

A Teaching Approach to the Incidence of Taxation on Capital

By HARRY GUNNISON BROWN

THE INCIDENCE and the various possible effects of taxation of capital and of the income from capital are, unfortunately, none too well understood by legislators or the general public. Confusing comments on the subject appear even in the writings of some professional economists. Yet the principles which must be appealed to for the explanation of the incidence and effects of such taxation are simple. With an appropriate technique of exposition, these principles can be made clear to college undergraduates and, indeed, to students in the beginning course (the "principles" course) in economics. If only we could hope, thus, to give a clear understanding of this and a few closely related economic problems to the majority of students in *most* of our colleges and universities, the chances should be at least a shade better for more intelligent future tax legislation!

I

TO UNDERSTAND THE SUBJECT of taxation of capital it is essential that the student have some understanding of the relation of the interest rate to the productiveness of capital. An important fact in this story is the fact—or principle—of "diminishing returns." The more capital a community has available, the less is the significance of an additional unit of capital. If we have only a little capital, we seek to have it in the most important forms. If we have a great deal more capital, we can afford the less essential buildings, machines, etc., and we can afford many desirable—but not superlatively important—improvements in quality.

The principle of diminishing returns from capital can be simply illustrated by the case of a farm which the owner, we may suppose, cultivates with the aid of two sons. To have *some* capital—tractor, harrow, reaper, barn—is overwhelmingly important. Without any capital at all it would not be worth while for the owner to try to farm. But to have, for use on his farm and with the three workers, \$1,000,000 worth of capital would be ridiculous.

There is not space here—nor is it desirable—to go carefully into all of the complicated ramifications of the theory of interest. What I particularly want to do, rather, is to present a type of arithmetical problem which I regularly require students in my classes to work on, illustrating the principle of diminishing returns, and to show how such a problem can be used in making clear to undergraduate students the facts regarding taxation of capital. There is nothing new in what the figures show or in the use of such figures to illustrate diminishing returns. It is, however, my very strong impression that almost no teachers of economics make their students actually practice on such problems even in those cases where such arithmetical illustration is given. And it is my experience that the working out of such problems by students, as compulsory practice exercises, with ample opportunity for questions and discussion, is pedagogically most advantageous. I was about to say it is indispensable!

Following, in smaller type, is a problem—taken from the Appendix of my "Basic Principles of Economics,"¹—such as I regularly assign to students in my class in "General Economics." I have interpolated here, between the quoted paragraphs, some explanation and discussion. In my class, I do not assign the problem until the general theory of the subject has been discussed during a number of class hours.

¹ Columbia, Mo., Lucas Brothers, 1942.

Assume a miniature community having one hundred business establishments. Each establishment includes a piece of land, improvements and other capital and a certain number of workers (which number we shall suppose to remain unchanged for the period covered by this problem). These establishments we may call A, B, C, D, E, A', B', C', D', E', A'', B'', and so on. On each of these establishments the added net output from the use of successive units of capital is as follows:

From the fifth \$1,000	\$85
From the sixth \$1,000	75
From the seventh \$1,000	70
From the eighth \$1,000	66
From the ninth \$1,000	63
From the tenth \$1,000	60
From the eleventh \$1,000	57
From the twelfth \$1,000	55
From the thirteenth \$1,000	53
From the fourteenth \$1,000	52

If \$980,000 of capital has been accumulated and is to be used in the community, what is the rate of interest that will satisfy the conditions of equilibrium in the market?

The interest rate satisfying the conditions of equilibrium for this problem is 6 per cent. At 6 per cent each establishment (*i.e.*, its manager) would eagerly bid for the ninth \$1,000 of capital, which he expects to add \$63 to the output of the establishment, since the capital would thus add to the user distinctly more than must be paid to the lender. At 6 per cent or but infinitesimally less, it should be possible to persuade the owners (or managers) of (say) eighty of the establishments to borrow a tenth \$1,000 of capital, since the tenth \$1,000 would add to the output a net (*i.e.*, in excess of repairs and allowance for depreciation) of \$60 a year. If each of the other twenty establishments might also possibly be willing to borrow a tenth \$1,000 at about 6 per cent, it should be clear that they would not offer any higher interest rate to get it, since then the outlay in interest paid to the lender would exceed the \$60 yield to the user.

