

HUNTING PRODUCTIVE WORK

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The crew was complete: it included a Boots
A maker of Bonnets and Hoods
A Barrister brought to arrange their disputes
And a Broker to value their goods

In this paper we want to address the perennially controversial question 'what is productive work'?

It is a question that stirs up emotions since nobody likes to be labeled unproductive and some would like to avoid the concept altogether, but try as one will, it repeatedly crops up not just in theory but in practical political discourse. We start by considering the views of two very eminent and very late economists, Prof Smith and Dr Marx. We then go on to present informally an alternative definition to those advanced by these giants. We develop this more formally and, using the example of Sweden compare the implications of using different criteria for the analysis of the working population. Finally we discuss the extent to which our definition of productive work can be reconciled with those of Smith and Marx.

1. ILLUSTRIOUS ANCESTRY

The idea of productive and unproductive labour was introduced by Adam Smith in 1776.

There is one sort of labour 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 labour. Thus the labour 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 labour of a menial servant, on the contrary, adds to the value of nothing. Though the manufacturer has his wages advanced to him by his master, he, in reality, costs him no expence, the value of those wages being generally restored, together with a profit, in the improved value of the subject upon which his labour is bestowed. But the maintenance of a menial servant never is restored. A man grows rich by employing a multitude of manufacturers: he grows poor by maintaining a multitude of menial servants. The labour of the latter, however, has its value, and deserves its reward as well as that of the former. But the labour of the manufacturer fixes and realizes itself in some particular subject or vendible commodity, which lasts for some time at least after that labour is past. It is, as it were, a certain quantity of labour stocked and stored up to be employed, if necessary, upon some other occasion. That subject, or what is the same thing, the price of that subject, can afterwards, if necessary, put into motion a quantity of labour equal to that which had originally produced it. The labour of the menial servant, on the contrary, does not fix or realize itself in any particular

subject or vendible commodity. His services generally perish in the very instant of their performance, and seldom leave any trace or value behind them for which an equal quantity of service could afterwards be procured. (Adam Smith, *The Nature and Causes of the Wealth of Nations*, Book II, Chapter III)

Almost a century later, the idea was re-defined by Karl Marx:

Productive labour, in its meaning for capitalist production, is wage-labour which, exchanged against the variable part of capital (the part of the capital that is spent on wages), reproduces not only this part of the capital (or the value of its own labour-power), but in addition produces surplus-value for the capitalist. It is only thereby that commodity or money is transformed into capital, is produced as capital. Only that wage-labour is productive which produces capital. (This is the same as saying that it reproduces on an enlarged scale the sum of value expended on it, or that it gives in return more labour than it receives in the form of wages. Consequently, only that labour-power is productive which produces a value greater than its own.) (Karl Marx, *Theories of Surplus Value*, Vol 1, Chapter IV)

These definitions of productive labour by Marx and Smith are very similar. Marx's was a subset of Smith's since Smith gave two criteria which are not identical. His first criterion was equivalent to Marx's: "the labour 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*," thus productive labour is that which, being employed by capital, produces a profit. According to Marx, Smith has a second definition, that productive labour must be embodied in a durable vendible commodity: "the labour of the manufacturer fixes and realizes itself in some particular subject or vendible commodity, which lasts for some time at least after that labour is past." Marx criticised this definition for abstracting from the social form in which the labour is performed and betraying a physiocratic heritage.

We want to argue that neither Smith nor Marx's definitions are complete though both are substantially correct and that Smith's durable commodity concept hints at a more satisfactory conceptualisation of productive labour.

A problem with Marx's formulation is that whilst it readily categorises the self-employed, state officials or parsons as unproductive, it runs into difficulties with some other categories. For instance are bank employees or the workers in advertising agencies productive or unproductive. The advertising agency clearly produces a commodity - adverts, the sale of which pays its employees wages and returns a profit on top. At first sight they would appear to be productive. Similarly it can be argued that bank employees produce a commodity 'financial services' and that their labour earns the bank a profit.

