

## Should We Remember Ricardo? Surplus Approach Two Hundred Years After 'On the Principles of Political Economy and Taxation'

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### Introduction

In the preface to his *Production of Commodities by Means of Commodities* (1963) Piero Sraffa famously tells his readers that 'anyone accustomed to think in terms of equilibrium of demand and supply may be inclined, on reading these pages, to suppose that the argument rests on a tacit assumption of constant returns in all industries'. He goes on to say that if the reader finds this helpful, there is no harm in adopting this view as a working hypothesis, however no such assumption is made in his work. Instead his assumptions were a constant output and constant production coefficients in each industry, with his investigation concerned exclusively with those properties that do not depend on changes in either the scale of production or the proportions between its' factors.

This, Sraffa (1963) argued, was the standpoint of the old classical economists from Adam Smith to Ricardo, which had been submerged and forgotten since the advent of what he calls the 'marginal' method, the latter being far from marginal when it comes to its prevalence in economic theory from the latter half of the 19th century onwards. *Production of Commodities by Means of Commodities* (henceforth PCMC) is widely seen as Sraffa's interpretation and formal mathematical exposition of Ricardo's theory of distribution and relative prices. It should therefore come as no surprise that the author begins his first chapter with a simple economic system where no surplus is created followed by the second chapter titled 'Production with a surplus', where the economy in question is now seen as having the technological capacity to produce a surplus product. We can be almost certain that despite his

neutral tone, Sraffa must have understood progression from a 'rudimentary' society to an economic system being able to produce a surplus is less a question of technology and more a question of social organization. Yet this is how the classical economists following Adam Smith (1776), when comparing the early and rude state of society with no accumulation of stock and appropriation of land to early capitalism, had seemed to delineate the world.

Even from Smith's description, however, we can see that the institutional shift to private property represents perhaps the most important distinction between the two systems and that issues of productivity and technology are secondary in the whole affair. In fact, we could dare and go so far as to say that the utility of many technological advances is in its ability to augment the creation of the net product and the ability to secure it, which in capitalism means the ability to successfully monetize it. Lucky for us the subtler overarching nature and interesting, yet ultimately illusive issues concerning the ancient wellspring of the surplus product are hardly of any importance for this brief inquiry. It will be enough to propose that capitalism is a system capable of producing a surplus and that this is in fact its main purpose, with all the other characteristics being secondary to this basic *primum movens*.

Following the classical tradition, we could say that movements of the surplus represent a gravitational pull for the whole economic system. In analyzing movements in prices of financial instruments Professor Shaikh (2010) makes a comparison between simple equilibrium as a state-of-rest and the classical notion of equilibration-as-turbulent-regulation. In this conceptual framework we can view the surplus product as the regulating force determining both supply and demand, while simultaneously being at least partially determined by both. A similar representation of such endogenous movements in the system revolving around the profit rate can be found in Goodwin (1967).

The following examples will illustrate how we can still use original Ricardian notions (coupled with Keynesian elements found in Pasinetti (1993) to explain some of the main characteristics of modern industrial societies, such as the persistence of unemployment. Importantly, this is done without any additional assumptions about the nature of the human spirit, leaving untouched the motivation, hopes, fears and desires of the individual. Not only is this framework more robust and less dependent on assumptions about the behavior of the individual, but in an era of intrusive data collection it is less invasive, representing a more gentlemanlike type of social inquiry that does not require either voluntary or non-voluntary breaches of privacy to test its hypotheses. Our only assumption is that in capitalism production

is carried out with the aim of securing a profit (Sušnik, 2016, p.1) and our inquiry is concerned with the implications of this simple fact.

### **Profitability, demand and employment in a simple one commodity economic system**

We can begin our inquiry by establishing the basic relationship between profits and wages since it is this dynamic which represents the central contradiction in modern economic systems. To put it simply the issue is that while companies will wish to sell as much commodities as possible they would also wish to produce with minimum costs, thereby actually depressing aggregate purchasing power. It is also the aim of capital to increase profitability, which is to say net income, whereas workers are interested in increasing the gross income of society. Since it is the capitalists who ultimately decide the level of employment (especially in a pure capitalist economy, with no state), their investment decisions regulate the level of final demand as well. Seeing as how these decisions depend on expected future profitability (gauged by past performance) it is ultimately profitability which determines the level of employment as well as the level of aggregate demand.