It will probably be clear to the reader that a *higher* rate of interest than 6 per cent could not continue under the assumed circumstances since there would be capital left over which could not yield the higher rate and which the owners would offer in competition, so lowering the rate down to 6 per cent. Suppose, for example, a rate of 6.5 per cent. With such an interest rate it is obvious that no establishment would use any capital—if it must be borrowed—beyond the eighth \$1,000. For the ninth \$1,000 would add to the annual output only \$63 and the tenth only \$60, either of which is less than the interest that must then be paid to the lender for the use of this additional capital. With each of the one hundred establishments using only \$8,000 worth of capital, the entire one hundred establishments would be using only \$800,000 of the available \$980,000 of capital. This would mean \$180,000 of capital unused and yielding the owners nothing—unless the owners used excessive amounts on their own establishments and so reduced their returns well below 6 per cent. Rather than do so, they would offer to lend at less than the rate of 6.5 per cent and their competition would certainly tend to bring the rate down to 6 per cent.

But if the rate of interest under the conditions assumed in our problem could not be above 6 per cent, neither could it be below. A rate appreciably below 6 per cent would make the manager of each establishment desire to use at least \$10,000 of capital and a rate below 5.7 per cent would make each such manager eager to use \$11,000 capital. Thus there would be a total wanted, for the hundred establishments, of \$1,100,000. But since the amount of capital available is only \$980,000, the amount wanted is \$120,000 in excess of the amount to be had and bidding of would-be borrowers must inevitably push the rate up to 6 per cent. At approximately 6 per cent, several establishments (*e.g.*, eighty) might be in-

duced to use \$10,000 of capital each, but none would use any more.

In real life, the figures for gain would not be thus precisely the same for each establishment, and perhaps understanding of the solution of the problem will be aided if allowance is made for that fact. The variety of real life—as contrasted with the formality of the illustrative figures used—I usually mention in discussing the problem with my students. Thus, it might be that the 10th \$1,000 of capital will add \$60.01 or more on each of eighty of the establishments, will add barely \$60.00 on the eighty-first, and will add \$59.99 or very slightly less on each of the remaining nineteen. On that basis, it should be clear that eighty establishments would definitely gain by borrowing the 10th \$1,000 of capital at 6 per cent and that nineteen would definitely lose by doing so, while one would be on a margin (“on the fence”) of indifference. The rate of interest satisfying the conditions of the problem would still be 6 per cent.

But in setting out a formal problem for students to work, it seems best not to include such complications, however desirable it may be to bring them out in discussion after the problem is worked (or while it is being worked, if questions make this seem necessary).

II

LET US NOW, however, go on with the next step in our problem:

If the owner of establishment A has saved and himself owns \$14,000 of this capital, then would he be likely to lend some to others or to borrow still more for use in his own business? How about the owner of B if he has saved \$12,000? How about the owner of K” if he has saved and himself owns only \$4,000 of the total \$980,000 in the community. Would he lend or borrow and why and how much?

After having had a similar problem explained in their textbook and, perhaps, by lecture as well, students will, nearly all

of them, realize that A would lend the 14th \$1,000, since it would add to output on his establishment only \$52 a year or 5.2 per cent, whereas he could lend it for \$60.00 or 6 per cent. A would lend, also, for a like reason, his 13th \$1,000 of capital, his 12th and his 11th, for even from the eleventh, using it himself, he can gain only \$57 a year whereas the competition of borrowing establishments for it will enable him to get \$60.00. As regards the 10th, he will be indifferent whether to use it himself or lend it—might decide by flipping a coin! B, also, will lend, but not so much. K" will borrow, for, from the 5th \$1,000 of capital his net output will be increased by \$85 while the interest he must pay is \$60, giving him an advantage from borrowing of \$25. There is also an advantage, though a progressively smaller one, from his borrowing of the 6th, 7th, 8th and 9th \$1,000. As regards the 10th, he would be, at 6 per cent, indifferent whether to borrow it or not.

Though the theory of interest on capital has been carefully and fully explained in advance and though it has been illustrated in a way similar to that in the problem which we are here discussing, I have found it advantageous to give students a problem like this as a *practice exercise* before holding them responsible for it on a *test*. While they are working on this practice exercise, I go from one to another, answering their questions. We spend a class hour on it and, by the end of the hour, most of them seem to have pretty well got the idea, although there may be some further questions at a succeeding class period.

