

A Ricardian Model

Of Adam Smith Ricardo writes,

The writer, in combating received opinions, has found it necessary to advert more particularly to those passages in the writings of Adam Smith from which he sees reason to differ; but he hopes it will not on that account be suspected that he does not, in common with all those who acknowledge the importance of the science of Political Economy, participate in the admiration which the profound work of this celebrated author so justly excites.

He goes on to say that he agrees with Adam Smith in all but his theory of value and distribution, which is to say, in all but most of Smith's theoretical apparatus.

Ricardo's analysis of value goes something like this. There is one good, corn (which is a British term for grain, and not what they call maize). Corn is grown on land of varying quality, and requires both capital and labor.

The produce of the earth—all that is derived from its surface by the united application of labour, machinery, and capital, is divided among three classes of the community; namely, the proprietor of the land, the owner of the stock or capital necessary for its cultivation [farmers], and the labourers by whose industry it is cultivated.

Ricardo wants to understand how the produce, or, the surplus beyond the real cost of production, is divided up into rent to the landowner, profit — the return to capital, and the wage bill. He goes on to discuss taxes, and ways in which badly-designed tax schemes “prevent the national capital from being distributed in the way most beneficial to the community.” The *Principals* also contain his theory of comparative advantage, to which we will come in a subsequent problem set.

Ricardo's analysis rests in part on a subsistence wage, which he calls the “natural wage”. He was very much in sympathy with Malthus, and thought of a long term population equilibrium in which wages above some baseline allowed the population to grow, while below the population would shrink.

Labour, like other things which are purchased and sold, and which may be increased or diminished in quantity, has its natural and its market price. The natural price of labour is that price which is necessary to enable the labourers, one with another, to subsist and to perpetuate their race, without either increase or diminution.

Beyond this long-run equilibrium, though, he believes the natural wage to be determined by social forces which are beyond both the scope of his analysis and this problem set. A hint here is to take it as a parameter.

Ricardo's theory of rent relies on diminishing returns to land. He writes:

Rent is that portion of the produce of the earth, which is paid in full to the landlord for the use of the original and indestructible powers of the soil.

On the first settling of a country, in which there is an abundance of rich and fertile land, a very small proportion of which is required to be cultivated for the support of the actual population, . . . , there will be no rent; for no one would pay for the use of land, when there was an abundant quantity not yet appropriated, and therefore at the disposal. . . .

When, in the progress of society, land of the second degree of fertility is taken into cultivation, rent immediately commences on that of the first quality, and the amount of that rent will depend on the difference in the quality of these two portions of land.

When land of the third quality is taken into cultivation, rent immediately commences on the second, and it is regulated as before, by the difference in their productive powers.

Ricardo's theory of profit is difficult to grasp because it is to be a return to capital, but he does not think in terms of units of capital stock. There is fixed capital, such as barns and plows. There is circulating capital, which is what one uses to pay one's labourers at the beginning of the season for work which will not generate revenue until the end. But his thinking is mostly static, not dynamic. He talks about a rate of profit — again confusing because there is no “per what”. The best explanation I've seen is to think of labour and capital as being tied; one piece of capital per worker. Then it makes sense to talk about profit per unit of capital, that is, worker.¹

Ricardo's arguments are entirely intuitive. So it is interesting to see how they hold up under a formal analysis. The purpose of the problem set is not to do Ricardo in math; instead, we want to see how the tools we have so far can help us explore Ricardo's ideas.

1. Construct a model to describe a simple linear activity production version of Ricardo's world. That is, we want a model that describes the determination of rent and agricultural wages. Are wages always determined by the natural wage rate? How is rent affected

¹Personally, I find Ricardo's treatment of profit in the first two editions confusing, and he significantly revises it in the third edition of 1821, where he first considers manufacturing.

by land quality, and what is the effect of bringing more land of different qualities into production?

What variables will you need? What parameters will your model require?

Here is one hint: When I first wrote a model I thought of each plot of land as being able to employ up to one labourer. This made it difficult to interpret my model because I could not distinguish between stocks and rates. (You'll see why when you write your model.) So I gave each piece of land both a quality and a labour capacity. Then the labour employed on each plot could be something other than 1, which helped.

To get you started, you might imagine that there are discrete pieces of land varying in both productivity and capacity, and that up to capacity, output is linear in labour input. One more hint: My experience with applied general equilibrium models is that relationships often spring into focus when the "right" numeraire is chosen. "Right" is in quotes because formally there is no correct choice, but again, a good choice gives more insight.

2. Congratulations! Now you have a model. What will you do with it? What questions do you want to ask of it? State some questions and provide answers. For example, what is the relationship between the natural wage and the market wage? What else?
3. As you will learn from *The Principles* or a secondary source, he makes some claims about the expansion of demand for corn on the wage rate. Can you examine this in your model? If not, why not?

You should read Ricardo Chapter I.1, II, and perhaps scan chapter 5. (Linked in the syllabus.) Some of the other readings in that section may also help.