There are counter arguments, that the accounts of the banks show that bank charges - the presumable payment for financial services - are insufficient to cover the banks wage bills and that the residual has to be met out of interest payments. It is harder to justify labeling advertising copywriters as unproductive on Marx's definition. Smith's 'durable commodity' criterion would eliminate bank employees, but leave copywriters as productive, since advertising copy can last for some time after the labour on it is past.

One might argue that bank labour and advertising were non-productive because they were merely concerned with the transfer of property between owners rather than with the production of final consumer goods, but this would go beyond what either Smith or Marx advocated. It is hard not to conclude that conventional Marxist categorisations like that of Shaik and Tonak, are using some unstated premises beyond what is explicit in Marx.

"Productive labor is the production labor employed in capitalist production sectors: agriculture, mining, construction, transportation and public utilities, manufacturing, and productive services (defined as all services except business services, legal services, and private households; ...). It excludes nonproduction labor (sales, etc.) employed in the production sectors such as trade or finance. Total productive labor is the sum of the production workers in each production sector. Total unproductive labor is the sum of nonproduction workers in the production sectors and all workers in the nonproduction sectors", (Shaik and Tonak, *Measuring the Wealth of Nations*, p. 295).

Why should legal services not count as productive if the law firms employ salaried clerks and return a profit for their partners?

Another problem with the conventional definition is that it is predicated upon an assumption that the social formation is a pure capitalist mode of production. For social formations containing a combination of modes of production this is not necessarily an adequate categorisation.

It has perverse results such as workers in government direct labour departments building roads being unproductive, when the same work done by private contractors is productive. Now clearly in the case of the private contractors, a profit is earned and so either:

- (1) The private contractors have been overpaid, or have under performed in road quality.
- (2) They have paid their workers less
- (3) They have used less labour due to use of more machinery or less wasted time.

Whilst the transfer to private contractors may result in an increase in the social surplus product (cases 2,3) this is not necessarily the case.

In any case, the product, the road is a directly social good not assuming the form of a commodity. To the extent that a large part of the social product takes this form, as it has at times in some European countries, it would appear that the economy becomes increasingly unproductive.

We believe that it is possible to reconstruct a rational and unambiguous definition of productive work by going back to Smith's original intentions. As we do this we will see that Marx and Smith were not wrong, only a bit imprecise.

Smith's introduction of the concept of unproductive labour has to be seen in the context of a polemic against the aristocracy and in favour of the manufacturing bourgeoisie in 18th century Scotland. The dissipation of part of the surplus product by an idle and licentious aristocracy employing small armies of personal retainers meant that these people were not employed building canals, roads or steam engines. If the surplus product was consumed unproductively, as had been the case under pre-capitalist economic formations, then the productivity of labour improved at a snail's pace from century to century. If instead, it were reinvested in capital goods, then the productivity of labour, and thus national wealth grew in geometric progression. I believe that this concern with capital accumulation was at the heart of the original concept of productive labour. From it, I believe sprang Smith's insistence that productive labour must be embodied in a commodity that persists. If your focus is on the improvement of production, an improvement embodied in roads laid, canals dug, mines sunk, ships built then a pre-occupation with lasting commodities was understandable. Accumulation of capital is an instance of the accumulation of value. Value can only accumulate if it persists through time. It can only persist through time if it has some underlying material form that lasts through time. This means it must accumulate

as commodities. You can accumulate value as money, but only insofar as that money takes the form of gold or silver, which by their nature are well suited to persist through time. No other accumulation of money is an accumulation of value or of capital. In Smith's day the Scottish economy already relied largely on banknotes and accounts rather than gold. A growth of M1, the mass of banknotes and current accounts, is merely a measure of the growth of a particular form of debt. A growth in debt involves a zero accumulation of value and thus of capital. But an accumulation of gold and silver in Scotland could only be achieved by an export of tangible commodities, thus it was reasonable to see the production of persistent commodities as a pre-condition for any accumulation of capital.