One of the difficulties is the fact that, to contain the problem in limited space and make it not too long to work in a reasonable time, I give the capital in \$1,000 units and, therefore, the gains from successive units of capital are discontinuous. That is, instead of the gains diminishing infinitesimally

as they would if the capital were represented as increasing by infinitesimal increments, the successive figures for gain from capital diminish by jumps,—from \$85 to \$75 to \$70 to \$66 and so on. Some students, working on the problem given here, think the answer may be 6.3 per cent or something between 6.3 per cent and 6 per cent. To those who ask if it would not be 6.3 per cent, I direct the inquiry whether they would themselves borrow a 10th \$1,000, paying \$63 a year for its use, when it would yield them only \$60? The usual answer is in the negative. Then I ask if they think others would be likely to do what they admit they would not do? When I receive a negative answer I ask how, then, the owners of the last \$80,000 worth of capital, out of the total of \$980,000, are going to get it used and whether they would rather use it themselves, getting 5.2 per cent, 5.3 per cent, 5.5 per cent and 5.7 per cent from it, when they might instead lend it at 6 per cent. It is important, I think, thus to bring the problem home to the student, making him *personalize* it,—making him consider what *he* would do under the given circumstances.

Those students who think that the interest rate in this problem might be *between* 6.3 per cent and 6 per cent are not fundamentally illogical. For if the total capital of the community, \$980,000, is divided into units much smaller than \$1,000, no establishment would have to take the entire 10th \$1,000 but, in place of its doing so, each establishment would take a *part* of the \$1,000, say \$800. But this solution would mean a division of the total capital into units of \$100 or, if the total capital were (say) \$982,723, into units of \$1; and it would mean that the stated problem must indicate how much *each such unit* would add to the annual output on each establishment—for the gain does not necessarily diminish at an even rate. Thus, the mere statement of the problem

would require far more space and the process of finding a solution would certainly be longer. Yet the result would be only slightly different and the principles involved would not be different at all.

We must remember, of course, that in real life the borrower, like the lender, does not know just how much will be added to his output by each successive improvement in machinery or increase in any kind of capital. He can but use his best judgment in deciding whether to borrow or lend and how much. A borrower of optimistic proclivities may find lenders, on the other hand, so pessimistic towards his abilities and prospects that they will not lend to him except at rates which look excessive to him but which look to the lender, who may balance them in thought against possible loss from failure of the would-be borrower's enterprise, not high at all.

We may note, too, that a particular establishment might increase its labor force by drawing labor away from some other establishment, and so be able to use advantageously an increased amount of capital. And it may, in similar manner, draw *land* away from other establishments. However, an establishment of excessive *size* as regards labor *and* land *and* capital, may be, just for that reason, relatively inefficient. In any case, the total labor force and sites and natural resources are limited. If, therefore, there are in the United States at any given time, \$320,000,000,000 in capital, it should be clear that the interest rate must be lower than if—all other things being the same—the available capital were less by (say) \$15,000,000,000. It should be equally clear that the savings of any one person (amounting to, for example, \$20,000) could not normally be lent at a rate higher than the marginal gain from capital—6 per cent in our problem under discussion—since these savings would have to compete with the savings of many others. Borrowers would use the savings of

these others and would get along without the less necessary kinds of capital or the marginal additions to the quantity or quality of their capital, rather than pay a particular lender more than this 6 per cent. Thus they would leave the too grasping lender with no one to borrow from him.

But let us go on further with the problem:

What would be the effect on the total annual output of goods and what would be the effect on the rate of interest if, because of widespread spendthrift habits, too little is set aside for replacement of depreciated capital, and the capital of the community decreases to \$885,000?

What would be the effect on the interest rate if widespread saving increased the capital to \$1,084,000?

If the student has understood the foregoing solutions—and I believe the method I follow with my classes results in substantial understanding by 95 per cent or 98 per cent of the students—he will experience no difficulty here. On the assumption given, that spendthrift habits have reduced the total capital of the community to \$885,000, the total annual output of goods will be less. The lost \$95,000 of capital would have aided labor and in its absence productive efficiency will inevitably be decreased. But the interest rate which will get the available capital all used while yet not leaving a demand from borrowers in excess of the capital available to borrow, is now 6.3 per cent. And if, on the other hand, thrifty habits and consequent increased saving, with resulting increase of capital equipment, brings the total available capital to \$1,084,000, the interest rate will tend to be at or about 5.7 per cent.

