The Gains from Inventions

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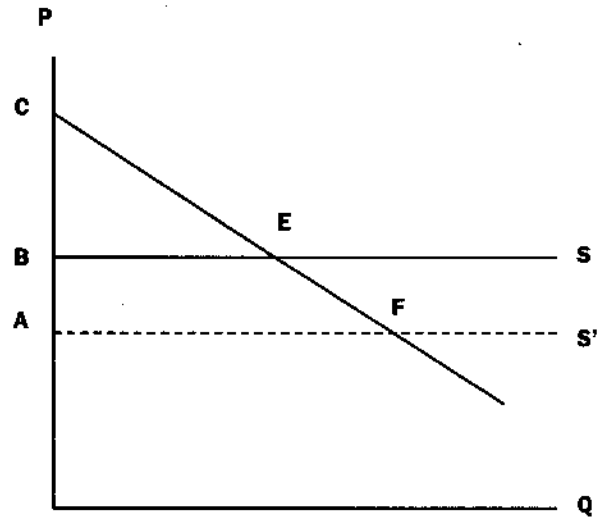
The most common opinion among both economists and the general public appears to be that inventions have tended to benefit almost everyone. The opinion may have arisen from, or at least is consistent with, Ricardo's analysis (Ricardo 1951, p. 387).

His discussion was a short section in chapter thirty one of his book, but its basis came from a lengthy exposition of the labour theory of value in chapter one. That theory implies a perfectly elastic supply schedule. In such a picture, inventions would shift the whole supply

FIGURE 1

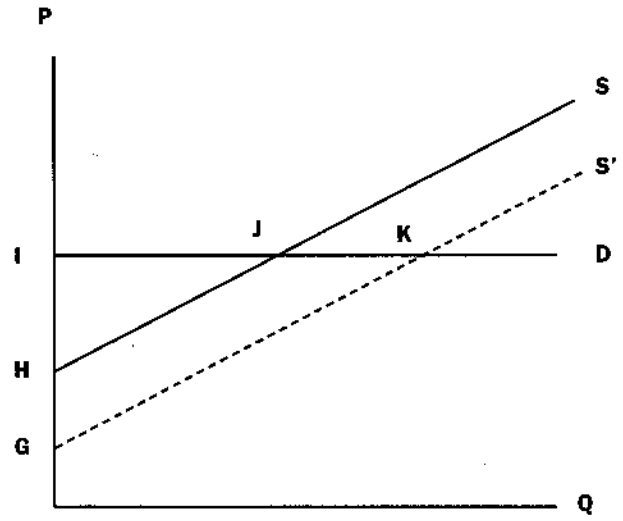


schedule downwards and consumers would benefit from lower prices. In more contemporary parlance, the benefit would be a gain in consumer surplus, ABEF in Figure 1, and it would be the only gain.

Ricardo did recognize that there may be large, but temporary, profits to the introducers of inventions. He might not have been so dismissive of the other gains if he had taken his chapter two on rents more seriously. The existence of rents opens the possibility of a polar opposite in pictures, which is Figure 2, with only demand being perfectly elastic.

The gain, GHJK, is solely a gain in producer surplus. The receivers of such gains need not resemble, even to the slightest degree, the beneficiaries of gains in consumer surplus. The gains look enlarged in Figure 2. They might not. The new supply schedule might be more elastic than the old. The new producer surplus might include a large quasi element that is eventually competed out of existence, and the more permanent producer surplus might be smaller than the old.

FIGURE 2



Economists like to imagine that reality lies between the polar opposites, and the demand and supply schedules accord to their textbook shapes. If so, inventions can give gains in both consumer and producer surpluses. The magnitudes of the gains will depend on the elasticities of the schedules, the degree of shifting of the supply schedule, the proportion and longevity of the quasi, and the possibility that the nefarious can increase both the quasi and permanent as well as appropriate some of the gains in consumer surplus. Unfortunately, even a vague notion is seldom available as to the positions and elasticities of the relevant schedules, which means the estimation of the gains is a virtual impossibility even in a single market. In the event of an invention coming into use in a myriad of markets, the estimation in each and every market and the aggregation over the full range of relevant industries would seem a forbidding exercise.

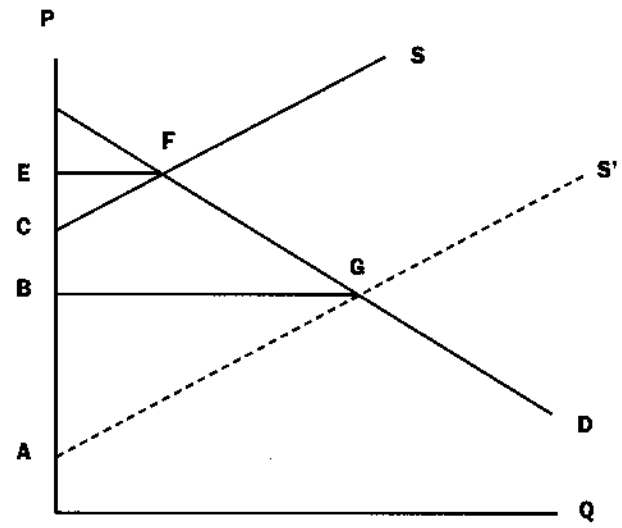
A more serious problem exists. The concept of producer surplus has an advantage and a nemesis. Its advantage is that there is probably some truth in the idea that there are more sources of scarcity and rent than land (Marshall 1961, 1: pp. 412-421, 810-812). Its nemesis is that economists know next to nothing about the technical basis for producer surplus coming from anything other than land, on which they share the same perspicacity as many other creatures: land can be technically as useful in providing food as sunlight or moonlight.