The concern with capital accumulation persisted in Marx, with his insistence that the production of surplus value was the sine qua non of productivity. But in his own analysis Marx failed to fully analyse the implications of this stipulation. What does it mean to produce surplus value, and is this identical to earning a monetary profit?

There are two ways that surplus value can be produced. The working day can be lengthened, what Marx termed absolute surplus value, or technical innovation can reduce the number of hours necessary to produce the real wage, relative surplus value. In a developed capitalist economy the latter is the most important. This process of production of surplus value is tied up with the very improvements in productivity that require persistent capital investment - Smith's concern. Note that the production of relative surplus value is an economy wide phenomena. When cotton mills cheapened clothing, they enabled the same real wage to be met with less money. The beneficiaries were not just the mill owners but all employers who could now pay lower wages. Relative surplus value is distal not proximate.

In the main therefore, to say that labour is productive of surplus value is to say that it is productive of relative surplus value, which means that it must be:

- (1) Susceptible to technical advance.
- (2) Produce a commodity that contributes to the real wage.

In what follows we will argue that it is the position that workers play in the process of social reproduction that determines whether their labour is productive. We shall explore the implications of asserting that:

Conjecture 1.1. *labour is productive if it can produce relative surplus value.*

2. INFORMAL PRESENTATION

We shall first relate some improving tales of the subject moral philosophy before going onto a more formal analysis.

2.1. The Bomber's lament. We will structure this argument using reproduction schemes derived from those given by Marx in vol II of Capital. Consider a 3 department model, with I= means of prod II= workers consumption, III= all other products. Many of the categories of activity traditionally classified as unproductive, soldiering, priestcraft, advertising, personal servants etc would fall into sector III. Sector III would also include some activities not traditionally treated as unproductive such as the production of Learjets and luxury Yachts, the manufacture of Hydrogen bombs and warships. We would argue that no technical change in dept III can increase the mass of sv and that the whole sector is unproductive.

To take a gratuitously horrific example, consider the advances that occurred in the manufacture of hydrogen bombs, such as the use of Lithium deuteride rather than liquid deuterium in their manufacture circa 1957. Would this technological revolution increase the rate of surplus value?

No, because hydrogen bombs did not enter into the real wage, so the ratio of necessary to surplus labour would not change. Any cheapening of bombs just meant that the state could afford more of them. But what if the state had been content with the same number of cheaper bombs and laid off workers in its bomb factories?

It might seem that this would reduce v_3 relative to s_3 and so increase the rate of surplus value in the economy as a whole. But this is not the case.

If we look at the reproduction equations we see the size of the output of dept III is determined in sectors I and II. Under simple or extended reproduction:

$$\begin{array}{rcl} \text{total sv} & & \text{dept III} \\ s_1 + s_2 + s_3 & \geq & c_3 + v_3 + s_3 \\ s_1 + s_2 & \geq & c_3 + v_3 \end{array}$$

The surplus value produced in sectors I and II is materialised as the means of production and wage goods used in sector III. Bearing this in mind, consider 3 possible results of workers being laid off from the bomb industry:

- (1) The former bomb makers are re-employed in sector III. Then v_3 will remain unchanged as will the total surplus value. What happens is that the physical form of sector III's output is changed whilst its value magnitude remains the same.
- (2) If they are redeployed to dept II, then the total working day spent on wage goods has risen and the net effect must be a fall in the rate of surplus value.
- (3) If they are redeployed to department I then s_1 rises but this is compensated by a decline in s_3 so net surplus value is unchanged. However the surplus is now materialised as constant capital indicating an increase in accumulation.

It is thus clear that an improvement in technology in department III can not increase the mass of surplus value. Since the conditions of labour in dept III do not alter the total surplus value we conclude that, generalising Marx's concept of unproductive labour, the whole of department III is unproductive.

The labour of advertising, for example, since it does not enter into the real wage (output of dept II) must fall into dept III and be paid for out of the surplus raised in depts I and II.