III

AND NOW WE TURN to the last paragraph of the problem, in which, for the first time, there is reference to the taxation of capital:

Going back now to the interest rate found for a total capital of \$980,000,

what would be the interest rate lenders would charge and borrowers would pay to lenders, if the state should take, each year, in taxation, two per cent of the value of all capital, viz., \$20 on each \$1,000?

Perhaps this question, as stated, is not quite clear to the common run of students. Most students are entirely unfamiliar with current taxation practices. They may not realize, therefore, that the property tax, as levied in American states and cities, is commonly charged against the titular owner regardless how much of the property is offset by debt. Thus, if K", in our example some paragraphs ago, has saved and himself owns \$4,000 capital and has borrowed (say) \$6,000, so that the total capital to which he has title is \$10,000 worth, this tax would take \$200 a year from the income yielded by the \$10,000 of capital to which K" has title. Note that it is not the lender who is taxed in this case, by taxation law and custom, but the *borrower* and *user* of the capital. But perhaps the burden finally rests on the lender, nevertheless, so far as concerns the amount of his loan. We shall see.

Consider again borrower K" and how low an interest rate the lender must charge if K" is to borrow the 10th \$1,000, which adds only \$60 a year to his output. On the basis of our previous assumptions he would be "marginal," i.e., "on the fence" or *hesitant* about borrowing this 10th \$1,000 at 6 per cent but would definitely gain could he borrow at any lower rate, even at 5.99 per cent. But now the tax will take \$20 out of the yield of \$60 from this added capital and so will leave him only \$40. Obviously he *cannot now afford* to borrow this capital unless the interest rate is lower than before, i.e., 4 per cent instead of 6 per cent (or 3.99 per cent instead of 5.99 per cent). And *similarly with all other borrowers*. The interest paid to lenders definitely tends to be *lower than before by the amount of the tax*. If it is not lower to that degree, borrowing will decrease and lenders will be unable to get their capital used by borrowers.

But in order to make perfectly clear to the student that the interest return must be less by the amount of the tax on capital, I call the attention of my class particularly to the case of the lender. The lender's case is that of (say) B who has \$12,000 of capital and was inclined, in our earlier reference to him, to lend the 12th and the 11th because a return of \$60 on each was better than to use this capital himself and get from it only \$55 and \$57 respectively. How is it with him now that we are supposing a tax on capital? Surely he will be as eager (relatively) to lend at 4 per cent as he previously was to lend at 6 per cent. For the tax on capital, of \$20 a year per \$1,000, will reduce his net return from the 12th \$1,000, if he uses it himself, from \$55 to \$35. Surely he would rather *lend* it and receive \$40! And the return from the 11th \$1,000, if he uses it himself, will be reduced by the tax from \$57 to \$37. This, too, he will be glad to lend for \$40 or 4 per cent rather than use it himself.

Any tax, then, on capital, which is levied on the *user* of the capital, will reduce his income from it by the amount of the tax if he is the unencumbered owner and, in so far as he has borrowed what he uses, will reduce in like degree the income of the lender.

This fact it is important to make the student understand, to the end that he may contribute to public enlightenment on a matter concerning which confusion of thought is widespread. Again and again it is claimed that bonds, mortgages, and notes unsecured by mortgages must be especially taxed, on the ground that the owners of these so-called *intangibles* "escape" the taxes levied on such tangible property as buildings, machinery, livestock, etc. Of this view the student now knows what to think. He sees that lenders, whether on mortgage or otherwise, do *not* escape but that, on the contrary, by whatever amount the gain from the use of borrowed capital

is cut down through taxes on it, *by that amount* lenders are *really* taxed, since the per cent they can get on their loans is reduced.

There is here no intention to argue that lenders *ought* to be thus taxed or that capital ought to be taxed. The contention is merely that *if* capital is taxed and *if* its net yield to users, including borrowing users, is thereby reduced, the loss, as regards the amounts borrowed, *falls on the lenders*—that they definitely do *not* “escape” taxes which titular owners of capital have to pay.

