects requiring most of the social and agricultural surpluses.

In passing we should recognize Quesnay’s surplus condition. Replacement seed and farm-sector subsistence constitute the annual advances for the next harvest. In a corn model the Quesnay surplus condition may be written:

\[ \text{total output} - \text{annual advances in agriculture} = \text{agricultural surplus} \]

Quesnay called agricultural surplus the net product. He believed it should be maximized by using plow agriculture while practicing laissez-faire policies.
5. ANCIENT EMPIRES

The first cities grew out of the most successful river-basin societies. The first empires grew out of those cities. It was an awesome story. It can be introduced using two social-surplus conditions. The first is from home production:

DOMESTIC ECONOMY: net output – social subsistence = social surplus

In the hands of a local leader, the social surplus was applied to raising an army, producing weapons and providing for other necessary supplies.

Nearby communities were conquered. Since it was possible to seize both their annual social surplus and their accumulated wealth, the second condition reads:

net output – social subsistence + plunder = social surplus + plunder

Accumulated wealth can only be seized once so the second condition becomes:

COLONIES: net output – social subsistence = social surplus

The course of the two social-surplus conditions determines the empire’s fate. In order for the empire to survive, both social surpluses must remain positive. Without social surplus extraction the empire will collapse. In order to keep up with population growth at home and abroad, some of the social surplus must be invested in agricultural expansion. An empire based upon plunder can last only as long as the plunder. An empire based upon trade can last for centuries.

The empire-builders were interested in three main resources in conquered lands: natural resources like forests or mines, agricultural products which could be stored easily and transported well, and slave labor. If a colony had the first two kinds of resources it was risky to enslave the population. Forestry, mining and agriculture would suffer a fall in productivity and the cost of enforcing slavery could be high. If the colony had few resources and produced a small social surplus it was tempting to grab slaves for tasks in other parts of the empire.

In order for the empire to function, the home capital needed a bureaucracy capable of keeping track of surplus extraction and expenditure, domestically and in the colonies. Something similar, but on a much smaller scale, was needed in territorial capitals. This was vital because it was important to know if current activities were sustainable and if further expansion was possible.

In order for the empire to remain vigorous, highly intelligent and strong young men from peon or barbarian backgrounds were recruited into the bureaucracy and the military. This could add generations to the life of an empire if the ruling families made good use of such talent.

Eventually, because of diminishing returns to the land, bloated bureaucracies and high military costs the empire faced severe financial crisis. Military and bureaucratic expenses had to be reduced, causing tension in the ruling classes. But the empire itself could survive as long as surplus extraction continued.
6. EARLY CAPITALISM

Triangular trade between Europe, Africa and the Americas might be the starting point of early capitalism. Europeans bought African slaves with firearms and rum. Plantation and mine owners bought slaves with silver. Slaves produced sugar, tobacco and cotton, or mined silver, for European markets. Profit maximization was the goal of this highly profitable triangle and it was based upon continuous expansion. Thus, the first surplus condition in capitalism was:

\[
\text{net output} - \text{slave-class subsistence} = \text{capitalistic surplus}
\]

This form of surplus production was pure exploitation. Patterns of mal-development and extreme inequality took shape in much of Latin America. Even now wealth and income inequality are huge there and resistant to change.

If this had been the only pattern of early capitalism we would still be stuck in the pre-industrial world. Fortunately, there was another pattern. England is the best-known case so let us consider English development.

First, we should put aside England’s colonial activities. They did not play a large role in the English economy until the last half of the nineteenth century. By then capitalism was well entrenched throughout England.

Instead we should begin with the revolution in agricultural productivity between 1600 and 1800. Recall the condition for agricultural surplus:

\[
\text{net output} - \text{farm-sector subsistence} = \text{agricultural surplus}
\]

In 1600, England still needed 70 percent of its population in agriculture. By 1800 this was reduced to less than 37 percent. England remained largely self-sufficient in food. Output per acre and per person doubled in that period.

England had long been pastoral but the advantages of mixed agriculture, animal power and river navigation were exploited to the full. Farming and animal husbandry improved bit-by-bit as scientific knowledge grew.

At the same time the energy ceiling imposed by dependence upon firewood was overcome by the use of coal. Highly productive agriculture freed up many hands and coal provided the energy needed for non-agricultural activities.

Great inventions—like the steam engine, the sewing machine and the railroad—opened up enormous areas for profitable investment. Capital replaced land as the central factor of production and a new surplus condition emerged:

\[
\text{net output} - \text{working-class subsistence} = \text{capitalistic surplus}
\]

Karl Marx had access to accounting information from a textile mill in Manchester. Gross profits were 100 percent of the subsistence wage-bill. Marx expected all capitalistic industries to achieve this rate. He also expected wage earners to never get a share of the capitalistic surplus. In the leading countries capitalism has had a much more wholesome development.
7. Mature Capitalism

The hallmark of mature capitalism is the creation of a large middle class. Most people identify as middle class in some countries and live comfortably above subsistence. This is a great achievement. In countries with social democratic or social market traditions, capitalistic surplus has been shared between the owners of capital, the managers of capital and the long-time workers for capital.