The productivity of depts I and II determine the potential size of dept III which is parasitic on them. The big increases in productivity of industry in the 2nd half of the 20th century led to substantial rise in the size of sector III, since only part of the gain in productivity was realised as higher real wages, a large part went as more surplus value.

2.2. The armourer's tale. We will now argue that the social form of labour in department III is also irrelevant.

Almost all economists would agree that the activity of the Army and Navy are unproductive. By extension it will probably be agreed that the former Royal Armoury and Royal Dockyards which supplied the Army and Navy with cannon and ships were unproductive. Now consider the situation that occurred when the government sold off the Royal Armouries and Royal Dockyards to private industry. It might appear that that, following Marx's definition, the dock workers and armourers must have suddenly become productive.

If we accept this we would have the remarkable result that an activity that was once an unproductive use of societies resources, had, by the magic of privatisation, become a productive and useful labour. To accept this would be to reduce the concept of productive labour to the most banal appologetics, but on both Smith and Marx's definition there seems no way out. Rosyth Docks PLC sells the Navy a vendible and durable commodity - ship repairs. It recieves money for this and makes a profit. Both Smith's criterion and Marx's

criterion point to the dockers and armourers becoming productive on privatisation. But has this transfer of social form actually increased the total surplus value produced.

Let us consider the situation the day after the private owner takes over, and before they have done any re-organisation of production since we have already shown that no improvement in productivity in a Dept III activity can raise surplus value. Here we are concerned with whether the change in employer produces more surplus value.

If there is no rise in productivity, any profit comes from the Navy paying more for ship repairs. Suppose that an hour's labour created a monetary value of £10, but the dock workers were paid £4 an hour. The Navy would previously have paid £400,000 for a repair job that took 100,000 hours. After privatisation they must pay £1million. The dockyard company has made a profit of £600,000. But how does the navy pay for this extra £600,000?

Obviously the chancellor has to raise taxes. If we follow a 'classical' approach to taxes we would assume that these taxes fall on the surplus product.

All taxes must either fall on capital or revenue. If they encroach on capital, they must proportionably diminish that fund by whose extent the extent of the productive industry of the country must always be regulated; and if they fall on revenue, they must either lessen accumulation, or force the contributors to save the amount of the tax, by making a corresponding diminution of their former unproductive consumption of the necessaries and luxuries of life. (David Ricardo, Principles of Political Economy and Taxation, Chapter 8)

Ricardo here implicitly assumes by 'revenue' the revenue of the propertied classes. He goes on to argue that taxes on consumer goods 'raw produce' ends up as a tax on profits and that:

A tax on wages is wholly a tax on profits, a tax on necessaries is partly a tax on profits, and partly a tax on rich consumers. The ultimate effects which will result from such taxes then, are precisely the same as those which result from a direct tax on profits. (David Ricardo, Principles of Political Economy and Taxation, Chapter 16)

If the new taxes fall on profits then all that has happened is that £600,000 has been transferred from the capitalist class in general to the new owners of the dockyard. No additional surplus value has been produced. Thus contrary to initial appearances privatisation creates no new surplus value. If one abstracts from social form this is not surprising since no change has occurred to alter the ratio of necessary to surplus labour.

If we allow that some of the new tax will fall on wages and that contrary to Ricardo, wages do not rise to compensate, then what has happened is a depression of the price of labour power below its value. This again is not the result of some new productivity of the labour in the dockyard, but an expression of the general power of the state to appropriate revenue. If we were to say that the state can 'produce' a surplus by raising taxes, then the whole distinction between productive and unproductive labour collapses. One could as well have said that all the King's horses and all the King's men were productive since their upkeep forced the King to levy taxes and thus 'produce' a surplus.

We can now advance a thesis about social form and unproductive labour:

Theorem. *No change in juridical relations can change what was formerly unproductive labour into productive labour.*

We will illustrate this with a Noble tale.