Let us take an economy with a given labor force and a given productivity of labor, with the wage rate likewise set exogenously by some institutional arrangement or other. Then we have the following relationships where  $L$  denotes the labor force,  $\pi$  is labor productivity and  $w$  are real wages:

$$L = \bar{L} \tag{1}$$

$$\pi = \bar{\pi} \tag{2}$$

$$w = \bar{w} \tag{3}$$

Profitability is determined by all three magnitudes. Real profits per unit of output are the difference between productivity of labor (equation 2) and the reward of labor (equation 3), while the mass of profits,  $P$ , is simply this difference multiplied by the labor:

$$P = \pi L - wL = (\pi - w)L \tag{4}$$

While not important in this first example, it should be noted that with full employment and a given productivity of labor, we also have the total output,  $Y$ , which in this case is constant. We could call the following relation a 'Smithian production function' of sorts:

$$Y = \pi L \quad (5)$$

Taking productivity, size of the labor force and (what follows naturally) output as given, we are free to examine the effects of a change in the wage rate on capital profitability. While neither profits nor wages can ever reach their extreme values (commanding the whole output) in practice, we do not exclude them at this point in the investigation. For a specter of real wages ranging from 0 to  $\bar{\pi}$  (the whole product) we get the following inverse relationship:

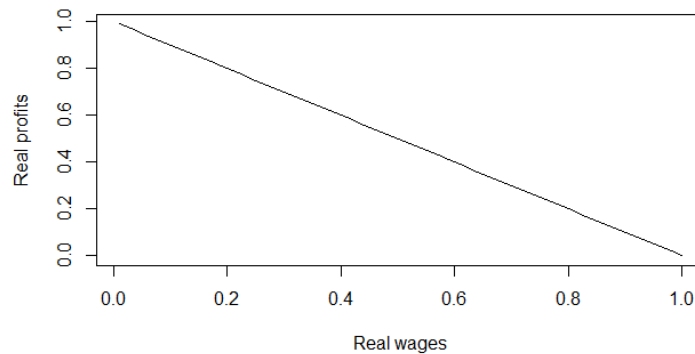


Figure 1: Relationship between real profits and real wages

Additionally, following Graziani (2009, p. 65), we can define the profit rate,  $r$ , as the difference between output and production costs, divided by the capital expenditure (in our case equal to production costs which consist only of the wage bill):

$$r = (\pi - w)L/wL \quad (6)$$

Using the same range of real wage bargaining positions (and under the same assumptions of constant output) the following relationship between the wage rate and the profit rate emerges:

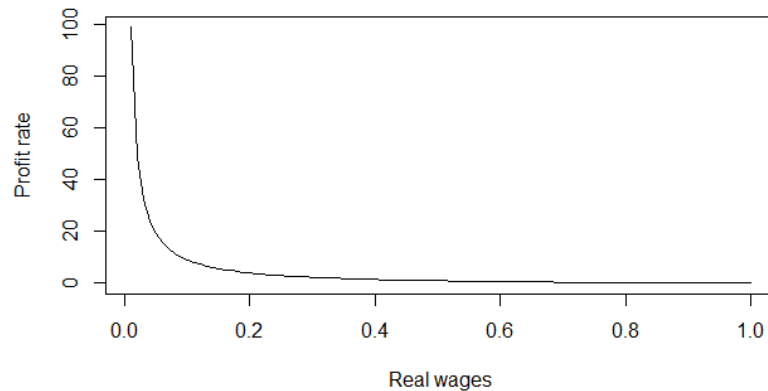


Figure 2: Profit rate in relation to real wages

With a given productivity it is obvious that any increase in real wages will decrease the profit rate. Now this does not mean that capital accumulation will come to a halt immediately, because while the aggregate profit rate acts as a gravitational pull we should not forget that the mass of capital is a sum of competing capitals. And when the individual capital outlays become great enough to absorb enough labor then we might see an increase in the wage rate. In other words capitalism is a spontaneous system and while capitalists as a class have similar goals, they do not invest as a class, which was pointed out by Kalecki (1971).