Ironically, the most important surplus condition in mature capitalism is humanity’s first production-survival condition! We observe it here in three ratio forms—each form being useful to make particular points:

\[
\frac{\text{net output}}{\text{subsistence per person} \times \text{population}} = \frac{\text{net output}}{\text{social subsistence}} = \frac{\text{net output per person}}{\text{subsistence per person}} > 1
\]

From the long-ago emergence of agriculture until the dawn of industrial capitalism, this ratio was rarely much above one anywhere in the world. Higher net output was usually absorbed by population growth.

With the establishment of industrial capitalism the conditions of subsistence improved greatly. The subsistence bundle of a working-class family grew to include basic education, public transportation, higher quality housing and public health measures—among other things. As the quality of social subsistence improved, life expectancy rose and family size shrank. The ‘demographic transition’ is usually explained by higher incomes. I disagree. I think the vastly improved social subsistence is the main factor.

Today net output is probably about twice the size of social subsistence in the most successful economies. This estimate is based upon pondering the conventional poverty-line measure in European Union. The poverty line is set at one-half the median income. If median income is twice the size of a poverty income, net output per person will not stray too far from being twice the size of subsistence per person—as long as income distribution is not too unequal.

Not all leading countries deserve equal praise. While the Japanese and Europeans have built peaceful societies without too much economic inequality, Americans have an astonishing level of economic inequality and tolerate a military-industrial complex with a hunger for ever-more foreign military bases.

The achievements of mature capitalism have been built upon fossil fuels and open-ended mass consumption. Neither of these are sustainable. Global civilization based upon hyper-consumption is a dead end! Thus, while mature capitalism is a great achievement, we must aim for something more refined.

Capitalism’s best quality is profit-driven technical change. In order to solve grave environmental problems we must use this strength fully. But our thinking and behavior should become less materialistic. If we can be content with a very comfortable social subsistence, a 20-hour workweek could replace the rat race.
APPENDIX
FOUR PAGES ON THE CLASSICAL MACROFOUNDATION FROM:
MACROFOUNDATIONS—SURVIVAL CONDITIONS ANALYSIS
(PALGRAVE MACMILLAN RESERVES ALL PDF RIGHTS)
11.3 MACROFOUNDATION OF CLASSICAL ECONOMICS

The classical macrofoundation depends upon two demographic propositions highly relevant in pre-industrial agricultural societies. First: population is limited by the available means of subsistence. Second: non-agricultural population is limited by the size of the surplus produced in farming.

These propositions were taken for granted by classical economists. They still play an important role in anthropology. For example, V. Gordon Childe, in *Man Makes Himself* (1936), and Jared Diamond, in *Guns, Germs and Steel* (1997), could not have told their stories without them.

Sir James Steuart is the father of the classical macrofoundation. The details are found in Book One of his *Principles*, ‘Population and Agriculture’. We shall leave out the details of his brilliant analysis to get to the heart of the system.

For Steuart, the first principle is found in existence and survival:

The fundamental principle of the multiplication of all animals, and consequently of man, is generation; the next is food: generation gives existence, food preserves it. (1.3.3)

Then he identifies the principle limiting population in a state-of-nature:

Were the earth . . . uncultivated, the numbers of mankind would not exceed the proportion of the spontaneous fruits which she offers . . . (1.3.5)

Under the same primitive assumption he identifies population dynamics:

[T]he generative faculty resembles a spring loaded with a weight . . . when food has remained some time without augmentation or diminution, generation will carry numbers as high as possible; if then food come to be diminished . . . Inhabitants will diminish . . . people will begin to be better fed; they will multiply, and . . . food will become scarce again. (1.3.10)

Steuart then introduces agriculture, which allows for larger populations:

I now suppose man to add his labour and industry to the natural activity of the soil: so far, as by this he produces an additional quantity of food, so far he lays a foundation for the maintenance of an additional number. (1.4.1)

Sir James then brings in agricultural surplus and its usage:

One consequence of a fruitful soil, possessed by a free people, given to agriculture, and inclined to industry, will be the production of a superfluous quantity of food, over and above what is necessary to feed the farmers . . . a certain number . . . will apply themselves . . . to . . . supplying . . . other wants. (1.5.19)

This leads to the emergence of the original social classes in agricultural society:

[W]e find . . . people distributed into two classes . . . farmers . . . and . . . free hands . . . (1.5.20)

This analysis, long forgotten by economists, is still relevant in the poorworlds.
Let us see the classical macrofoundation with the help of social accounting. It is easiest to build from the closed-economy corn model. We assume an agrarian society with a high ratio of agriculture labor to total labor.