This fact has been too seldom clearly brought out even in books on taxation and public finance. Ordinarily there is comment on the difficulty of collecting special and additional taxes on “intangibles” and on the resulting temptation to evasion and false statement on the part of taxpayers. There may be suggestions looking to reduction of the *rate* of taxation on intangibles, in the thought that thus evasion might be substantially lessened. But rarely is there forceful presentation of the fact—as indicated above—that bondholders, mortgage owners and lenders generally, *do really pay* when capital in general is taxed, and that the whole idea of a special and additional tax on intangibles is economically foolish. Such a tax is *unfairly discriminatory*. It is economically harmful in that it takes more from the income of capital loaned than from capital used directly by the owner and thereby discourages lending and tends to interfere with the use of capital by borrowers who may well be, in many cases, able to use it more productively than the owners.

The contention has been made in this paper that when capital is taxed, the lender does not “escape” but loses, so far as his lending is concerned, the entire amount of the tax on the capital in which his savings are embodied. This conclusion would not apply, of course, as regards loans made *before*

the imposition of the tax on capital. If, for a long time, capital were not taxed and its net marginal yield were, on the average, 6 per cent and if certain savers had loaned at 6 per cent to borrowers, the borrowers would still be liable for the 6 per cent to the lenders when, later, a 2 per cent tax on capital made their returns minus taxes only 4 per cent. But *new loans and renewals would be made at the lower interest rate of 4 per cent.*

Capital is everywhere taxed in the United States and pretty generally in other countries. But it is to be noted that *if* we had a *purely local* tax on capital, it would not compel lenders to lend at appreciably lower rates than if there were no such tax, since they would have the alternative of lending in surrounding areas where the tax was not levied.

It should be noted, however, lest someone get the idea that lenders would then have an advantage over users of their own capital, that a similar alternative is available to any persons who might be saving and investing, even though they were not and did not intend to be lenders. For they could invest their savings directly in the construction of capital in the jurisdictions where the tax did not apply and where, therefore, they would themselves receive the entire product of their capital, undiminished by claims of government.

Here we may note a significant fact about taxes on capital in one jurisdiction when there are none—or, since complete freedom of capital from taxation is indeed rare, when the taxes on capital are appreciably *lighter*—in other jurisdictions and especially in neighboring ones. In general, those who save will invest in capital construction where their return from the capital is more rather than where it is less. Inevitably capital tends to decrease in the jurisdiction where it is heavily taxed and to increase in the jurisdiction where it is taxed lightly or not at all. And where capital decreases, labor, being

less well equipped, tends to be less productive and unable to command wages so high.

In the jurisdiction where capital is heavily taxed, the relative scarcity of capital tends to raise the rate of return on it so as, partly at any rate, to offset the tax. Thus, owners of capital, *including lenders*, may, finally, not have their returns on capital in that jurisdiction reduced by the entire amount of the tax. But this is *only because* a considerable number of savers—including lenders—have sent their savings to other jurisdictions and have so made capital in the capital-taxing jurisdiction relatively scarce and its marginal yield (before subtracting taxes) higher. In any case, if and so far as the net rate of return from capital is reduced by a tax on capital, lenders' returns would be reduced along with the returns of capitalists who themselves personally manage their capital.

It is reasonably probable, too, that taxes on capital which greatly reduce the net per cent return on capital to those who save, will not merely drive capital into other jurisdictions but will lessen the inducement to save and invest and so make the total amount of capital less. For this reason also, the heavy taxation of capital or of the income from capital may bring it about that labor is less well provided with tools and equipment and is, therefore, less productive and not able to earn wages as high as otherwise it might earn.

Taxation which draws, for public expenditures, on the geologically-produced and community-produced annual rental value of land, even though it may take substantially *all* of this annual rental value, definitely does *not* drive capital into other jurisdictions. It definitely does *not* discourage saving and capital construction. But it *does* discourage speculative holding of good land from productive use. Thus, such taxation is in every way, as compared with taxation of the buildings and other equipment men make, favorable to effective

production and to the welfare of those who contribute to the productive process. Taxation of land values (natural resources and sites) does not penalize labor or the saving which is essential for the accumulation of capital. It draws only from what landowners are able to get by charging for *permission* to work on and live on the earth in those locations made advantageous by geological forces and community development and for *permission* to draw from the earth mineral and other subsoil deposits.

Conceivably, in generations to come, broadly trained historians will look upon it as one of the most amazing evidences of men's prejudice and lack of understanding in outgrown economic "dark ages," that for centuries a privileged group, the landlords, were allowed to appropriate for their own use and enjoyment the rent of land.

University of Missouri