2.3. **The Duke's story.** The Duke of Atholl maintains the only remaining private feudal army in Europe - the Atholl Highlanders. They and similar feudal retainers were the original target of Smith's polemic against unproductive labour. We do not believe that they would become productive were he to form them as a mercenary company 'Atholl Highland Soldiers Plc.', owned of course by his Highness, and then use the revenues of his estate to hire them to guard his castles.

"A man grows rich by employing a multitude of manufacturers: he grows poor by maintaining a multitude of menial servants. "

But what if his Highness were to hire his mercenary company out to perform ceremonial duties at the palaces of his Peers, the Dukes of Buccleugh, Sutherland or Lancaster?

The Atholl Highlanders would no longer be a drain on his estate but a source of income. Has this wheeze made them productive?

Smith would unhesitatingly have said "No". No durable commodity issues, so there is no productive labour. As soon as one looks at the National Accounts the illusion of the troop's industry is dispelled. They are still maintained out of rent, a surplus produced by the tenant farmers of the Noble Lords. The fact that the Dukes have banded together to bear the cost of soldiers alters this not one jot.

This is true of the Duke of Atholl, and it is true of a nation as a whole. If a nation maintains a large military establishment, a large part of its best engineers are involved not in the design and production of capital goods but in the production of machines which do not constitute capital. This slows down capital accumulation in those countries. The person hours spent on Trident submarines and aircraft carriers are hours not spent modernising the means of production.

3. FORMAL PRESENTATION

3.1. **The production matrix.** Let us define a sector as an activity involving labor and material resources, integrated with other such activities. Productive sectors must be considered 'necessary' or 'basic' in some specific economic sense because the concept implies that a fraction of its surplus supports the unproductive ones. We consider an economy consisting of n sectors. The level of aggregation is not necessary to specify here. Data published by national accounting agencies usually contain about fifty to one hundred sectors, but we might define our economy in greater detail.

The production relations between the n sectors form a $(n \times n)$ production matrix \mathbf{A} , describing the technical conditions of production.¹ A matrix element a_{ij} is defined as the output of sector i necessary to produce a unit of output from sector j .

The production matrix will obviously change its structure and values over time as economic patterns alter, innovations are applied, new sectors are formed and old ones disappear. It should be emphasized that it strictly deals with inputs of *production*. An electrician might need a bank account, but there is no technological reason why she couldn't perform her service without consulting a bank.

3.2. **The workers' consumption vector.** All sectors in the economy require some set of workers. Let \mathbf{c} be the $(n \times 1)$ worker's consumption vector that describes the bundle

¹It can be empirically approximated for some reasonable time period using input-output tables of the economy.

of goods and services they consume for some time period.² An element c_i denotes their consumption of sector i 's output. There will be several sectors with zero input in \mathbf{c} .

3.3. A simpler definition. With a production matrix \mathbf{A} and workers' consumption vector \mathbf{c} for some time period, we can handle several types of economies with different mixes of relations of production. This makes it possible to propose a more general definition of productive sectors, one which applies to socialist and mixed economies as well as capitalist ones.

To restate what has been said in part 2, it is not sensible to view sectors that produce the workers' consumption bundle as unproductive. It is improvements in these that allow relative surplus value to be produced. Our conjecture 1.1 ties productive labour to the production of relative surplus value. Further more it is clear that while workers don't consume jumbo jets, they do consume air travel that requires them. In turn, the production of jumbo jets requires various components that you wouldn't find in any household's shopping list.