Consider a recent harvest. We subtract the replacement corn seed to determine the net output. In order to identify the surplus conditions, we need to know three things: subsistence consumption per person, the total population and the population in the farm sector.

The social subsistence equals subsistence consumption per person times the population. Subtract this from the net output to get the social surplus:

$$\text{net output} - \text{social subsistence} = \text{social surplus}$$

The farm sector subsistence equals subsistence consumption per person times the population in the farm sector. We subtract this from the net output to get the agricultural surplus:

$$\text{net output} - \text{farm-sector subsistence} = \text{agricultural surplus}$$

The first condition yields population dynamics: if social surplus is produced, the population can expand. If less than the social subsistence is produced, the population contracts. Of course, there are other formulas possible under different assumptions of birth and death rates and subsistence quality.

The second condition yields class dynamics: if agricultural surplus is produced, nonfarm populations can exist and be supported. The greater the agricultural surplus, the larger the nonagricultural populations supportable from internal resources. If there is ambition, nonagriculture divisions of labor will multiple.

The farm sector requires more introduction. The right-hand side of the diagram feeds into the left-hand side through the subsistence conditions. Farmers must be able to maintain their sector or the society cannot function. Agricultural surplus is a necessary (but not sufficient) condition for social surplus.

Our assumption about a high ratio of agricultural labor to total labor implies something about alpha: it will be low. For example, if the first ratio is 90 percent and the productivity of labor is equal in all uses, alpha will equal 1.1.

Social survival depends upon feedbacks from farm-sector performance, economy-wide performance, population dynamics, and class dynamics.
11.7 DIMINISHING RETURNS AND DISTRIBUTION

Malthus took exception to Smith’s partially formed ideas on population. David Ricardo took exception to Smith’s views on the ‘harmony of interests’ of the three great classes in capitalistic society. For while Smith said,

The interest of the first of those three great orders . . . is strictly and inseparably connected with the general interest of the society. Whatever either promotes or obstructs the one, necessarily promotes or obstructs the other. (1.11.262)

He also said:

As soon as the land of any country has all become private property, the landlords, like all other men, love to reap where they never sowed, and demand a rent even for its natural produce. (1.6.8)

There is a loophole in the Smith argument. Ricardo appears to have seen it. He produced a refinement of Malthusian population theory—with a twist.

This is seen in Ricardo’s analysis of distribution, in An Essay on Profits (1815). Everyone agreed that wages were determined by subsistence—sometimes scanty and sometimes plentiful. What determined profits and rent?

Consider the following diagram. Corn is produced on land with corn seed and labor time. Landlords provide the land; capitalists provide the seed and management. The same quantity of seed and the same labor time are applied to every acre. But land differs in quality, from very productive to totally barren.

OA is the product of the most fertile acre. OB is number of farmable acres. AB is the marginal-product curve. The area OAB is the maximum production of corn. OC is the seed per acre and CD is the wage per acre.

Suppose capitalists rent OE acres for production. The seed needed is OCFE. The wage-bill is CDGF. Agricultural surplus is DAHG. The division of the agricultural surplus between profits and rent is determined ‘at the margin’ at point H. Profits are DIHG and rent is IAH.

For the next harvest, OCFE replacement seed is available, or, if the capitalists would like to sow more acres, additional seed can be got out of profits.
Suppose productivity remains unchanged and corn imports are forbidden. As population expands, additional acres will have to be brought under cultivation. Such expansion of agriculture will be at the expense of capitalists and to the benefit of landlords. This bothered Ricardo terribly. Let us see why.

The diagram below has the same points A through D but now point E has moved to the right. OE’ acres are under cultivation to feed the larger population. Agricultural surplus now equals DAH’G’. The division of surplus between profits and rent is determined at point H’. Rent has swelled to I’AH’ while profits have shrunk to DI’H’G’

But the news gets worse. In the Ricardo model, the rate of profits in agriculture will determine the center of gravity for the general rate of profits in society:

In this state of society, when the profits on agricultural stock . . . are fifty per cent, the profits on all other capital . . . will be also, fifty per cent. (6–7)

On the previous page the rate of profits was the ratio of profits to the sum of seed and wages. It was obviously very high. On the diagram above the rate of profits has shrunk considerably.

For Ricardo, this threatened the expansion of capitalistic society. If the average rate of profits fell too low, the incentive to accumulate capital would weaken seriously and progress would come to a halt. Ricardo was blunt in drawing an awesome conclusion:

[T]he interest of the landlord is always opposed to the interest of every other class in the community. (20)

These were tough words. Ricardo wanted Britain to renounce Corn Laws prohibiting the importation of grain. The political power of the landowning class was still too strong. The Corn Laws sat on the books until almost the middle of the eighteenth century, until the political power of the capitalists could overwhelm the landlords on this issue. In the meantime, technical change had come to the rescue and capitalism in England was booming!

The modern poorworlds have not been so lucky. They still struggle against feudalistic thinking while facing run-away population growth.