We can make a simple extension of the existing model to see the effects of changing employment on the wage rate. The wage setting relation is no longer institutionally determined and exogenous to the system, instead we connect it to the level of employment:

$$w = \sqrt[2]{L} \quad (7)$$

Keeping the other assumptions intact we can now see how different levels of employment impact the distribution of income. It should be mentioned that this exercise in comparative statics does not imply that changes in the level of employment are the causal drivers of the system. The logic for accumulation of capital over any longer period will have to be somehow connected with profitability of capital, but as mentioned previously, this does not mean that aggregate investment decisions cannot lead to periods of low profitability.

Once again if we take productivity as given and cycle through all the possible levels of employment ranging from 0 to  $\bar{L}$  (in our case simply equal to 1), this allows us to examine relationships between employment and the distribution of income. Strictly speaking by doing

this we are straying from the assumption of fixed output but doing so does represent a certain closure of the classical system (as interpreted, for example in the PCMC), because it fixes real wages and by doing so also determines real profits.

The results while unsurprising are still informative. For example, a clear inverse relationship between the profit rate and the level of employment emerges. Obviously, given the wage setting relation, exactly the opposite is true for real wages.

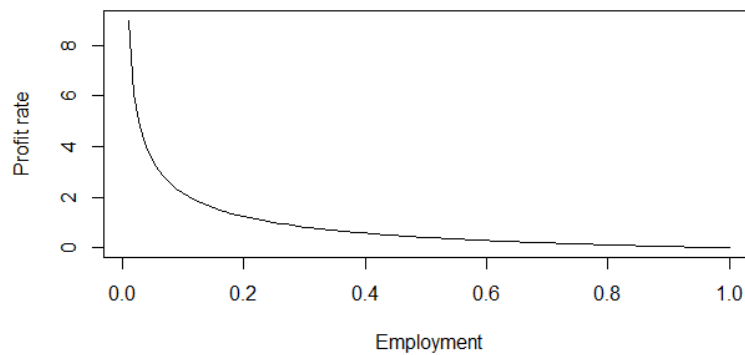


Figure 3: Profit rate in relation to employment with endogenously determined wages

Essentially the same inverse relationship holds between the wage rate and the profit rate, which is obviously just a reflection of the wage bargaining relation:

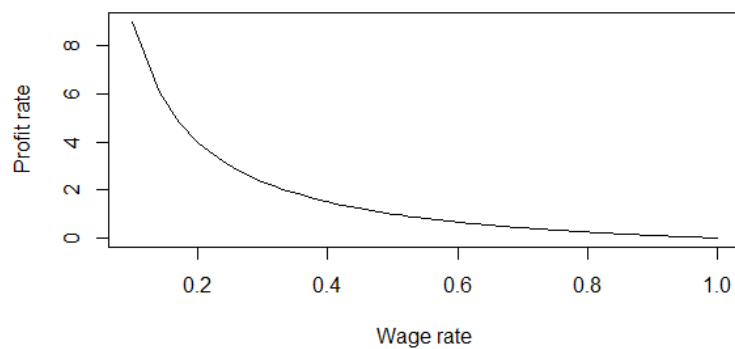


Figure 4: Profit rate and the wage rate

On the other hand, real profits will keep on increasing up to a certain point after which any additional increase in employment will decrease aggregate profitability:

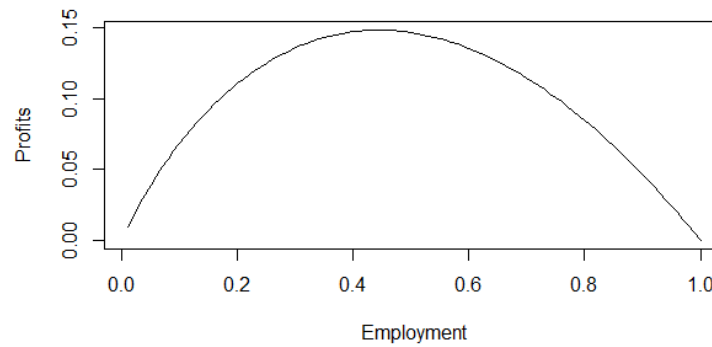


Figure 5: Mass of profits in relation to different levels of employment

Since increases in employment lead to increases in the wage rate it should come as no surprise that the relationship between the wage rate and aggregate profits is like the relationship between employment and profits:



Figure 6: Mass of profits in relation to the endogenously determined wage rate

Again, while we have not imparted causality on the examples above, they are nevertheless telling. Abstracting from changes in productivity, there is a clear antagonistic relationship between the profitability of capital and the real wage rate. Whether or not these should become explosive or not is a whole different matter. It does seem unlikely, however, that a harmonious ahistoric relationship would spontaneously emerge in a society where income distribution on some basic level resembles the examples given above. More likely great institutional efforts would have to be expanded to make sure that such an economic system reproduces itself from one period to the next. And indeed, that seems to be the case for modern industrial societies the world over.

### A simple dynamic economic system

Having defined the basic relationships between wage, profits and employment we can use these to create a simple dynamic economic system. Once again, we leave productivity untouched and exogenously given as in (2).

Employment in each period of production,  $L_t$  now becomes a function of profitability, meaning that it is in principle determined by the investor class.

$$L_t = f\left(\text{mean}\left(\sum_i^a r_{t-1}\right), \varepsilon_t, \overline{L_{max}}, \overline{L_{desired}}\right) \quad (8)$$

The exact functional relationship between the profit rate and employment can be seen in the appendix. However, if the average profit rate in the recent past is lower than the average rate in the preceding period, then employment decreases. Otherwise it is assumed that capitalists will marginally increase their capital outlays, but never above exogenously given  $\overline{L_{max}}$ . While the addition of the latter parameter is somewhat *ad hoc*, its aim is to capture the fact that capitalism is a system with constant unemployment. Additionally,  $\overline{L_{desired}}$  represents the maximum level of employment that the capitalists would be willing to employ, if they could invest in tandem with one another. Finally,  $\varepsilon_t$ , represents random normally distributed stochastic elements in the level of employment that occur within any given period of production. The profit rate,  $r_t$ , and the wage rate,  $w_t$ , are set in the same fashion as before, with wages being a function of employment and with profitability representing the residual between productivity and real wages:

$$r_t = (\pi - w_t)L_t/w_tL_t \quad (9)$$

$$w_t = \sqrt[2]{L_t} \quad (10)$$

These are the results for one thousand production periods. The whole body of labor in the economic system is normalized to one, so that there is no difference between labor employed and the level of employment. The blue line are profits, the green line represents employment and the red line the real wage rate.



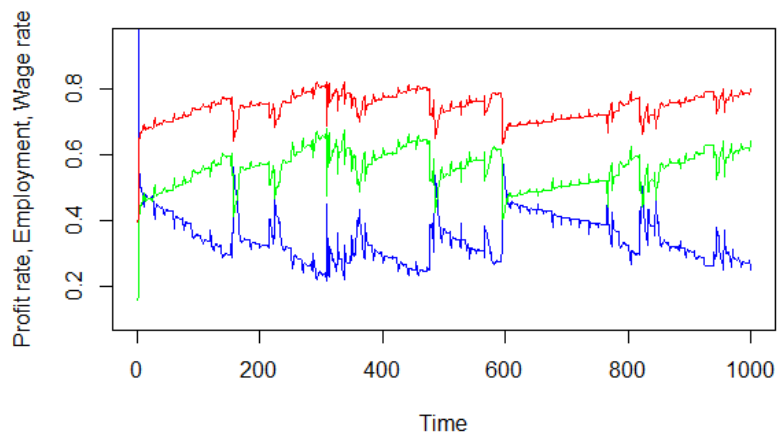


Figure 7: A dynamic representation of a simple classical economic system

The reader can see that when profitability keeps falling for consecutive periods, this eventually leads to a fall in employment and *pari passu* to a fall in the wage rate. However, increased profitability raises expectations and with renewed animal spirits capital expenditures begin to increase leading once more to consecutive periods of falling profitability. At this point we are already dangerously close to Keynesian waters where expectations drive investments, yet these expectations are still firmly grounded by ghosts of past profitability, which remains the central gravitational force around which the investment and employment nexus gravitates.