There exists a bundle of goods and services necessary to sustain the worker's consumption bundle, which we can write as a $(n \times 1)$ vector \mathbf{c}^* . It is defined by the following relation: $\mathbf{c}^* = \mathbf{A}\mathbf{c}^* + \mathbf{c} \Rightarrow \mathbf{c}^* = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{c}$. (Here \mathbf{I} is the $n \times n$ identity matrix.) An element c_i^* denotes the quantity of sector i 's output required to sustain the worker's consumption bundle. This also provides a rational basis for a definition of productive sectors:

Theorem 3.1. *Sector i is productive if $c_i^* \neq 0$, i.e. any sector that directly or indirectly sustains the workers' consumption bundle is productive.*

3.4. Theoretical implications. If our economy is specified at industry level we can tell what industries are productive. If it is in greater detail we will gain information on what functions of it are productive. Our definition has some theoretical implications that are addressed below:

- (1) If social production and consumption can be described by \mathbf{A} and \mathbf{c} , the definition is general and can be applied to a large variety of economies, including state capitalist enterprises, public sector, workers' co-operatives, peasants producing for markets and the Soviet-type economies. Changes in \mathbf{A} and \mathbf{c} also make it logically possible for some sectors to shift from unproductive to productive, or vice versa, over time. Contrawise, a change in the form of ownership of the means of production does not itself shift sectors from productive to unproductive.
- (2) The total labor-time performed by the workers in the productive sectors can now be divided into 'necessary labor' required to produce their part of the consumption bundle and 'surplus labor' that forms the material basis for the surplus product. Productive labor not only supports the entire working population and its dependents, but also the ruling classes of the political-economic system. To the extent that capitalist production dominates, the ratio of surplus to necessary labor can be held equivalent to the 'rate of surplus value' as Marx does in the first volume of *Capital*.
- (3) In modern capitalist economies the more obvious unproductive sectors are public administration and the police-military apparatus, but also capitalist activities such as armaments, private guards, wholesale trade, advertisement, financial and juridical services, luxuries etc.

²Excluding the fraction of ruling groups who actually work, such as 'top management' in modern capitalist firms. Depending on their privileges, their consumption will diverge significantly from the workers in the sector.

- (4) Some sectors which have traditionally been treated as unproductive in Marxist discourse, such as parts of state education, may now be seen to be productive since they enter indirectly into the reproduction of the labour force and thus affect the ratio between necessary and surplus labour.

It is clear that such sectors or subsystem of sectors must be financed by a fraction of the surplus of productive ones, since they don't serve as input in the production of those goods and services. The surplus of the productive sectors is thus the upper limit to the size of unproductive activities. Improvement in labor productivity in such activities won't either increase the rate of surplus value.³

We can also deduce a corollary from theorem 3.1.

Corollary 3.2. *If a labour activity is productive then it enters directly or indirectly into the production of every other product in the economy.*

This is analogous to Sraffa's idea of the *Standard system* (Sraffa 1960). Recall that the standard commodity was a commodity bundle. It was produced by a sub-section of the economy, the Standard system, in such a way that the ratios of the outputs of the Standard System was the same as the ratio of the inputs required to produce it. Sraffa argued that

It can be said that in any actual economic system there is embedded a miniature Standard system which can be brought to light by chipping off the unwanted parts. (Sraffa, 1960, Chap IV)

The components of the Standard commodity are used directly or indirectly as inputs to all other commodities. The Standard commodity can be thought of as an eigen vector of the input-output system, and has associated with it an eigen-value = $1 + R$ where R is the *Standard ratio* or Maximum rate of profit - the rate of profit occurring if wages are zero. If on grounds of realism we do not allow ourselves to consider zero wages, then the concept of the Standard system can be extended by including a set of processes that reproduce labour of different specialisms. The inputs into these processes include both the real wage and the educational and training activities necessary to produce labour. We model this with an extended reproduction matrix R with additional rows and columns representing the labour producing processes. We want an extended analogy to the Standard system made up of all the productive activities in the economy which we will term the Productive system.

A constructive derivation of the Productive system is as follows L, B are two sets of integers designating rows in the extended reproduction matrix, and S is the set of rows entering into the Standard commodity.

Algorithm 3.3.