Knowledge is not possible, but guesses are. In history, there have been instances of inventions leading to remarkable expansions in certain industries. One instance came in the late eighteenth century when the steam engine, some textile machines and the coke process in iron production were invented.

The steam engine was a new, or at least, a more effective factor of production. An illustrative picture could be Figure 3 for a market of a final good, but the producer surplus area encompasses rents gathered throughout all stages of production and distribution. There is a gain in consumer surplus, BEFG, and a possible net gain in producer surplus, ABG-CEF. The gains could have arisen at any or all the manifold stages of production and distribution in any particular market and be consummated in a vast multiplicity of markets for final

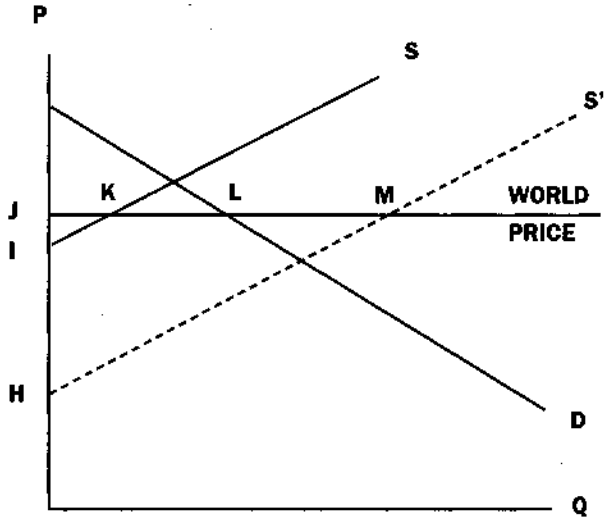
goods. An estimation of the aggregate gains would require technical knowledge at each and every point of the steam engine's use in order to ascertain the degree of shifting of the relevant supply schedules. No such knowledge exists, at least in the mind of any economist. In many industries, the net change in producer surplus may have been trifling because the engine's use was somewhat small. Nevertheless, there were some industries like transportation and textiles where it

FIGURE 3



can have contributed to a very significant shifting of supply schedules.Cotton textiles show a different picture. The industry produced both thread which is an intermediate good and cloth which is more a final good. The production of both products was very limited earlier in England, and most of the domestic demand was met from foreign places of which India was a large source. The inventions at the carding, spinning, weaving and finishing stages permitted a huge expansion of English production, and England turned into a large exporter. Figure 4 depicts the transformation of the cloth market.

FIGURE 4



Imports were equal to KL, exports became LM. If the world prices for cotton cloths had not changed, the gain would have been exclusively in producer surplus and equaled the area, HIKM. World price can, however, fall when supply conditions improve in one region of the world market. Although the evidence is not clear that textile prices did fall (Edwards 1967, p. 254 and Harley 1982, pp. 286-289), any fall in prices would have given a gain in consumer surplus to English consumers, and a reduced gain in producer surplus to English sources.

The iron industry also turned from net imports to net exports even though the earlier domestic production had been relatively larger. Nevertheless, Figure 3 is more germane. Iron is an intermediate good that contributes to the production of an immense variety of final goods, and any cheapening of its price would make for a picture that conforms more to Figure 3. The picture would be quite varied with regard to the extent of the shift of the supply schedules. Some industries used iron, some used little or none, some used a lot.

These pictures point to the possibility that the inventions gave rise to substantial increases in producer surplus. The interplay has since

continued into the present and elsewhere in the economy. The main difference has been that the flow of inventions has burgeoned immensely while sources of scarcity continue to remain in existence. Scarcity is not only a natural phenomenon due to movements of the earth's crust some hundreds of millions of years ago. It can be permanent and yet contrived out of a larger human creation: the entire social, political, legal and economic system in which any human individual is doomed to live.

Unfortunately, the notion of producer surplus is much more an illustrative device than an observational tool, and our ignorance of the technical inhibits any determination of its sources and magnitudes. We can still guess. For centuries, land provided the basis for aristocratic wealth and power. Not all the rents went to the rich, but enough went to the aristocracy to make them rich. We can hazard the guess that there has been some factual justification, since Ricardian times, for extending the notion of Ricardian rents to other sources besides land, and any extension is unlikely to have lessened either the magnitudes or the gains. Both can be large enough to account for a reality that is observable: the world of privilege is alive and well.

BIBLIOGRAPHY

M.M. EDWARDS, *The Growth of the British Cotton Grade. 1780-1815,* (Manchester: Manchester University Press, 1967).

C.K. HARLEY, "British Industrialization before 1841: Evidence of Slower Growth during the Industrial Revolution" *The Journal of Economic History* 42.2 (1982) pp. 267-289.

A. MARSHALL, *Principles of Economics,* 9th. ed., 2 vols. (London: MacMillan and Co., Ltd. 1961).

D. RICARDO, *On the Principles of Political Economy and Taxation,* Edited by Piero Sraffa. (Cambridge: Cambridge University Press 1951).