### Keynes, Ricardo and Machinery

*»These were my opinions, and they continue unaltered, as far as regards the landlord and the capitalist; but I am convinced, that the substitution of machinery for human labor, is often very injurious to the interests of the class of laborers.«* Ricardo (1821), On Machinery

In this final section I would like to examine the relationship between the capacity of a modern society to produce commodities and its capacity to consume them. As Pasinetti (1994), among others, pointed out, this is by no means something that can be taken for granted. For this final part we will relax our assumption of fixed productivity and the focus will reverse to issues of demand and exogenous profit expectations. In the previous section profitability was endogenously determined, here we will regress to a state of given expected probabilities. If the reader feels that there is a distinctly Keynesian feel to our approach, they would not be

mistaken, but this is only because, as mentioned by Morishima (1989, p.171), Ricardo himself unconsciously abandons Say's law in his analysis of the effects of labor-saving technologies on income distribution. By doing so he implicitly acknowledges the critique later leveled by other authors (Marx, Keynes) at the notion that supply creates its own demand.

Let us start with a very neutral example, reminiscent of Pasinetti's (1993) work on the same subject. We have an economic system with different possible levels of productivity. Alternatively, although I am not sure that Joan Robinson would look kindly upon this interpretation, we could imagine that we have a dynamic system where productivity falls in each succeeding period. However, since we do not have a temporal element, we must imagine that each rate of productivity is assigned to its own economic system, since it would be schizophrenic for one society to possess all these different states at the same time. Yet while we have various levels of labor productivity, aggregate demand is the same for all of them. What are the consequences of this, represented by the following relations, where  $Y$  is output,  $\pi$  is labor productivity,  $L_s$  represents exogenously given labor supply and  $L_d$  is labor demand?

$$Y = \bar{Y} \tag{11}$$

$$\pi = \pi_i^n \tag{12}$$

$$L_s = \bar{L} \tag{13}$$

$$L_d = Y/\pi \tag{14}$$

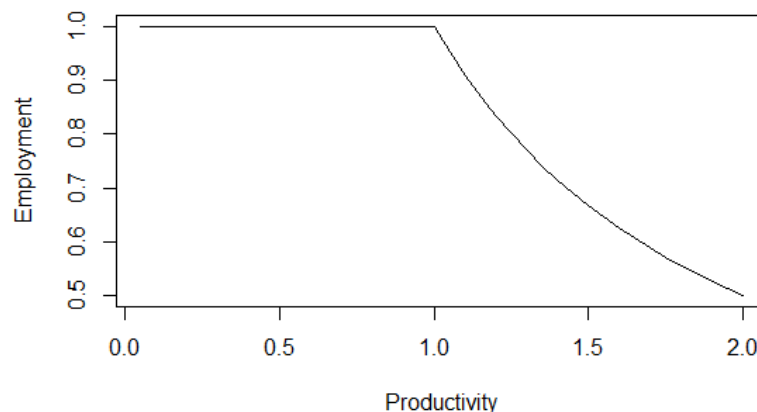


Figure 8: Changes in productivity in relation to the level of employment (with given output)

While demand outstrips supply (due to productivity lagging behind the wants of a society), we have full employment and had we constructed a price system as well, it seems only too likely that the economy in question would be facing inflation. On the other hand, once productivity

is large enough to cater to all the demands (and more!), we see that the level of employment starts to drop off. This is a simple consequence of the fact that in a system of productivity growth, demand must follow. If demand lags behind the growth in productivity, then by dint of fewer hands being able to supply the desired amount of goods in each succeeding period, some laborers will have to be let go. Labor saving technologies therefore do not immediately imply, as already mentioned by Ricardo, that the whole society would be automatically better off.