1. Let $B \leftarrow S, L \leftarrow \{\}$
2. $L \leftarrow B$
3. $\forall j \in L \forall r_{ij}: i \notin L$ then $B \leftarrow B \cup \{i\}$
4. if $L \neq B$ then goto 2

At the end of this algorithm B will be the set of production processes comprising the Productive system. This will include some educational processes but not others. For example, seminaries and officer training colleges would not fall within the productive system but an engineering college or a primary school would. It will include some consumer goods but not others. Baking would be productive but making Rolls-Royces would not.

³The economic impact of unproductive activities may however vary. See for example 'military-keynesiansism'.

Note too, that even self employed farmers can be productive. A productive worker does not need to be a wage labourer, since relative surplus value is produced in all sectors that can contribute to the real wage whether these are capitalist or not. Improvements in farming technology, the use of machinery etc, greatly increased labour productivity on European farms in the second half of the 20th century. The labour necessary to produce food fell. This improvement in productivity occurred both on capitalist and peasant farms. To the extent that improved techniques by the peasants cheapened wage goods, these same peasants contributed to the production of relative surplus value and were productive workers.

4. EMPIRICAL IMPLICATIONS

Let us see what the empirical implications are for our definition of productive labour, using employment statistics at industry level for Sweden for years 1987-2003. During this period the average employment was about 4.2 million people, or roughly half of the Swedish population. Employment dropped to about 3.9 million during the years of economic crisis in the early 90s. Many workers in the public sector were fired when the 'one-way' crisis politics kicked in. Total employment has however recovered in the latest years.

Employment in sectors as

1. wholesale, retail and commission trade,
2. financial real estate and other business services,
3. renting of machinery and equipment, activities of membership organisations
4. Public administration and defense, was considered unproductive on our definition.

If one uses the conventional Marxist definition, however, three additional sectors must be added to this list; research and development institutions, education and health and social work services.

A significant part of R&D institutions is government funded and they don't produce commodities as capitalist firms, nevertheless it is safe to say that the output of civilian R&D enters indirectly in the production of the wage-bundle. In Sweden the overwhelming majority of workers in education and health and social work services are employed by the tax-financed public sector.

Table 1 shows the estimated share of unproductive employment in Sweden for the years 1987-2003, using both definitions. As one can see there is a huge difference here. If one accepts the conventional Marxian definition then about 56% Using our definition the figure is about 29%

5. CONCLUSION

We have given a more precise definition of productive labour. We presented it as an immanent critique of Marx's definition, using his ideas on relative surplus value, necessary and surplus labour time, and the reproduction schemes of vol II of Capital to tease out what it actually means to be productive of surplus value. The logic of this shows that whilst the general thrust of Marx's analysis on the subject is right, the implications are not always what they seem. In particular his critique of Smith's second definition of productive labour as labour embodied in a durable commodity is probably unjustified. The thrust of Marx's criticism of Smith was that this second definition was invalid because it ignored the social form of the labour - whether it was wage labour or not. We think that Marx was overly restrictive in this, and that in fact changes in social form do not determine whether labour is productive or not. Instead, we argue that it is the position of the labour within the process of social reproduction that is crucial.

TABLE 1. Fraction of the workforce who are unproductive in Sweden using two different definitions

Year	Orthodox Definition	New Definition
1987	0.529	0.266
1988	0.534	0.270
1989	0.536	0.273
1990	0.539	0.273
1991	0.548	0.277
1992	0.563	0.287
1993	0.572	0.286
1994	0.575	0.287
1995	0.570	0.285
1996	0.568	0.288
1997	0.565	0.293
1998	0.566	0.291
1999	0.568	0.293
2000	0.573	0.301
2001	0.58	0.307
2002	0.59	0.311
2003	0.596	0.312

Source: Statistics Sweden, 'Sysselsatta (AKU) efter näringsgren SNI2002 och tid'. Available at: www.scb.se

Smith's concern with the production of durable commodities, whilst an inexact formulation did hint at something important, that whether or not work is productive depends on what it produces.

Our conclusion is that productive labour includes all work necessary to the support of the direct producers. This conclusion is well grounded in input/output analysis and lends the concept of productive labour a modern progressive polemical edge.

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