Let us now move once again away from the issue of productivity growth and focus solely on demand. Let us furthermore return to the division of income between capitalists and workers, thus moving away from the idealized homogenous society existing in the previous example. It does not follow from the previous example that just because labor suffers from increasing productivity (given output), that the same is true for capitalists. In fact, if we imagine that the same wage and profit relations hold as described in section two, this is certainly not the case:

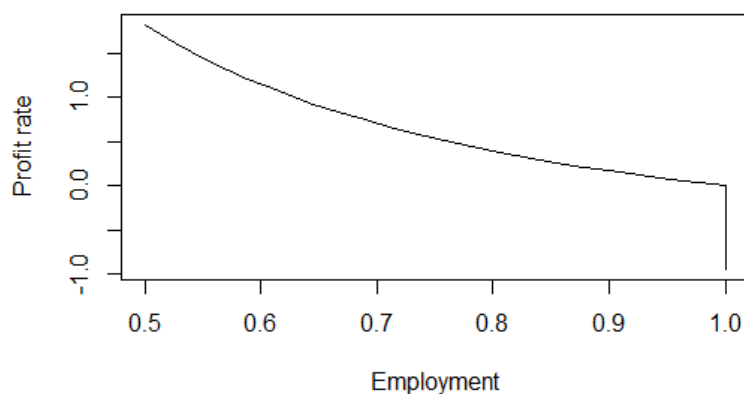


Figure 9: Profit rate and the level of employment at different levels of labor productivity

We see that capital would be receiving negative returns under a full employment regime, whereas with growing productivity and falling employment, the profit rate keeps increasing with growing productivity. As far as capital is concerned, therefore, the lower the demand for labor, while productivity keeps increasing, the better. Once again, a very simple example illustrates an important facet of social reality, such as why is capital interested in austerity policies.

Let us now move from the classical world of endogenous profit rates into the Keynesian universe of expectations and exogenously given autonomous demand:

$$r^e = \bar{r}^e \quad (15)$$

$$Y = \alpha_0 + \sqrt[2]{r^e} \quad (16)$$

$$L_d = Y/\pi \quad (17)$$

Expected profit rates,  $r^e$ , are given exogenously by (15). National income defined by (16) consists of an autonomous element below which it cannot fall, and it is positively related to expected profits, which are assumed to drive investments which increase expenditures directly and by increasing the purchasing power of the workers. Demand for labor,  $L_d$ , is a function of aggregate demand and exogenously given level of labor productivity. How does this system behave?

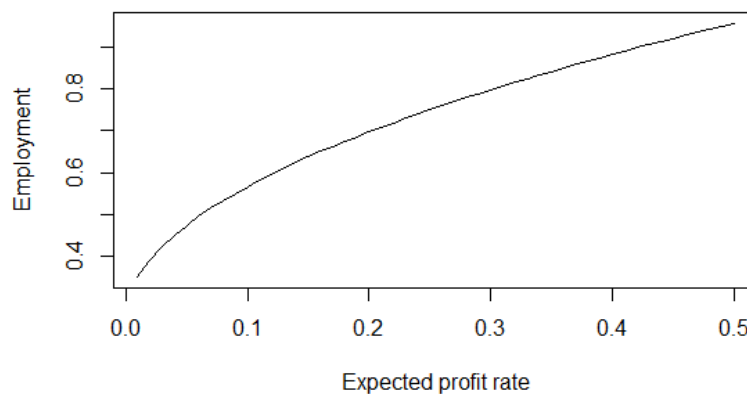


Figure 10: Level of employment across different expected rates of profit

It is obvious that the expected profit rate drives the system. The higher it is, the higher will be the level of employment (which cannot fall below the minimum level defined by the ratio between  $\alpha_0$  and the exogenous productivity of labor). Again, on the surface it is investments which determine the level of employment, but investments are ultimately ruled by profit expectations. Essentially the same positive connection exists between expected profits and national income:

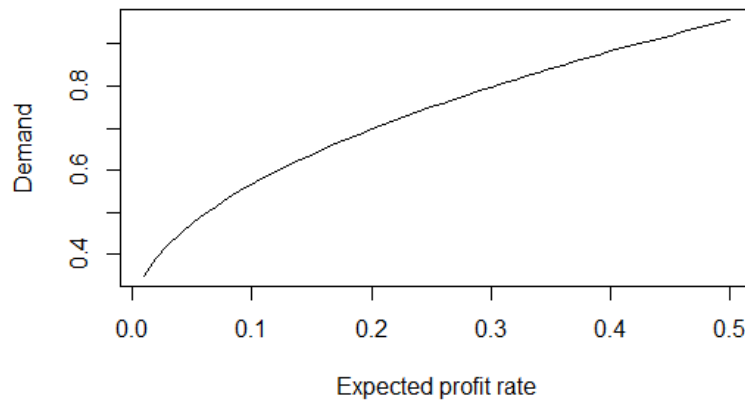


Figure 11: Demand at different expected rates of profit

We can expand this basic system by making the level of productivity partially endogenous to the system. This can be seen as a Smithian element, where an increase in demand leads to further division of labor, or we can view it as a consequence of Verdoorn's Law, where increases in aggregate demand were seen to lead to an increase in labor productivity ( $\frac{\partial \pi}{\partial Y} > 0$ ).

$$\pi = \pi(Y) \quad (18)$$

This allows us to see the difference between an economic system where the level of productivity is fixed and an economic system where the level of productivity is connected to the level of economic activity. The blue line on the graph represents the evolution of the first and the red line represents the evolution of the second example:

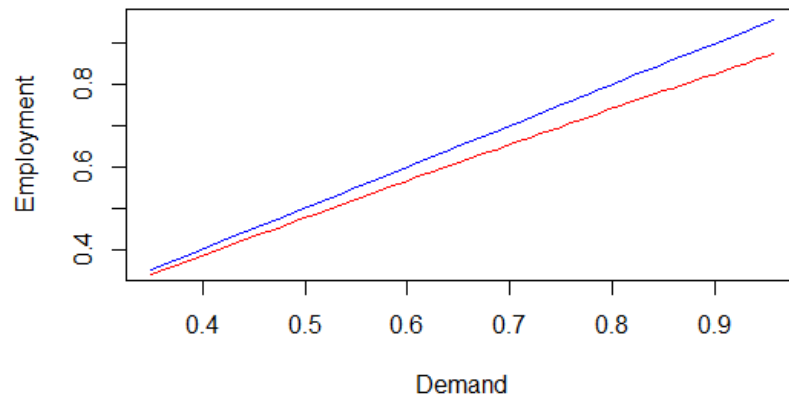


Figure 12: Employment across different levels of demand under different productivity regimes

Once again, we can show, that increased productivity (due to various reasons, but usually connected to technological advances) has a negative impact on employment, given the level of demand. It is therefore still true, that technological advances are by no means sure to increase the wellbeing of the society. As was shown in previous examples, however, they will increase the net income that accrues to capitalists. Here we catch a glimpse of why technology is so idolized today and why it is seen as an *Allzweckmittel* to cure all ills, because its implementation clearly favors the dominant social group in the struggle for income distribution.

### Concluding notes

As was shown in the previous examples, Ricardo's notions concerning the economic system can be applied to a wide range of problems that remain relevant today. The beauty of classical political economy is the simplicity of its assumptions and their non-invasive nature, not requiring an intimate glimpse into one's soul to reach robust conclusions about macrodynamics of an economic system. The latter might very well be independent of the actions of individuals, since it is very unlikely that these actions would map themselves linearly onto the canvas of social reality. Additionally, if we connect Ricardo with Marx, Keynes and

Kalecki, we can create an interesting a powerful analytical apparatus which can be expanded at will to better understand the nature of modern societies.

Two centuries have passed since Ricardo had finished his monumental work, describing the workings of early industrial societies and I would argue that his method is as important today as it was in the 19th century. The surplus approach provides logical rigor and methodological freedom limited only by our ingenuity. Perhaps most importantly, the surplus approach is not a deterministic closed system - social outcomes depend on history and human agency. In this sense its methodological freedom and indeterminacy represent not only assets for researchers but offer theoretical glimpses and possibilities that could make the world a better place.

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